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J. E. MITCHELL

1,945,820

MACHINE FOR SEPARATING COTTON FROM AIR

Filed July 16, 1931

2 Sheets-Sheet 1

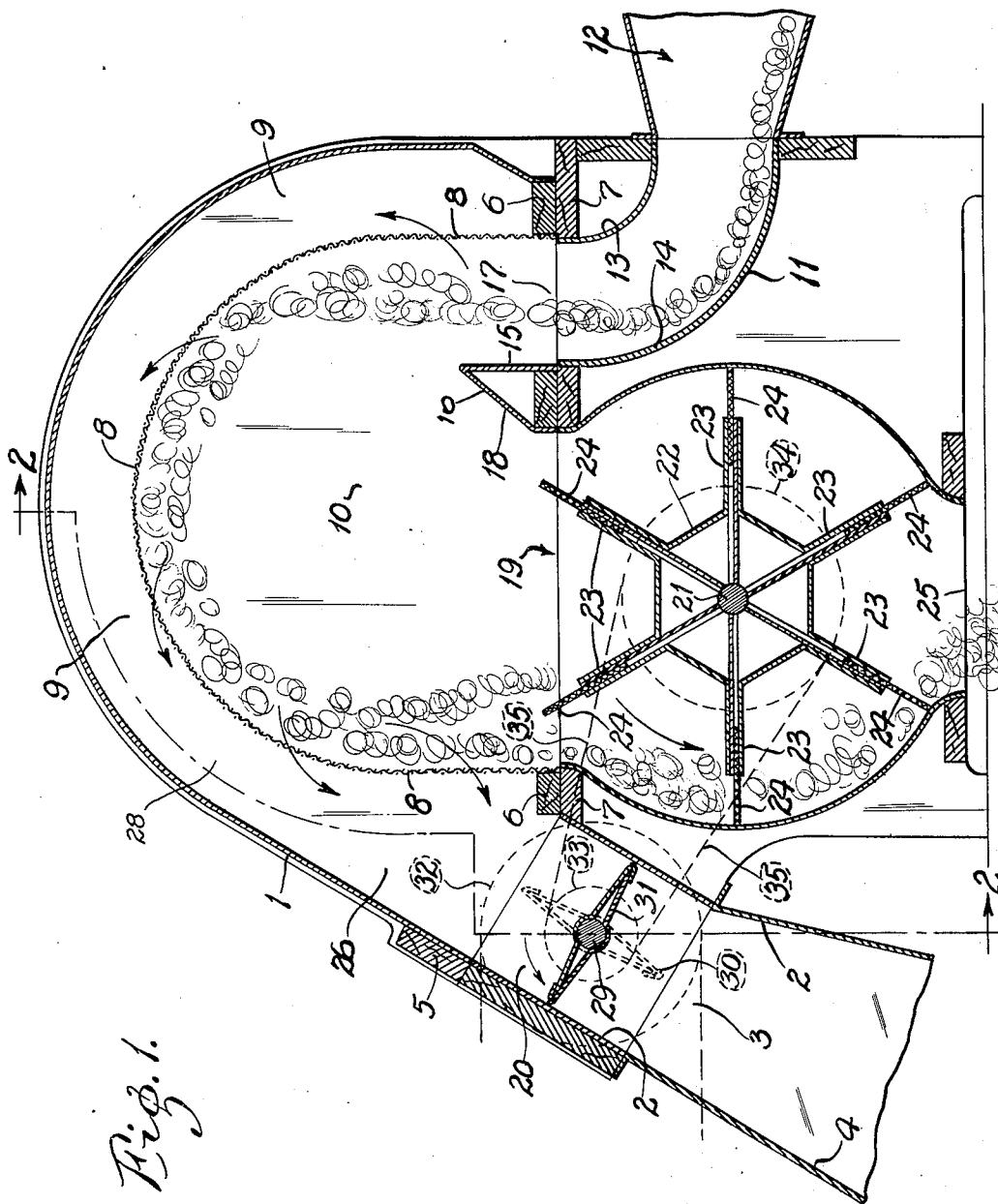


Fig. 1.

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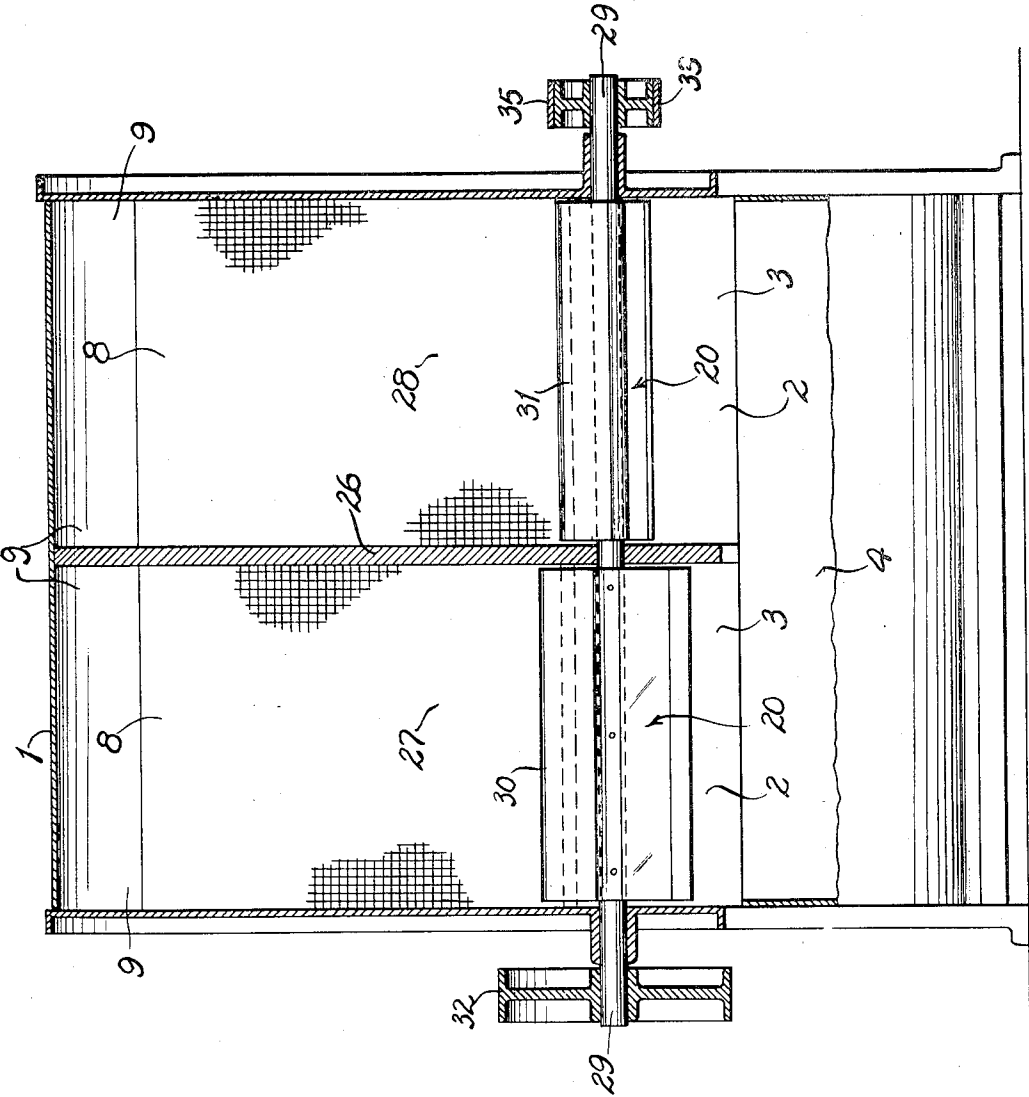


Fig. 2.

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UNITED STATES PATENT OFFICE

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MACHINE FOR SEPARATING COTTON FROM AIR

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9 Claims. (Cl. 19—75)

This invention relates to a novel machine for separating cotton from air and to a novel method involved in the operation of said machine, which invention is useful, primarily, in the operation of elevating cotton from wagons, cotton houses, and other sources of supply, to the machinery of cotton gins.

The general object of my invention is to insure the possibility of continuously elevating cotton from a source of supply, separating the cotton from the air, and discharging the cotton from the separating mechanism, without the liability of stoppage due to clogging of the cotton in the separating machine.

Machines for separating cotton from air are in general use; but so far as my knowledge extends, none of these is entirely satisfactory in all particulars. In common with my invention, they all employ a screen mounted in an expansion chamber, the screen operating to arrest the course of the cotton while permitting the air to pass through. The arrested cotton is supposed to fall from this screen, and to some extent does so for a while, and the deposited cotton is continuously removed from the expansion chamber and delivered to the cleaning and ginning machinery. Many of these machines employ rotating members in the expansion chamber to clear the separating screen from adhering cotton, and these rotating members tend to rope, twist, and otherwise machine the cotton to an objectionable extent. In other machines not employing rotating members in the expansion chamber, there is a constant tendency of the cotton fibers to adhere to the screen, especially when the cotton is damp, and frequently this continues until the screen becomes covered to such an extent with the cotton fibers as to prevent the passage through it of the air and the machine is thus rendered altogether inoperative. Finally, most of the machines that have been utilized for the purpose of separating cotton from air have been very inefficient by reason of the extremely large expansion chambers rendered necessary in order to provide an adequate screen surface.

My improved separating machine differs from all other machines of this nature heretofore used in that, while there is a continuous and steady flow of air to and from the separating chamber, the current passes continuously only through a portion of the screen which makes the separation. That is to say, the air current is alternately momentarily interrupted through different portions of the screen surface in rapid succession, thus providing over the surface of the separating

screen a succession of dead or inactive spaces in which there is no force exerted tending to draw the fibers against the screen, with the result that the cotton fibers are free to fall from such spaces, and as the incoming cotton is in continuous motion, the screen is thus maintained free of adhering fibers, and there is a continuous fall of cotton to the bottom of the separating chamber, from whence it is removed.

In the machine employing the preferred embodiment of my invention, I provide a series of air channels or compartments extending over the screen from the inlet to the outlet end of the machine, which compartments communicate with a suction opening common to all of them; and I provide valves rotating in the suction ends of said compartments, and set at different angles of action, whereby, in operation, the compartments will be intermittently opened and closed by said valves alternately in rapid succession, which operates to block each compartment momentarily against the force of the created suction, the portions of the screen forming the bottoms of said compartments being thus rendered inactive or dead in succession. The invention, however, is not limited to the precise means employed for causing the alternate intermittent operation of suction over segregated portions of the screen.

For removing the separated cotton from the separating chamber, I employ a valve chamber forming a continuation of the separating chamber, having a discharge opening at its lower end, and in said chamber I mount a pocket valve rotating in sealing contact with the walls of said valve chamber, whereby the deposited cotton may be removed without impairing the force of the suction exerted in the separating chamber.

This invention is illustrated in the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view through a machine constructed according to my invention; and

Figure 2 is a cross sectional view taken on the line 2—2 of Figure 1, and viewed in the direction of the arrows.

Referring now to the drawings, the numeral 1 indicates a curved housing provided at one side and at its lower end with a suction spout 2 affording an outlet opening 3. Connected to the suction spout 2 is a pipe 4 which leads to a suction fan (not shown). The wall of the curved housing 1 is supported at one end, that at the left of Figure 1, on a transverse bar 5 and at its other end to the edge of a floor 6, which is supported on longitudinal frame members 7. Secured in

one side of an opening in floor 6 is a curved or dome-shaped screen 8, which is concentric with the curvature of the wall of housing 1 and separates said housing into an expansion chamber 9 and a separating chamber 10. A conduit 11 leading from the source of cotton supply enters through the side of the machine at 12 and is supported at its upper end in the horizontal frame member 7 in a manner to have its outer side 13 form a continuation of the corresponding side of screen 8. As shown by Figure 2, the screen 8 extends from side to side of the machine, and the conduit 2 is of the same width as the screen. The inner side 14 of the conduit abuts the lower edge of the vertical side 15 of an angular partition 16, the said side 15 forming with the opposite side of screen 8 an elongated opening or throat 17 through which air and cotton are discharged into the separating chamber 10. The throat 17 compels the air and cotton entering the chamber 10 to pass upward along the side of screen 8 and over the upper curved surface thereof. The opposite side of the partition 16 to that described is inclined, as indicated at 18, and forms one side of an opening 19 leading from chamber 10 into a valve chamber 20. The other side of opening 19 is formed by the lower end of screen 8 with which the upper edge of the corresponding wall of chamber 20 coincides.

Rotatably mounted in the side walls of valve chamber 20 is a shaft 21, on which is mounted a bucket valve 22, having arms 23, each of which is provided at its outer end with a strip 24 of flexible material, such as rubber, which strips, in the rotation of the valve, move in sealing contact with the wall of chamber 20 and thus prevent entrance of air through the discharge opening 25 at the bottom of the chamber.

According to my invention, the expansion chamber 9 surrounding the screen 8 is divided into compartments. In the drawings I have shown only two of such compartments; but any desired number of compartments could be provided. To form these compartments, I mount centrally in the expansion chamber a partition 26, Figure 2, extending over the entire surface of the screen and dividing the expansion chamber 9 into two compartments 27 and 28. The partition 26 extends from the screen to the wall of housing 1, which thus forms the top of the compartments, while the bottom is formed by the portions of screen 8 extending under them. A feature of my invention consists in alternately shutting off compartments 27 and 28 against the power of suction exerted through spout 2 which, it should be stated, forms a continuation of the expansion chamber and extends substantially from side to side of the machine. This result is accomplished by the means now to be described.

Rotatably mounted in the side walls of the machine, and within spout 2, is a shaft 29 having mounted thereon two valves, 30 and 31, each of which is in the form of a double-bladed vane of substantially the width of spout 2. The valves 30 and 31 are positioned at right angles to each other on shaft 29, as indicated in the drawings. The shaft 29 passes through partition 26, which extends into spout 2, and each valve is of a width to extend from one side of the partition to the opposite side wall of the machine, or of spout 2. Thus, when the valve 31 is in the position shown in Figure 1, it extends across and closes that half of the opening of spout 2 forming a continuation of chamber 28 and prevents the power of suction from being exerted through said compart-

ment. At the same time, valve 30 will extend longitudinally of the other half of spout 2, so that the power of suction will be exerted through this half of the spout and consequently in compartment 27.

The shaft 29 has mounted on one end a drive pulley 32 and at its other a sprocket 33. The shaft 21 has mounted on a corresponding end a sprocket wheel 34, and a sprocket chain 35 connects sprocket wheel 34 with sprocket 33. The shaft 29 is driven at a comparatively high rate of speed, while the relative sizes of the sprocket 33 and sprocket wheel 34 permit the bucket valve 32 to be driven from such shaft at a much slower rate of speed.

In operation, suction being set up through spout 2 cotton and air will be drawn in through conduit 11 and directed upward against screen 8 in the separating chamber 10. The air, of course, passes through the screen into expansion chamber 9 and out through suction spout 2. The cotton is arrested by the screen, deflected over the curved portion and farther side thereof, drops down into the pockets of the bucket valve and is carried around and discharged through opening 25 in the bottom of the valve chamber. At the same time the above operation occurs, the valves 30 and 31 are rotated, with the result that compartments 27 and 28 are alternately momentarily closed against the power of suction, so that the cotton fibers passing, for example, under that portion of the screen forming the bottom of compartment 28 will be momentarily freed from the suction draft and be free to fall from the screen. Immediately thereafter this portion of the screen will be opened to suction while the portion under compartment 27 will be closed. This opening and closing of the respective compartments 27 and 28 occurs in rapid alternation, so that suction is always exerted in the separating chamber, and the inward movement of the cotton is therefore continuous. A part of the movement of the cotton over that portion of the screen rendered dead or inoperative by closing the suction thereto, will be due to inertia; and this movement of the body of cotton produces a wiping of the under surface of the screen and, occurring simultaneously with the closing of draft through the screen, tends to continuously free the surface of the screen from fibers which might otherwise adhere thereto. The wiping effect described is incident, in a measure, to the operation of any machine of this character; but in my machine it is made highly effective, due to the fact that, with the power of suction destroyed through the portion of the screen affected, fibers are free to be moved by the body of moving cotton instead of being held against the screen by suction, as would occur in other machines.

From the above description it will be observed that while the movement of the air is practically continuous through all of the screen surface, it is nevertheless intermittent and alternately pulsating through different portions of the screen surface, which makes possible the use of a comparatively small amount of screen surface and a correspondingly small separating chamber. This contributes very greatly to increased efficiency, and to such an extent that a smaller high-speed fan, or a lower-speed large fan can be used than is now required, and a considerable saving of power be effected.

By means which I employ for producing an intermittent flow of air through given portions of the screen, I prevent clogging of the screen

without resorting to any form of rotating member within the expansion chamber, which not only effects a saving in cost and construction, but entirely does away with any tendency to rope, twist, or otherwise machine the cotton.

I desire to emphasize the fact that while the movement of the air through the machine is for a short interval partially, if not altogether, switched alternately from one half of the machine to the other, the alternations are too rapid to have any appreciable effect upon the movement of the cotton, and it continues to flow into the expansion chamber beneath the screen in a steady stream.

15 I claim:

1. The method of separating cotton from air which consists in moving a body of cotton into engagement with the entire surface of one side of a screen by suction exerted from the opposite side, and simultaneously interrupting the suction over defined areas of the screen less than its total surface in alternation.

2. The method of separating cotton from air which consists in moving a body of cotton into engagement with and over the entire surface of one side of a screen by suction exerted from the opposite side, and during the movement of the cotton simultaneously interrupting the suction over defined areas of the screen less than its total surface in alternation.

3. The method of separating cotton from air which consists in continuously drawing cotton into a chamber by suction created on one side of a screen confining in its totality a portion of said chamber, intermittently interrupting the suction over defined areas of said screen less than its total surface in alternation and continuously discharging deposited cotton from said chamber.

4. The method of separating cotton from air which consists in continuously drawing cotton into a chamber by suction created on one side of a screen confining in its totality a portion of said chamber, intermittently interrupting the suction over defined areas of said screen less than its total surface in alternation, and continuously discharging deposited cotton from said chamber without impairing the force of suction effective to draw the cotton into said chamber.

5. A machine for separating cotton from air comprising a housing, a stationary screen mounted therein in spaced relation to the wall of said housing, a source of suction communicating with the housing above said screen, an inlet for cotton communicating with the housing below said screen, a series of partitions dividing the space between said screen and the wall of said housing into compartments, means interposed in the line of suction and operating to intermittently interrupt the suction through said compartments in alternation, and means for removing the cotton falling from said screen.

6. A machine for separating cotton from air comprising a housing, a curved screen mounted therein in spaced relation to the wall of said housing to provide an expansion chamber above the

screen and a separating chamber below it, a source of suction communicating with said housing at one end of the expansion chamber, a conduit for cotton communicating with said separating chamber at the side of the machine opposite said suction opening, a partition extending between the wall of said housing and the upper surface of said screen throughout the extent of the latter and providing two separated compartments, valves located in said suction line and controlling the inlet to each of said compartments, means for operating said valves to intermittently open and close said compartments in alternation, and means for withdrawing from said separating chamber cotton falling from said screen.

7. A machine for separating cotton from air comprising a housing, a screen mounted therein in spaced relation to the wall of said housing, a source of suction communicating with the housing above said screen, an inlet for cotton communicating with the housing below said screen, a partition dividing the space between the said screen and the wall of said housing into compartments, means interposed in the line of suction and operating to intermittently interrupt the suction through said compartments in alternation, a valve chamber forming a continuation of the space below said screen and having an outlet and a pocket valve mounted in said chamber and rotating in sealing contact with the walls thereof.

8. A machine for separating cotton from air comprising a housing, a curved screen mounted therein in spaced relation to the wall of said housing to provide an expansion chamber above the screen and a separating chamber below it, a source of suction communicating with said housing at one end of the expansion chamber, a conduit for cotton communicating with said separating chamber at the side of the machine opposite said suction opening, a partition extending between the wall of said housing and the upper surface of said screen and dividing said expansion chamber into two compartments, a rotatable shaft mounted in the walls of said housing and having a pair of valves mounted thereon set at different angles and controlling the mouths of said compartments, whereby, in operation, suction will be intermittently interrupted in said compartments in alternation, and means for withdrawing from said separating chamber cotton falling from said screen without impairing the power of suction.

9. A machine for separating cotton from air comprising a housing, a curved screen mounted therein in spaced relation to the wall of said housing, a source of suction communicating with the housing above said screen, an inlet for cotton communicating with the housing below said screen, means for directing the cotton drawn into said inlet by suction along one side and over the curved surface of the under side of said screen and means operating while the cotton is in motion past said screen to interrupt the suction over defined areas of the screen in rapid alternation.

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