Nov. 8, 1932. J. E. MITCHELL 1,886,713

METHOD OF CLEANING COTTON

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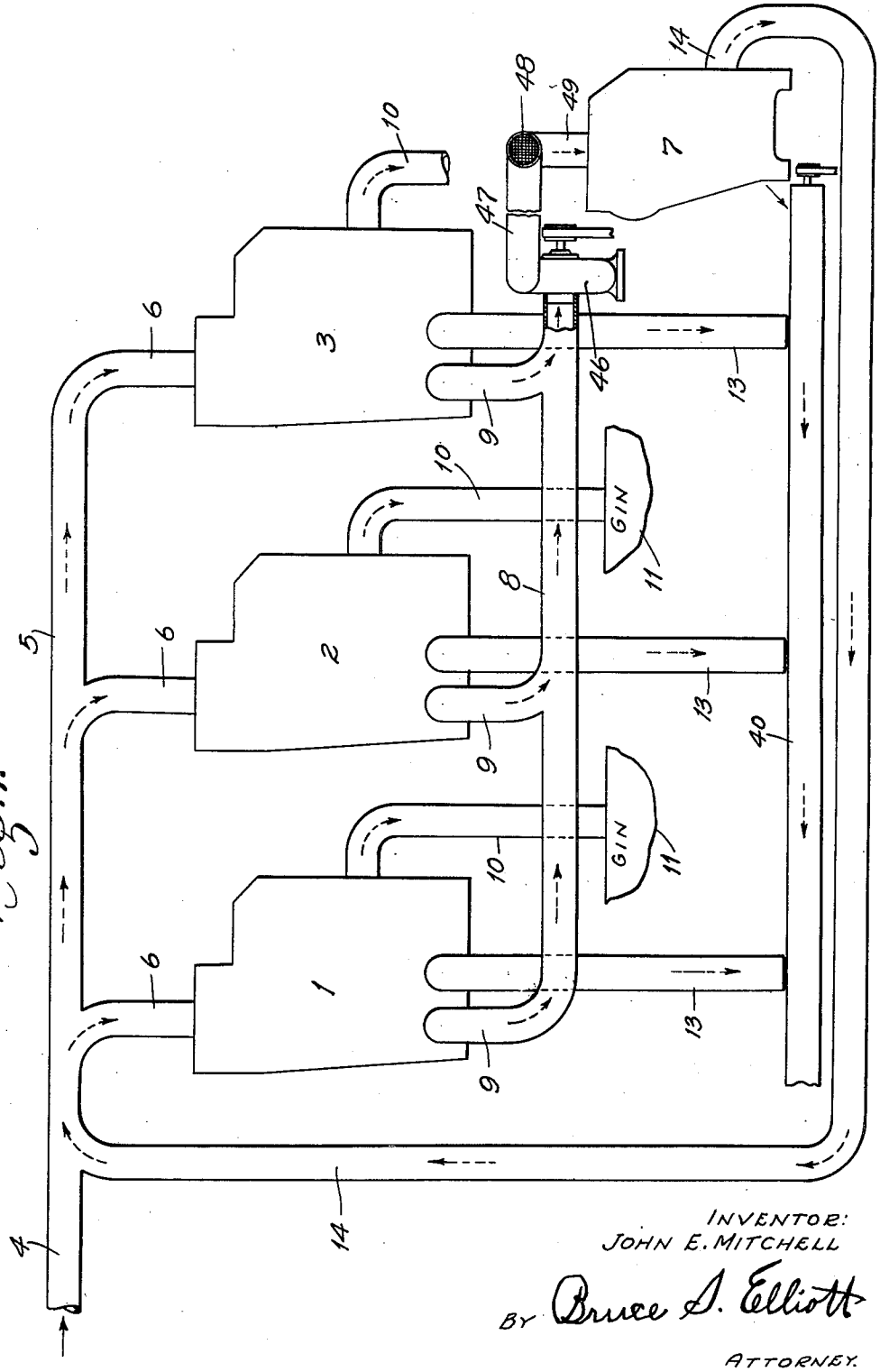


Fig. 1.

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Fig. 3.

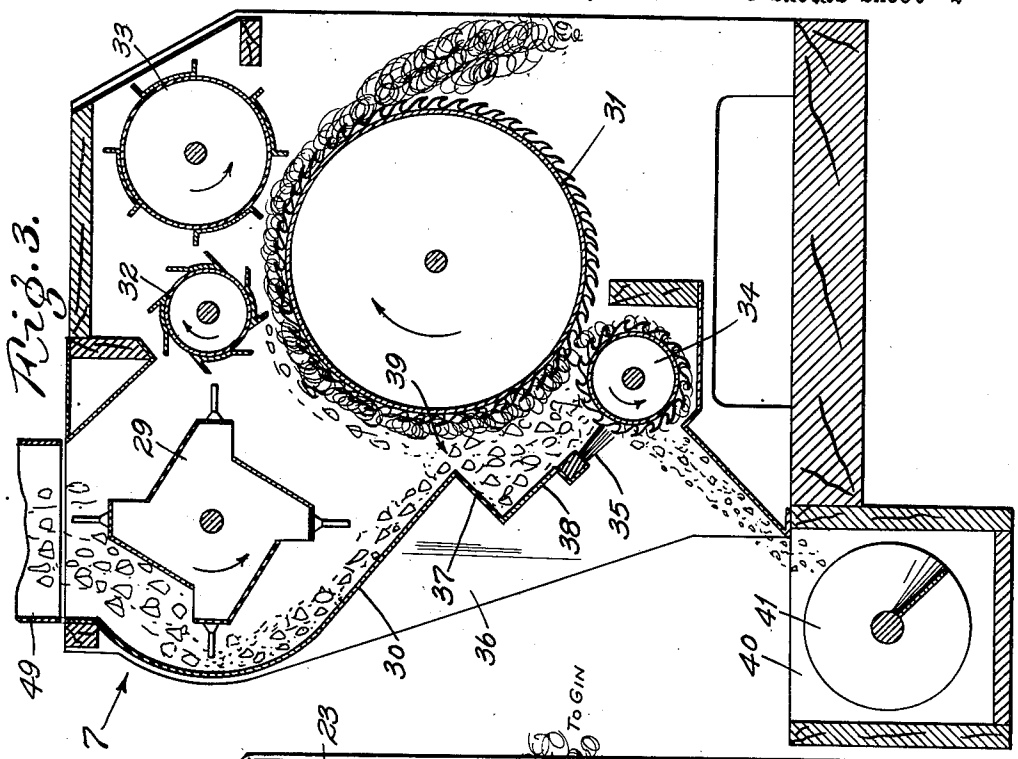
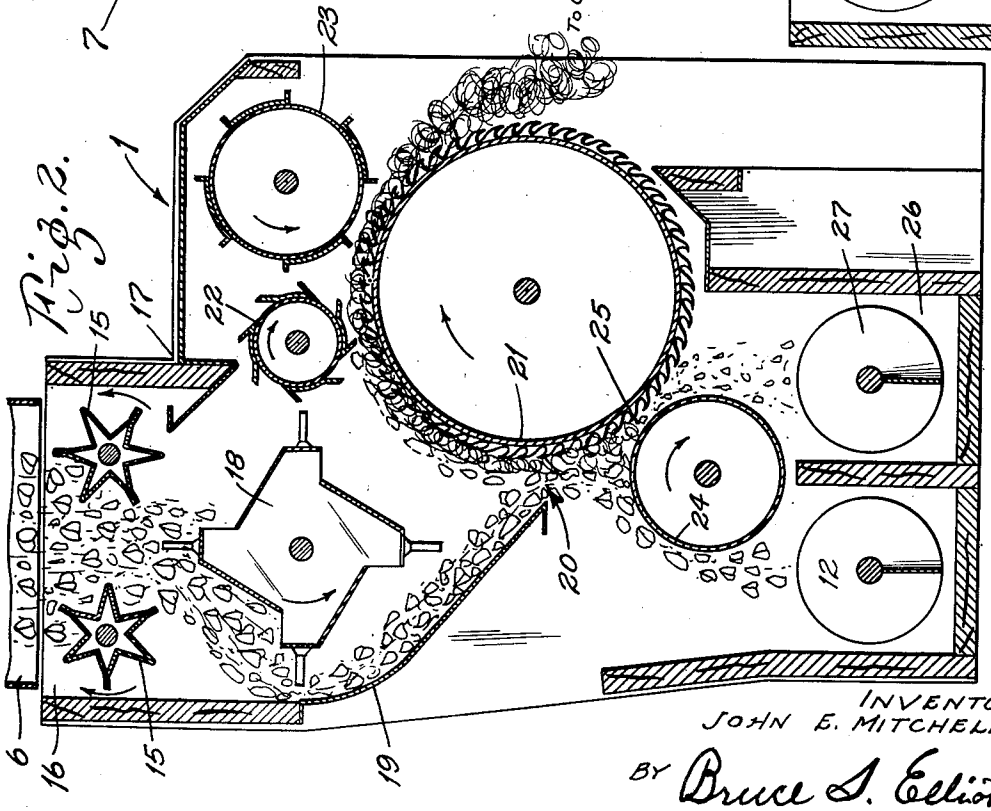


Fig. 2.



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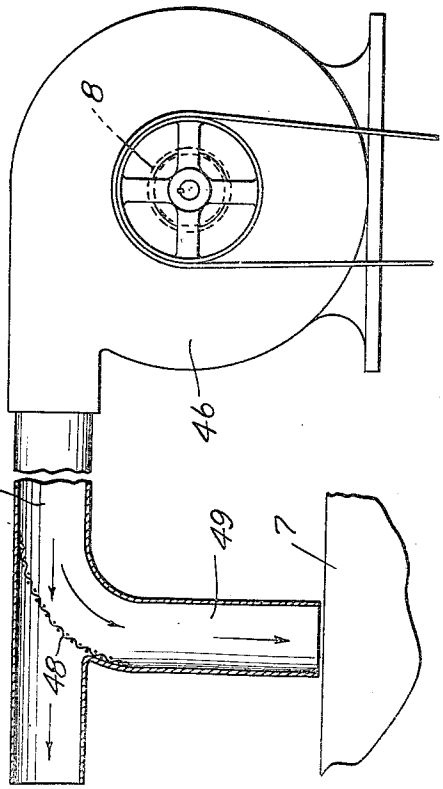


Fig. 4.

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Patented Nov. 8, 1932 1,886,713

UNITED STATES PATENT OFFICE

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METHOD OF CLEANING COTTON

Application filed June 28, 1930. Serial No. 464,560.

This invention has for its general object to provide novel means for and a novel method of cleaning cotton, and as to the method is an improvement in the method of cleaning cotton forming the subject-matter of Letters Patent No. 1,182,193 granted to Mitchell and Parks May 9, 1916.

The method described in this prior patent consists, in substance, in subjecting bulk cotton to the action of a plurality of cleaning machines, each being adapted to remove the main body of the cotton, while providing a free discharge of refuse, hulls, bolls, and small locks of cotton, the discharged product from all of the machines being passed to a supplemental or recleaning machine for recovering the remaining cotton.

This prior method has been used very extensively and has proved of value in providing freer discharge of the hulls and trash from the main battery of machines and in preventing undue waste by recovering, in a supplemental machine, the cotton that escapes from the main battery that would otherwise be wasted.

The method has proven objectionable, however, in some particulars, and especially in the cleaning of roughly harvested cotton, in that all of the fine trash together with the hulls and other refuse is sent along with the wasted cotton from the main battery of machines to the single recleaning machine, which reclaims most, if not all of the cotton. At the same time this cotton is in very poor condition, having been mixed with such a comparatively large amount of fine trash that the latter becomes so intimately entangled with it that anything approaching satisfactory separation between the cotton and trash is impossible; and in many installations it has been found necessary to handle the cotton from the supplemental or reclaiming machine as a separate grade; that is, it cannot be returned with the stream going to the main battery of machines as contemplated in the patent.

To overcome this objection, I have devised the present method, which consists briefly of discharging the hulls and trash from the main battery of machines in two streams; one stream containing the small hulls and all of the fine trash and practically no waste cotton of value, and the other stream containing the larger hulls and the cotton, which later inevitably escapes with a free discharge of such hulls, and in passing this latter stream only to a single reclaiming machine, whereby the cotton is reclaimed in good condition and free of fine trash, so that it can be returned to the stream for supplying the main battery of machines without appreciably affecting or lowering the grade of the cotton.

A subsidiary object of the invention consists in pneumatically conveying the hulls and cotton separated from the discharge of the main battery of machines to a reclaiming machine and during the passage of such mixed product breaking up small unopened bolls, half bolls, or partly opened bolls escaping with the stream of hulls and cotton thus being propelled.

In order that my improved method of cleaning cotton may be clearly understood I have illustrated in the accompanying drawings a main and a modified construction of apparatus which may be employed for the purpose.

In the drawings—

Fig. 1 is a diagrammatic view illustrating an arrangement of a main battery of cotton cleaning machines each of which in practice is mounted on a gin, in connection with means for conveying a portion of the discharged product from each machine to a single reclaiming machine and with means for returning the cotton discharged by the latter to the main battery of machines;

Fig. 2 is a longitudinal sectional view through one of the main cotton cleaning machines;

Fig. 3 is a similar view of the reclaiming machine;

Fig. 4 is a sectional view on an enlarged scale showing the conveyor pipe leading from the main battery of machines to the reclaiming machine and provided with a fan wheel which operates to draw by suction the stream consisting of the large hulls, closed or partly open bolls, waste cotton, etc., away

from the entire line of cotton cleaning machines and having its discharge side connected to a conventional separator for delivering the mixed cotton hulls and broken bolls to the reclaiming machine and discharging the air to the outside.

Referring now to Fig. 1 of the drawings—

The numerals 1, 2 and 3 indicate, respectively, cotton cleaning machines arranged in line, and each of which in practice will be mounted on a gin; the numeral 4 indicates a suction pipe for drawing the bulk cotton to be cleaned from any source of supply, as a wagon; the numeral 5 any preferred form of cotton distributor having branches 6 communicating with the respective cotton cleaning machines 1, 2 and 3. The numeral 7 indicates a reclaiming machine, and the numeral 8 an air pipe having branches 9 communicating with discharge outlets of the respective machines 1, 2 and 3, and also communicating with the top or the cotton feeding chamber of the reclaiming machine 7.

As stated, each of the machines 1, 2 and 3 in practice is placed directly over the gin so that the cotton passes from each machine directly into the gin. This is illustrated diagrammatically in the drawings, however, by conduits 10 leading from the cotton discharge outlet of the respective cotton cleaning machines 1, 2 and 3 to the gins 11. The reclaiming machine 7 also has a pipe 14 leading back to the distributor 5 so that the clean cotton discharged from the machine 7 may be returned to be commingled with the cotton passing into machines 1, 2 and 3.

As shown in Fig. 2 each of the cotton cleaning machines comprises a pair of feed rollers 15 located below an opening 16 provided in the top 17 of the casing. Located below the feed rollers 15 is a rotatable breaking cylinder 18 which rotates in proximity to a hull board 19, the lower end of which defines the size of an opening 20 past a saw cylinder 21. Mounted above the saw cylinder is a kicker roll 22 and to the rear of this kicker roll is a doffing roll 23 for removing the cotton from the saw cylinder 21. The cotton removed from the saw cylinder by the doffing roll 23 passes directly to the gin on which the cleaning machine described is mounted.

The opening 20 past saw cylinder 21 is made sufficiently large to permit of the free discharge of hulls, trash, bolls and all small lock cotton not carried up by the saw cylinder. In order to avoid treating this entire product to recover the waste cotton therefrom, I provide for separating the discharged product passing through opening 20 into two streams. In one form of the invention, that shown in Fig. 2, I provide a smooth roller 24 which defines the size of a relatively narrow opening 25 past the saw cylinder and as shown by the arrow is rotated as to its upper side in a direction toward the saw cylinder. The opening 25 is sufficiently large to permit the passage through it of small hull particles, trash, sand and the like, but not large enough to permit the passage through of any cotton of value. This cotton will usually be in the form of small locks or wads and will be knocked back together with the large pieces of hulls and bolls or partly open bolls over the roller 24 to a conveyor 12, whence they pass through the branch pipes 9 into the air pipe 8.

The small hull particles, trash, sand and the like passing through opening 25 fall into a trough 26, whence a conveyor 27 conducts them to discharge pipes 13 which lead to the outside of the machine.

The reclaiming machine, indicated by the numeral 7, is similar in general construction to one of the main cotton cleaning machines, having a breaking cylinder 29, a hull board 30, a saw cylinder 31, a kicker roll 32, and a doffing roll 33. In addition to the above mechanism I mount below the saw cylinder 31 a reclaiming saw cylinder 34 which rotates in contact with a line of brushes 35. The hull board 30 extends between the side walls 36 of the machine and at its lower end is bent outward at right angles as indicated at 37 and then downward at right angles as indicated at 38 and the brushes 35 are suitably mounted in the lower end of the downwardly extending portion 38.

The hull board 30 defines the size of an opening 39 past the saw cylinder 31, and any cotton passing through said opening will fall upon the reclaiming saw cylinder 34 and being carried thereby under the brushes 35, the latter causes the cotton to adhere to its teeth and be carried up to the main saw cylinder 31. The latter has a higher surface speed of rotation than the reclaiming saw cylinder 34 and its teeth will engage and remove the cotton carried up by said reclaiming saw cylinder. At the same time, hulls and other forms of trash falling on the reclaiming saw cylinder and passing under brushes 35 will be readily thrown off by centrifugal action and fall into a trough 40, whence a conveyor 41 conducts them out of the machine. The pipes 13 likewise discharge into trough 40. The cotton carried under the kicker roll 32 by the saw cylinder 31 is removed by the doffing roller 33 and is conducted by the air pipe 14 back to the distributor of the main battery of cleaning machines.

It will be obvious from the above that the removal of the small hulls, shale, pieces of hulls, leaf trash, sand and dirt, or all of the other fine stuff which readily becomes entangled with the fibres of the cotton, leaving only the large clean hulls to be discharged with a small percentage of cotton, enables the supplemental or reclaiming machine, in recovering such cotton to produce a greatly improved and much superior grade or quality

of cotton, over what would otherwise be the case if all of the product discharged through the openings 20 of the main battery of machines were conveyed to the reclaiming machine, and this superior grade of cotton can be returned through pipe 14 to the stream supplying the main battery of machines without lowering the grade of the cotton delivered from the same.

In the free discharge of hulls and small lock cotton provided by the relatively wide openings 20 past saw cylinders 21 it is inevitable that small unopened bolls, half bolls or partly open bolls, will escape with the stream containing the comparatively small amount of cotton and the larger hulls, and these bolls or half bolls must be opened before the cotton can be recovered.

I have found that the most desirable manner of opening these bolls is to draw them through a fan wheel rotating at a high tip speed or peripheral velocity. At the same time the use of such a fan located in a suitable air pipe is the simplest and most desirable method of drawing the hulls, bolls and lock cotton away from the battery of cotton cleaning machines. A simple embodiment of this arrangement is illustrated in Figs. 1 and 4, where the numeral 46 indicates a fan wheel having the air pipe 8 connected to the suction side thereof and having a discharge pipe 47 connected to the delivery side thereof and provided in its length with conventional means for separating the air from the cotton hulls and bolls, which means, for the sake of simplicity in illustration I have shown to consist of a curved screen 48 extending across the pipe 47 and serving to permit the air to escape therethrough and causing the cotton to fall through a branch pipe 49 of pipe 47 leading into the reclaiming machine 7.

With the fan wheel 46 in operation the hulls, bolls and lock cotton passing through branch pipes 9 into the air pipe 8 are drawn by suction through said pipe and enter the casing of the fan wheel, where the bolls, owing to the high tip speed of the fan wheel will be completely opened to release the cotton contained therein and the product continuously discharged through pipe 47 and branch pipe 49 into the reclaiming machine 7, the air passing through screen 48 to the outside.

While it is not practicable to draw a large mass or bulk of cotton through an exhaust fan wheel, the amount of cotton escaping from the main battery of machines, along with the unbroken bolls, large hulls, etc., is a very small percentage of the stream of cotton handled by such machines and discharged to the gins. Furthermore, the cotton drawn through the fan wheel is mostly of the small or one-seed lock variety, so that both the character and quantity is such that there is no tendency to foul or interfere in any way with the operation of the fan.

In the interest of brevity, I shall employ the expression "small refuse" in the claims as indicating the fine trash, sand, dirt, and small hull particles which are separated from the product discharged through openings 20 of the main battery of cleaning machines to permit only the large clean hulls, lock cotton and bolls remaining to be conveyed to and treated in the cotton reclaiming machine.

I claim:—

1. In the art of cleaning cotton, the method which consists in subjecting bulk cotton to the action of a plurality of cleaning machines, each of which is adapted to remove the main body of cotton while providing a free discharge for small refuse, hulls, bolls and small lock cotton from the machine, dividing the discharged product from each machine into two streams, one of which contains the small refuse and the other the large hulls, lock cotton and bolls, subjecting the bolls in all of said latter streams to further treatment to open the same, and finally subjecting the products of all of said latter streams including the open bolls, to further treatment to recover the cotton therefrom.

2. In the art of cleaning cotton, the method which consists in subjecting bulk cotton to the action of a plurality of cleaning machines, each of which is adapted to remove the main body of cotton while providing a free discharge for small refuse, hulls, bolls and small lock cotton from the machine, dividing the discharged product from each machine into two streams, one of which contains the small refuse and the other the large hulls, lock cotton and bolls, pneumatically conveying the products of the latter streams to a single cotton reclaiming machine to recover the cotton therefrom, and in the course of its passage to said cotton reclaiming machine subjecting the bolls to additional treatment to free the cotton therein, and then recovering said cotton in said cotton reclaiming machine.

3. In the art of cleaning cotton, the method which consists in simultaneously subjecting bulk cotton to the action of a plurality of cleaning machines, each of which is adapted to remove the main body of cotton while providing a free discharge for small refuse, hulls, bolls and small lock cotton from the machine, continuously separating the small refuse from the discharged products of all of the machines, and, as part of a continuous operation, subjecting the bolls discharged from all of said machines to further treatment to free the cotton contained therein and conducting said opened bolls together with the large hulls and lock cotton discharged from all of the machines to a single cotton reclaiming machine to recover the cotton content from the materials conveyed into said machine.

4. In the art of cleaning cotton, the method which consists in subjecting bulk cotton to the action of a plurality of cleaning machines, each of which is adapted to remove the main body of cotton while providing a free discharge for small refuse, hulls, bolls and small lock cotton from the machine, dividing the discharged product into two streams by continuing the discharge movement of the small refuse only to a point removed from the remainder of the product, and conducting the latter product of all of the machines to a single cotton reclaiming machine to recover the cotton therefrom.

5. The herein described means for cleaning cotton comprising, in combination, a battery of cotton cleaning machines, each of which has a saw cylinder and provides an opening past the same for the escape of hulls, small refuse, and locks of cotton not engaged by the teeth of the saw cylinder, a rotary member positioned below each of said openings, rotating in the same direction as the saw cylinder and positioned in such proximity to the lower portion thereof as to define a space past the saw cylinder large enough to permit the free discharge of the small refuse but small enough to prevent the escape of cotton, said rotary member by its position permitting the saw cylinder to knock back over the top of the rotary member the coarse hull particles and locks of cotton which may not be engaged by the teeth of the saw cylinder, a cotton reclaiming machine, means for conveying the coarse hull particles and locks of cotton knocked back over the rotary members of all of said machines to said cotton reclaiming machine, and means for returning the reclaimed cotton to the battery of cotton cleaning machines.

6. In combination with a cotton cleaning machine having a saw cylinder and providing an opening past the same for the escape of small refuse, hulls, and locks of cotton not engaged by the teeth of the saw cylinder, a rotary member, rotating in the same direction as the saw cylinder located below said escape opening and defining a space past the saw cylinder large enough to permit the free discharge of the small refuse past the saw cylinder but small enough to prevent the escape of cotton, the rotating member being so positioned in relation to the lower portion of the saw cylinder as to permit the latter to knock back over the top of the rotary member the coarse hull particles, and the small locks of cotton which may not be engaged by the teeth of the saw cylinder, means for reclaiming the cotton so knocked back by the saw cylinder, and means for returning the reclaimed cotton to the machine.

In testimony whereof, I have hereunto set my hand.

JOHN E. MITCHELL.