Nov. 23, 1937. J. E. MITCHELL 2,100,302

SELF CONTAINED BOLL COTTON EXTRACTING MACHINE

Filed May 18, 1936

Fig. 1.

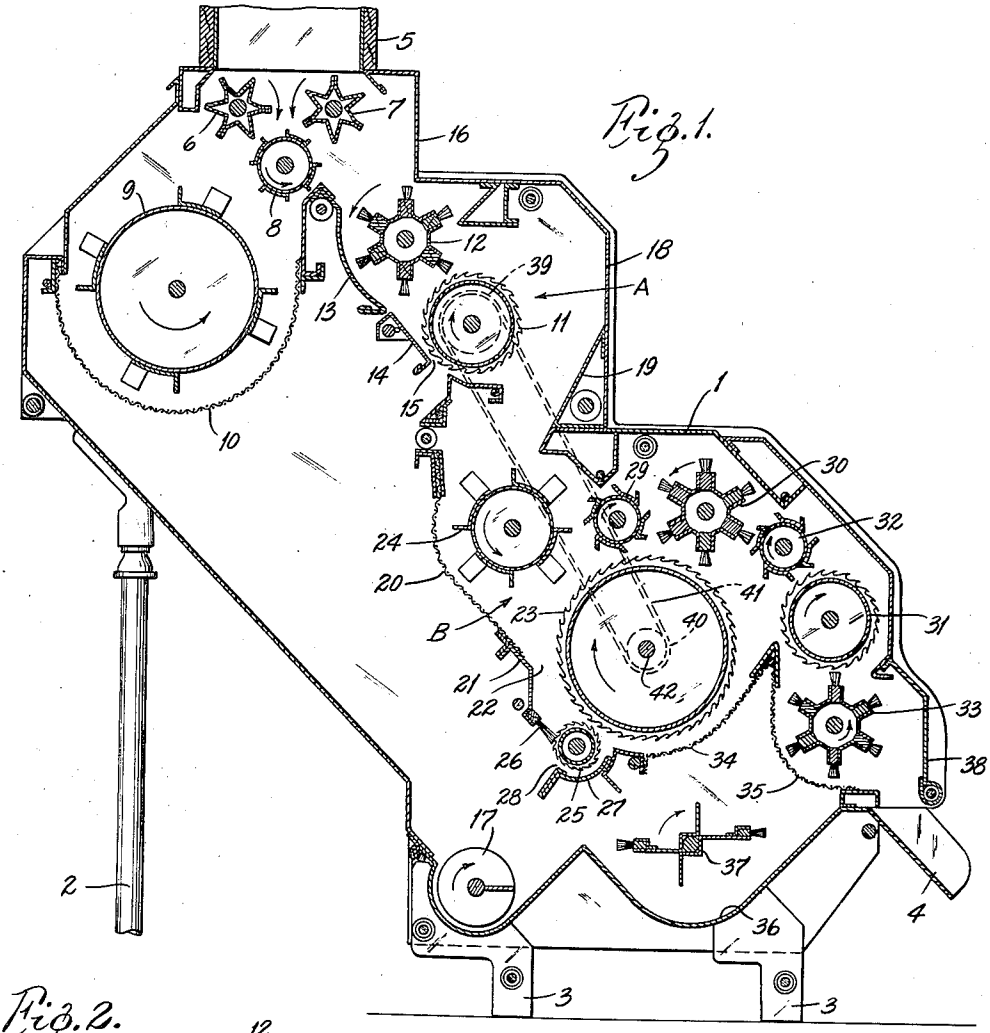
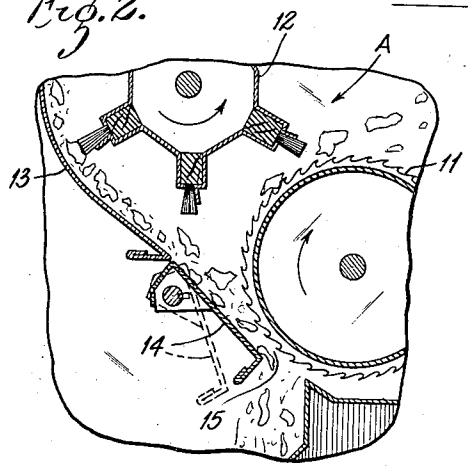


Fig. 2.



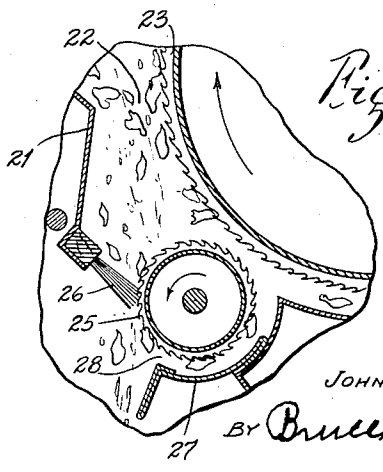


Fig. 3.

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SELF-CONTAINED BOLL COTTON EXTRACTING MACHINE

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11 Claims. (Cl. 19—35)

The general object of my invention is to provide a self-contained boll cotton extracting machine having two or more sets of extracting units, and which shall be compact enough to mount on a gin stand within the space ordinarily available between the gin and the feeding mechanism which supplies a regulated stream of cotton to suit the capacity of the gin.

In the preferred embodiment of my invention shown in the accompanying drawing, two extracting units are employed, each of which includes in its construction a main extracting saw cylinder, and it is the general object of the invention to so proportion the respective speeds of rotation of these cylinders that the extracting cylinder of the first unit may be run at an ideal peripheral speed most effective in permitting the discharge of hulls through a space defined by a stationary hull board past the saw cylinder, while the main extracting cylinder of the second unit is run at a higher rate of speed, or at such speed as produces the highest measure of co-operation between it and a kicker roll employed for effecting a closer separation between the cotton and hulls than is effected in the first extracting unit by mechanically knocking back hulls carried around by the cotton engaged by the saw cylinder.

The general object of the invention is attained by providing a multi-unit extracting machine, the first unit having an extracting saw cylinder running at a relatively slow rate of speed in conjunction with an adjustable, but relatively stationary, hull board defining the size of an opening for the escape of hulls only past the extracting cylinder, and the second unit having as essential elements an extracting saw cylinder of larger diameter than the extracting cylinder of the first unit, and rotated at a higher speed, a hull board defining the size of an opening past said saw cylinder for the free escape of hulls and small lock cotton, a reclaiming saw cylinder located below said opening, and a kicker roll co-operating with said extracting cylinder.

It is a further object of the invention to provide a multi-unit extracting machine in which a portion of the hulls are separated from the cotton in the first extracting unit solely by the action of gravity, that is, without the use of the conventional kicker roll for knocking back hulls, and the cotton, and such hulls as are not separated therefrom, are delivered to the second extracting unit in substantially the same condition in which they were fed into the machine. Stated otherwise, the separation of hulls effected in the first unit is produced without mechanically acting upon the hulls, so that no breaking, cutting or shaling of the hulls is caused by the separating action of the first unit.

The invention, however, in its broader aspects, is not limited to dispensing entirely with mechanical action on the hulls in the first extracting unit, as I am aware that by adjusting the kicker roll sufficiently far from the saw cylinder damage to the hulls can be considerably reduced, although at the cost of less efficient separation. As, however, any mechanical action on the hulls will inevitably produce some shaling, or cutting of the hulls, I prefer to dispense entirely with a kicker roll in the first unit.

When an extracting cylinder is provided with a kicker roll having blades that are forced against the bat of cotton mixed with hulls carried by the teeth of the extracting cylinder, it is necessary for the extracting cylinder to have a relatively high peripheral speed to exert considerable centrifugal action so that there shall be a tendency for the bat of cotton, and the hulls mixed with same, to be lifted or thrown from the teeth of the saw cylinder at the point where the bat carried by the teeth is acted upon by the kicker roll; otherwise, the kicker roll is not effective in knocking back the hulls or any cotton adhering to the hulls. Instead, practically the entire mass is carried through the space between the teeth of the extracting cylinder and the blades of the kicker roll, resulting in the hulls being mangled or shaled to such an extent that it is afterwards almost impossible to separate the small hull particles from the cotton.

On the other hand, when an extracting cylinder is rotated at the ideal peripheral speed to exert just the right amount of centrifugal action for the most effective co-operation with the kicker roll in knocking back the hulls and locks of cotton adhering to the hulls, the speed is entirely too fast to permit a free discharge of hulls through a hull discharge space between the hull board and saw teeth that is narrow enough to prevent the escape of one-seed lock cotton. This is because the hulls, which are elongated in shape, in trying to pass sidewise through the narrow discharge between a single hull board and extracting cylinder, are thrown violently by the high speed saw teeth back into the incoming stream of cotton, and if a double hull board, such as disclosed for example, in my prior Patent No. 1,030,913, is used, the hulls are thrown over the top of the lower hull board and a considerable quantity of lock cotton is thrown out with such hulls, causing an

unnecessary waste. With a relatively low peripheral speed of rotation, the hulls are merely agitated instead of being thrown back, and as a result of the agitation are turned so that they can slip endwise through the deeper space between the rows of saw teeth. Such low rate of speed, however, is impracticable if the conventional kicker roll be associated with the extracting cylinder, for reasons heretofore stated.

In view of the above conditions, when an extracting cylinder is to be rotated at a speed most effective for its co-operation with the kicker roll, it becomes necessary to use a reclaiming saw, such, for example, as disclosed in my prior Patent No. 1,613,242, in lieu of a hull board, for recovering locks of cotton escaping with the hulls through a relatively large gap, or discharge opening past the saw cylinder; and because of the necessity for making a close separation of the remaining hulls, such a high speed extracting cylinder with its kicker roll and reclaiming saw, is obviously more suitable for the second unit in a two unit machine.

Experience has shown, however, that improved results may be obtained in a two-unit machine by having the extracting cylinder of the upper unit rotate at a relatively low peripheral speed that makes it most effective in permitting the discharge of hulls through a space defined by a stationary hull board, but which space is too small to permit the escape of small lock cotton. This low peripheral speed of the extracting cylinder, for reasons stated, would be too slow for effective co-operation with a kicker roll. Therefore, when employing an upper extracting unit having a relatively slow moving saw cylinder, the stationary hull board for controlling the discharge of hulls is preferable to a reclaiming saw and, at the same time, less expensive; but as the slow speed saw cylinder is most effective in promoting the discharge of hulls, and least effective for cooperation with a kicker roll in promoting the mechanical separation of hulls from the cotton, I find it convenient, and in many cases highly desirable, to dispense with the use of a kicker roll in the first unit, with the resultant advantage that I avoid all cutting, mashing, or shaling of the hulls which are delivered with the cotton from the first to the second unit.

It will be obvious, of course, that damage to the hulls as a result of the action of the kicker roll in the second unit is reduced to the minimum by reason of a large percentage of the hulls being separated by the upper unit and a considerable portion of the remaining hulls going direct to the reclaiming saw through the relatively large opening of the lower unit. In other words, by the hulls being largely separated from the stream of cotton before the latter reaches the kicker roll of the second unit, any damage done by the action of the kicker roll occurs only in the act of separating the small percentage of hulls that reach the kicker roll.

In the drawing—

Figure 1 is a cross-section through a machine constructed according to my invention, the conventional driving mechanism for the various rotary members being omitted and the directions of rotations of these various members being indicated by arrows applied thereto.

Figure 2 is an enlarged broken sectional view of the first extracting cylinder and cooperating parts; and Figure 3 is an enlarged broken sectional view of the reclaiming cylinder and cooperating parts.

Referring now to the drawing, the numeral 1 indicates, generally, the casing of the machine which is adapted to be supported by front and rear standards, 2 and 3, on the top of a gin into which the cleaned cotton from the machine is delivered from a spout, 4. The boll cotton supplied by a suitable distributor (not shown) to the hopper, 5, above each machine, is compressed by a pair of conventional feeding rollers, 6, 7, which, as usual, have a variable speed drive which is adjusted to feed the stream of boll cotton at a rate to suit the capacity of the gin located below the machine. Below the feeding rollers is mounted a directing cylinder, 8, which, as to its upper portion, throws the boll cotton to the farther side of a cleaning cylinder, 9, which forces the cotton over a curved screen, 10, to remove small trash therefrom, after which it is thrown upward by the cleaning cylinder against the under side of the directing cylinder 8 which operates to deliver it to the first, or upper, extracting unit. The cylinder 8 thus has the combined functions of a directing and discharge cylinder.

The elements just described may be considered as conventional, and in themselves form no part of the present invention. It may be stated, however, that the cleaning cylinder 9 is rotated at such velocity that the impact of its blades with unopened bolls will cause such bolls to be opened and the cotton knocked therefrom, and unless the bolls are damp, or quite tough, will break the shells of the bolls apart.

The first extracting unit, indicated, generally, by the letter A, comprises a relatively small extracting saw cylinder, 11, a combined directing cylinder and doffer, 12, and a hull board, 13, the lower portion, 14, of which is adjustable, as indicated by the dotted lines, to vary the size of a hull discharge opening, 15, past the extracting cylinder 11. This opening is adjustable to suit the size of the hulls, which vary in proportion to the size of the locks of cotton. The upper side of the casing is provided with a vertical portion, 16, located above the doffing cylinder 12 which acts as an impact plate, or stop, to arrest the motion of the cotton and hulls thrown outward by the directing cylinder 8 and to cause them to fall upon the doffing cylinder 12, which carries them to the hull board and propels them over the same into contact with the rising portion of extracting cylinder 11. In this operation, the free hulls, that is, hulls not entangled with the cotton, will fall by gravity through the opening 15 and to the bottom of the casing, whence they are removed from the machine by a trash conveyor, 17. The doffing cylinder 12 rotates in doffing relation to the extracting cylinder 11, and cotton and hulls carried up by the latter are doffed therefrom by the cylinder 12 and thrown against the vertical wall, 18, of the casing, whence they slide over an incline, 19, and pass into the second extracting unit, indicated, generally, by the letter B.

This second extracting unit comprises a hull board member, the upper portion of which is formed as a screen, 20, and the lower portion as an imperforate member, 21, the lower edge of which defines the size of an opening, 22, for the free escape of hulls and any small lock cotton that may enter the second unit, past the main extracting saw cylinder, 23. Cooperating with the screen 20 of the hull board member is a combined beating and directing cylinder, 24. As the discharge opening 22 is relatively wide, it is necessary that the hulls and cotton be propelled

over the hull-board member at considerable velocity so that they will span the gap 22 and be thrown against the rising side of the extracting cylinder. To accomplish this, the cylinder 24 is rotated at a relatively high rate of speed and the hull-board 21, instead of extending below and to one side of the extracting cylinder, as in the first unit, is so positioned that its line of extension would cut through the saw cylinder, its lower end terminating substantially in the horizontal plane of the axis of the cylinder.

Located below the opening 22 is a small reclaiming saw cylinder 25, co-operating with which is a yielding member or brush, 26, which functions to force the small locks of cotton into engagement with the teeth of the saws but does not exert sufficient pressure to force hulls into such engagement, which accordingly are thrown off by centrifugal action after passing beneath the brush. These hulls fall into the trash conveyor 17 and are removed from the machine. The reclaiming cylinder 25 is mounted sufficiently close to the extracting cylinder 23 to enable the latter to doff the locks of cotton therefrom. An adjustable hull-board, 27, defines the size of an opening, 28, for the discharge of hulls from the reclaiming cylinder.

Co-operating with the extracting cylinder 23, on the upper side thereof, is a kicker roll, 29, which is set sufficiently close to the surface of the cylinder to knock back all hulls and hull particles carried up by the cotton. Co-operating with the extracting cylinder 23 is also a doffing cylinder, 30, which doffs the cotton from the extracting cylinder and projects it onto the surface of a second, but smaller, extracting cylinder, 31, with which co-operates a kicker roll 32, and, on its under side, a doffing cylinder, 33. The lower portion of the extracting cylinder 23 is partly surrounded by a screen, 34, and the lower portion of the doffing cylinder 33 is similarly partly surrounded by a curved screen, 35, so that trash and small hull particles knocked back by the kicker roll 32, or falling by gravity through the space between the two extracting cylinders 23 and 31, will fall on the screen 34 and through the same into a trash trough, 36. In like manner as the cotton is forced over screen 35 by the doffing cylinder 33, small trash particles will pass through the screen and fall into the trough 36. A rotary member 37 continuously removes trash from trough 36 and discharges it into the trash from trough 17.

The cotton carried over screen 35 is projected by the doffing cylinder 33 against a vertical portion, 38, of the wall of the casing, whence the cotton falls into the spout 4 and is delivered to the gin in a thoroughly clean condition.

Referring, finally, to the feature of the relative speeds of rotation of the two extracting cylinders 11 and 23, it is, of course, obvious that, even if these were driven at the same rate of speed, the cylinder 23, because of its greater diameter, would have a higher peripheral speed than the cylinder 11. However, the cylinder 23 is actually driven, in practice, at a greater speed than the cylinder 11, and to make this apparent from the drawing, I have shown, in dotted lines, the cylinder 11 provided with a relatively large pulley, 39, driven from a smaller pulley, 40, on cylinder 23 by a belt, 41. In such an arrangement, which is purely diagrammatic, the shaft, 42, of cylinder 23 would be a drive shaft.

I claim:

1. In a multi-unit cotton extracting machine, an upper unit having a low speed extracting cylinder and a co-operating hull board providing an opening of a size adapted to permit the escape of hulls only past the cylinder, a lower unit having a high speed extracting cylinder, a hull board co-operating therewith and providing an opening of a greater size than said first opening to permit the free escape of both hulls and lock cotton past the last-named extracting cylinder, a kicker roll co-operating with the second extracting cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of the second extracting cylinder.

2. In a multi-unit cotton extracting machine, an upper unit having a low speed extracting cylinder and co-operating hull board providing an opening of a size to permit the escape of hulls only past the cylinder, a combined directing and doffing cylinder co-operating on one side with said hull board and on the other with said extracting cylinder, a lower unit having a high speed extracting cylinder, a hull board co-operating with the latter cylinder and defining the size of an opening permitting the free escape of hulls and lock cotton past the cylinder, a kicker roll co-operating with the high-speed extracting cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of said latter extracting cylinder.

3. A cotton extracting machine having an upper and a lower extracting unit, a low speed extracting cylinder in the first unit, an adjustable hull board co-operating therewith for defining the size of an opening to permit the direct escape by gravity of hulls only past the cylinder, said extracting cylinder and hull board constituting the sole means for separating the cotton and hulls in said unit, a doffing cylinder co-operating with said extracting cylinder to deliver cotton, and hulls carried around with the same, directly into the lower unit, a high speed extracting cylinder in the lower unit, a hull board defining the size of an opening past said high-speed cylinder permitting the free escape of hulls and lock cotton, a kicker roll co-operating with said cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of said high-speed cylinder.

4. In a multi-unit cotton extracting machine, an upper unit having a low speed extracting cylinder and cooperating hull board providing an opening of a size to permit the escape of hulls only past the cylinder, a lower unit receiving the cotton, and the hulls not separated therefrom, from the first extracting unit, a high speed extracting cylinder in said lower unit, a combined screen and hull board mounted in said lower unit, the hull board defining the size of an opening past its extracting cylinder for the free escape of both hulls and lock cotton, a beating cylinder co-operating with said screen member, a kicker roll co-operating with said high speed extracting cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of the high-speed extracting cylinder.

5. In a multi-unit cotton extracting machine, an upper unit having an extracting cylinder and co-operating hull-discharge means for effecting the escape from the unit and the discharge from the machine of free hulls from a mixture of cotton and hulls fed into the unit, and the delivery

of the cotton and remaining hulls to a lower unit, an extracting cylinder in said lower unit, a kicker roll co-operating with the latter extracting cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of said latter extracting cylinder.

6. In a multi-unit cotton extracting machine, an upper unit adapted to receive a stream of mixed cotton and hulls, and having an extracting cylinder and co-operating hull-discharge means for permitting the escape from the unit of free hulls and causing the direct discharge thereof to the outside of the machine and delivering the cotton and remaining hulls to a lower unit, an extracting cylinder in said lower unit, a kicker roll co-operating with the latter extracting cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of said latter extracting cylinder.

7. In a multi-unit cotton extracting machine, an upper unit adapted to receive a stream of mixed cotton and hulls, and having an extracting cylinder and co-operating hull-discharge means for effecting a partial separation of hulls from the cotton, the direct discharge of the separated hulls to the outside by gravity, and the delivery of the cotton and unseparated hulls to a lower unit, an extracting cylinder in said lower unit, a kicker roll co-operating with the latter extracting cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of said latter extracting cylinder.

8. In a multi-unit cotton extracting machine, an upper unit adapted to receive a stream of mixed cotton and hulls, and having as sole extracting elements a saw cylinder and co-operating hull-board, the latter providing an opening past the cylinder leading to the outside for the discharge from the machine of hulls escaping through said opening, a lower unit adapted to receive the cotton and unseparated hulls from the upper unit, and having an extracting cylinder, a kicker roll co-operating with the latter extracting cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of the said latter extracting cylinder.

9. In a muli-unit cotton extracting machine, an upper unit adapted to receive a stream of mixed cotton and hulls, and having an extracting cylinder and co-operating means for effecting the discharge of a portion of the hulls by gravity to the outside of the machine, and constituting the sole means for separating cotton and hulls in said unit, a lower unit having an extracting cylinder, a kicker roll co-operating with the second extracting cylinder and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of the second extracting cylinder.

10. In a multi-unit cotton extracting machine, an upper unit adapted to receive a stream of mixed cotton and hulls, and having an extracting cylinder and co-operating hull-board, constituting the sole means for separating the cotton and hulls in said unit, said hull-board providing an opening past said cylinder leading to the outside for the direct discharge from the machine of hulls escaping through said opening, a lower unit having an extracting cylinder, a kicker roll co-operating with the second extracting cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of the second extracting cylinder.

11. In a multi-unit cotton extracting machine, an upper unit adapted to receive a stream of mixed cotton and hulls, and having a low speed extracting cylinder and co-operating hull-board, constituting the sole means for separating the cotton and hulls in said unit, said hull-board providing an opening past the extracting cylinder leading to the outside for the direct discharge from the machine of hulls escaping through said opening, a lower unit having a high-speed extracting cylinder of greater diameter than the first-named cylinder, a kicker roll co-operating with the second extracting cylinder, and a reclaiming cylinder for recovering locks of cotton escaping with the hulls past the lifting side of the second extracting cylinder.

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