March 9, 1954 J. J. WALLACE 2,671,248

COTTON SEPARATOR

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Fig. 1.

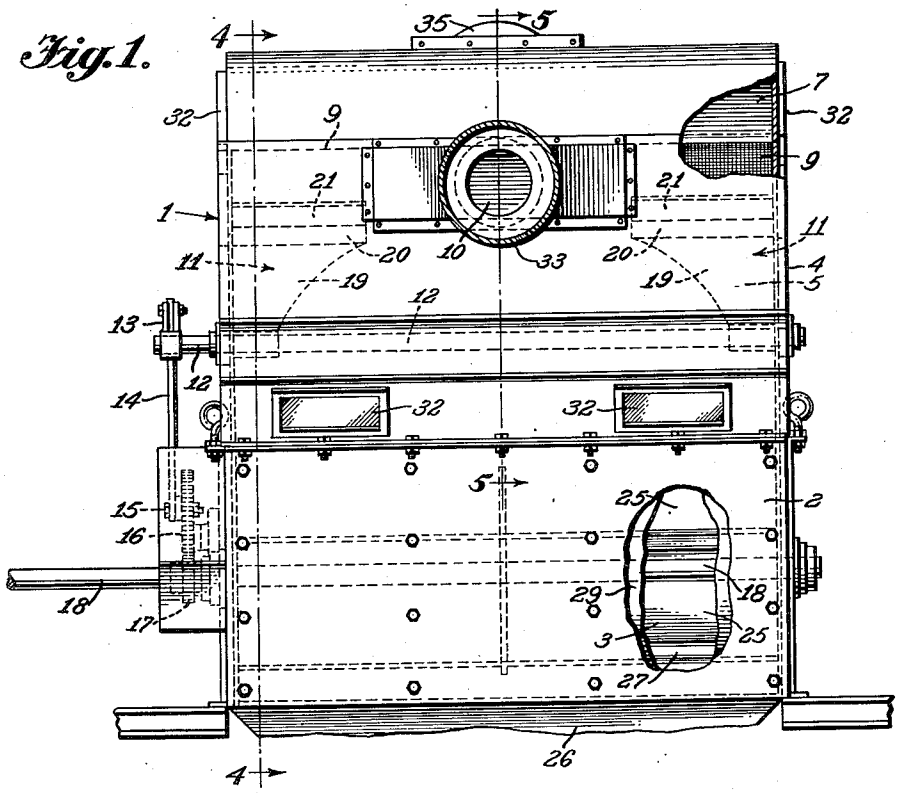
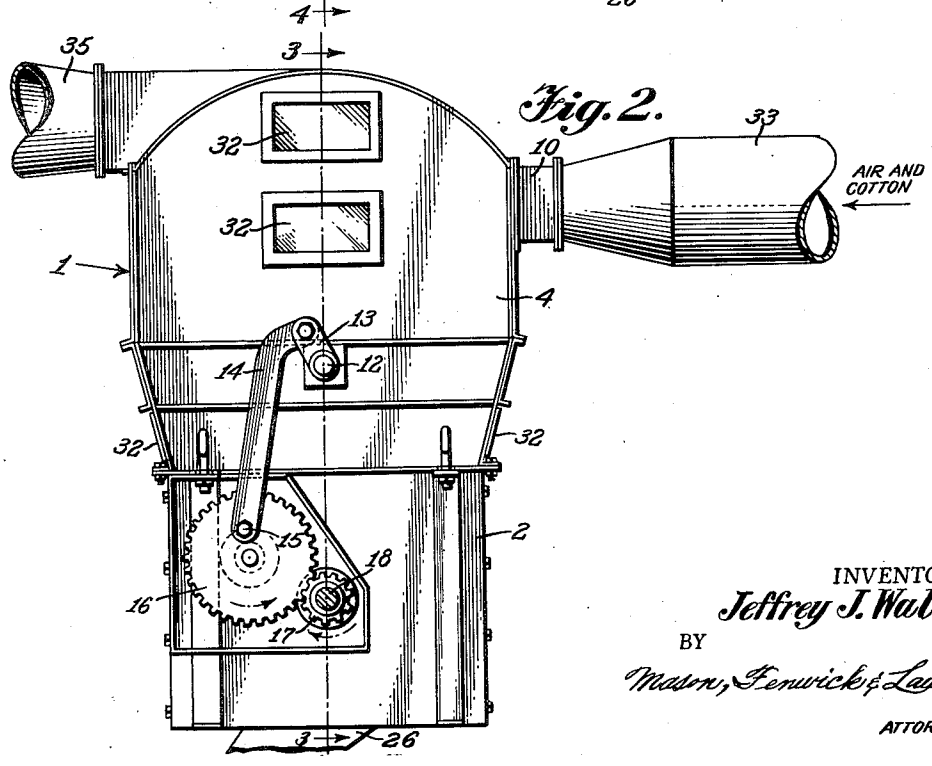


Fig. 2.



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Fig. 3

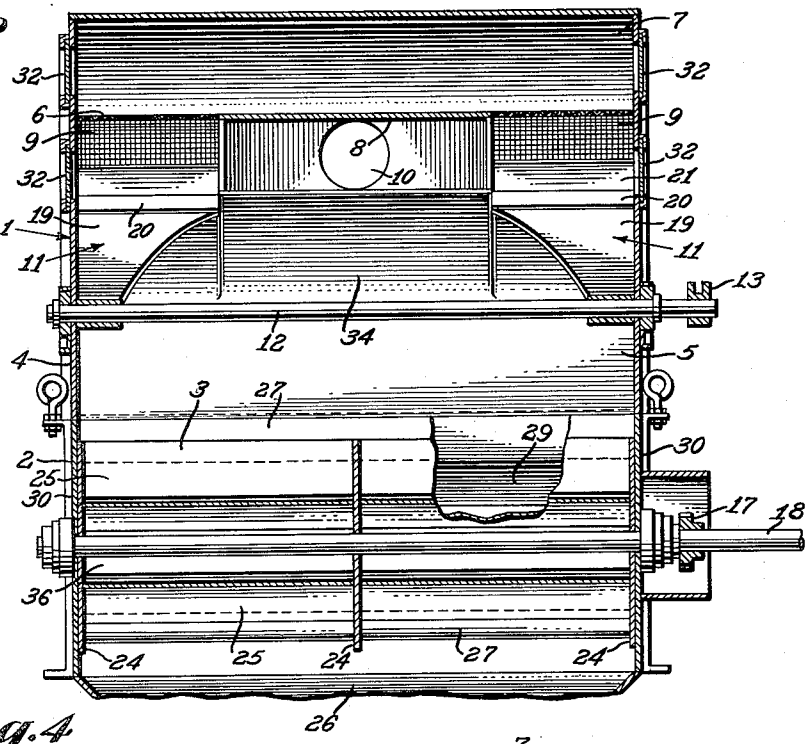
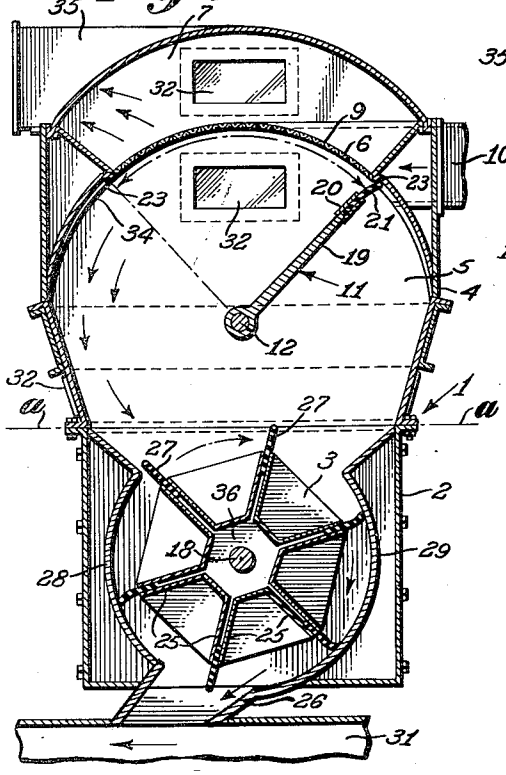


Fig. 4



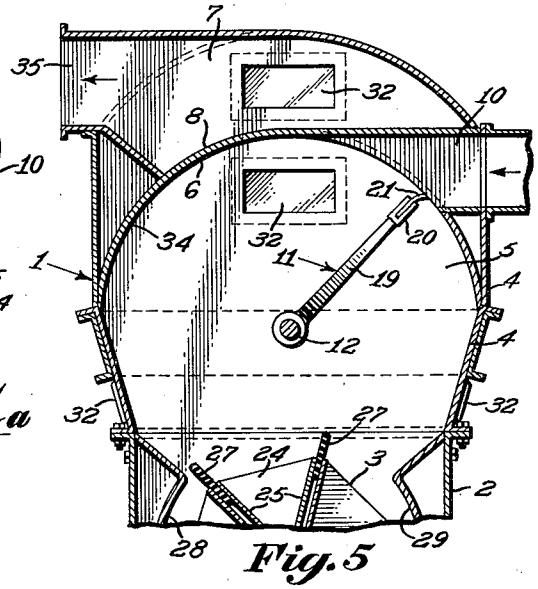


Fig. 5

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Patented Mar. 9, 1954 2,671,248

UNITED STATES PATENT OFFICE

2,671,248

COTTON SEPARATOR

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Application October 4, 1949, Serial No. 119,415

4 Claims. (Cl. 19—75)

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This invention relates to a cotton separator.

Cotton is elevated from the truck and conveyed to the gins or a storage chamber by a suction line, including a conduit having an exhaust fan at the outlet and an intake nozzle (flexible or telescopic) at the opposite end through which the cotton is drawn. The cotton separator is interposed in said conduit, its purpose being to separate the cotton from the vehicle air, diverting the cotton to the gin or storage chamber and letting the clean air pass to the exhaust fan and from it to atmosphere.

One of the objects of the invention is to provide a separator so constructed as normally to keep the suction line open so that the draft of air through the separator may be effective at all times, and automatically to interrupt the suction flow through the separator responsive to the stoppage of the power driven rotary discharge valve of the separator, so that the latter will not become choked with cotton incident to such stoppage, and will be in condition to resume its separating function as soon as the power to the rotary valve has been restored.

Another object of the invention is to provide a separator having a discharge valve for cotton so related to its seat as to function as an air pump, creating an air current in the direction of cotton discharge, which materially assists the discharge.

A further object of the invention is the provision of a cotton separator in which the cotton with vehicle air comes in at a lower level than the air exit, and strikes a deflector whereby the heavy material is directed downward toward the rotary discharge valve, there being screens laterally of and above the flow path of the entering cotton and air, through which the air passes, and against which the lighter material is drawn by the exhaust fan.

Still another object is the provision of wipers for cleaning the screens of lint accumulation, and means to prevent clogging of the wipers.

Another object of the invention is to have that part of the apparatus which embraces the inlet and outlet portions of the suction line reversible with respect to that part which carries the rotary valve, so that the apparatus may be assembled to cause the discharge valve to discharge cotton tangentially of said valve in its direction of rotation, regardless of the direction in which the valve rotates, this being the direction in which the air displaced from the separating chamber is traveling incident to the pumping function of the discharge valve.

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Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawing which accompanies the following specification and throughout the figures of which the same characters of reference denote identical parts:

Figure 1 is a side elevation of a cotton separator, parts being broken away and parts being in section, viewed from the intake side;

Figure 2 is a left end elevation, referred to in Figure 1;

Figure 3 is a medial vertical longitudinal section taken along the line 3—3 of Figure 2;

Figure 4 is a section taken along the line 4—4 of Figure 1;

Figure 5 is a medial vertical cross-section taken along the line 5—5 of Figure 1.

Referring now in detail to the several figures, the numeral 1 represents in general a casing which is divided into a lower part 2 containing te rotary discharge valve 3, and an upper part 4 which includes the separating chamber 5. These two parts are relatively reversible along their line of separation *a—a*, for a reason that will presently appear.

The casing is provided with a partition 6 near the top, defining with the overlying portion of the casing an eduction chamber 7 above the separating chamber 5. Said partition has an intermediate imperforate portion 8 and screens 9 laterally positioned with respect to said intermediate portion. An intake duct 10 for cotton in a vehicle of air open into the separating chamber 5 beneath the intermediate portion of said partition. This communicates with a suction pipe 33, the opposite end of which, not shown is flexible or telescopic, so that it can be moved around upon a pile of cotton in the truck to draw the cotton into the separator.

Opposite the intake duct 10 the casing is provided with a downwardly curved wall 34 for deflecting cotton downwardly toward the discharge valve. The eduction chamber is provided with an outlet conduit 35, adapted to be connected to an exhaust fan, not shown

Cotton laden air is sucked in by way of the intake duct 10. The heavier material is deflected downwardly, as indicated by the arrows in Figure 4 toward the rotary discharge valve 3. The atmosphere of the separating chamber becomes filled with lint, which is drawn upwardly against the screens 9, the air, filtered by said screens, passing into the eduction chamber 7 and to the fan by way of the outlet conduit 35.

Oscillating wipers 11 operate to remove the lint from the screens 9, the latter being curved coaxially with the shaft 12 to which the wipers are fixed, and which is oscillated by a crank 13, Figure 2, connected by a pitman 14 to a crank pin 15 on a gear 16, which meshes with the smaller gear 17 on the shaft 18 of the rotary discharge valve 3.

The wiper consists of a blade 19, having a holder 20 at its outer end, in which a rubber strip or doffer 21 is retained. The length of this doffer is the same as the width of the screen, and the height of the doffer is such that it bends back in a sweeping fashion against the screen, as shown in Figure 4.

The screens 9 occupy a top position with respect to the separating chamber, the walls of the latter being slightly outwardly offset adjacent the ends of the screens to permit the doffers to assume a normal straight radial position, a shoulder 23 being thus formed adjacent each end of the screen.

In operation, the doffers sweep over the surface of the screens 9, bent back like a broom, removing the thin collection of lint. Some of this may stick to the ends of the wipers, but when the wipers reach the end of their range of oscillating amplitude they go off of the face of the screen into the enlarged portion of the separating chamber, so that they immediately resume straight position and are bent back in the opposite direction on the return trip of the wiper as soon as the doffer has contacted the adjacent end of the screen. This reversal in the direction of sweep of the doffers effectively cleans them of any accumulated lint, so that they start fresh and clean at the beginning of each traverse of the screens.

The function of the discharge valve 3 is to clear the separating chamber of cotton as fast as it comes in, so as to prevent an accumulation of cotton in the separating chamber. The rotary discharge valve is elongated, as shown in Figure 3, and comprises a drum 36, which as shown, is hexagonal, although this is a matter of choice, and has end and intermediate headers 24 secured to said drum. Radial vanes 25 are provided, which define with the headers pockets which receive cotton, and as the valve rotates, carry the cotton to the outside and centrifugally eject it into the cotton passage 26. The free edges of the radial vanes are each clothed with a strip 27 of rubber or the like, which wipes against the valve seats 28 and 29. Said valve seats are of cylindrical contour and extend the full length of the discharge valve 3, the end headers 24 of said valve being closely adjacent the end walls 30 of the casing.

It will be noted that the valve seat 29 is wide enough to close two of the pockets formed between successive vanes 25, but that the width of the valve seat 28 is less than sufficient to close two pockets. The valve 3 rotates in a clockwise direction, as shown in Figure 4, that is, toward the wider valve seat, so that two pocketfuls of air are displaced from the separating chamber at the same time that only one pocketful of air is being brought into said chamber. This gives the rotary discharge valve a pumping function, always taking slightly more air out of the separating chamber than it returns to it, so that there is a dominating current of air leaving the separating chamber on the righthand side of the valve 3, as indicated by the arrows in Figure 4. This current of air purges the separating chamber of a great deal of floating lint, which otherwise would be drawn into contact with the screens 9 and diminish the efficiency of the suction line.

The discharge passage 26 of the separator is tangential to the direction of rotation of the rotary discharge valve, so that the cotton entrained in the pockets of said rotary valve is thrown forcibly into the outlet 31, in the direction of discharge.

In determining the position of the upper part 4 of the casing relative to the lower part 2, the adjustment should be such that the inlet to the separator should be on the same side of the casing as the discharge side of the valve 3. With the parts so arranged, the heavier material is deflected downward along the wall 34, and enters pockets of the discharge valve moving in the same direction as the discharge valve and in the direction of current induced by the pumping action of the discharge valve. This makes for maximum efficiency, since the flow of heavier cotton and of lighter lint merge in the discharge valve and pass out in one continuous stream without counterflow or turbulence.

The shaft 18 of the rotary discharge valve is suitably driven from a power source, not shown, usually by a belt and pulley. It is independently driven with respect to the exhaust fan, not shown, to which the outlet passage 35 is connected. Ordinarily, if the power which drives the rotary discharge valve should fail, as by the breaking of a belt, while the suction line continues to operate, the entire separating chamber would fill up with cotton, and when the power were finally restored to the valve 3, the separator would have to be opened and emptied of cotton to clear the screens, so that the suction line could again become effective. This is particularly true where the screens occupy the ends of the separating chamber and the accumulation of cotton in the separating chamber gradually occludes the screens until they are entirely covered, rendering the suction line inoperative. By positioning the screens at the top of the dome of the separating chamber, but lower than the air outlet and laterally with respect to the air intake, the screens are not obstructed by any entering heavier cotton, which as stated, is directed immediately downward toward the discharge valve. By being laterally placed, there is a direction change in the contents of the separating chamber before any material reaches the screens, so that only the lighter lint collects on the screens. This is wiped away by the oscillating action of the wipers, keeping the screens clean. If under these circumstances the belt should break and the discharge valve cease to relieve the separating chamber of the incoming cotton, the wiper would at the same time stop, and the screens would quickly become closed by an accumulated layer of lint, rendering the suction line ineffective so that no more cotton will be drawn into the separating chamber. When the belt is fixed, the wipers begin to operate simultaneously with the valve 3, immediately clear away the accumulation from the screens 9, and put the suction system back into operation.

It will be noted that the cotton separator of the present invention is provided at desirable points with the sight windows 32, by means of which the conditions within the separator at various points may be visually ascertained.

While I have in the above description dis-

closed what I believe to be a preferred and practical embodiment of the invention, it will be understood by those skilled in the art that the specific details of structure and arrangement of parts, as shown, are by way of example and not to be construed as limiting the scope of the invention.

What I claim as my invention is:

1. Cotton separator comprising a casing including a partition near the top dividing it into an air eduction chamber above said partition and a cotton separating chamber beneath said partition, said partition having an imperforate middle portion and arcuate screens laterally positioned with respect to said middle portion, a cotton and air intake opening into said separating chamber beneath said middle portion, an air outlet for said eduction chamber adapted to be connected to an exhaust fan whereby air is drawn through said screens from said separating chamber, a cotton discharge valve at the lower part of said cotton separating chamber, wipers for said screens oscillatable about the axis of curvature of said screens having flexible end elements of such radial length as to trail against said screens, said wipers having a range of movement extending beyond said screen at both ends, the wall of said casing being outwardly offset at the ends of said screens forming shoulders, the direction of trail of said end elements being reversed by engagement of said elements with said shoulders.

2. Cotton separator comprising a casing including a partition near the top dividing it into an air eduction chamber above said partition and a cotton separating chamber beneath said partition, said partition having an imperforate middle portion and screens laterally positioned with respect to said middle portion, said screens being arcuately curved with respect to a horizontal axis within said separating chamber, a cotton and air intake opening into said separating chamber beneath said middle portion, an air outlet for said eduction chamber adapted to be connected to an exhaust fan whereby air is drawn upward through said screens from said separating chamber, a cotton discharge valve at the lower part of said cotton separating chamber, oscillatory wipers for said screens coaxial therewith and common driving means for said valve and wipers.

3. Cotton separator comprising a casing, a partition wall of cylindrical curvature dividing said casing into a lower separating chamber and an upper air eduction chamber, an oscillatable wiper shaft extending through said separating chamber forming the axis of curvature of said partition wall, said partition wall having an imperforate middle section and including screens at the top at opposite sides of said middle section establishing communication between said chambers, a cotton and air inlet duct opening into said separating chamber at one side in the zone of said middle section, equidistantly from the ends of said separating chamber, the upper wall of said duct merging tangentially with said middle section at the top of said partition wall, and the mouth of said duct confronting the downwardly curved opposite side of said imperforate middle section whereby the heavier cotton entering said separating chamber is directed downwardly, thereby by-passing said screens, wipers on said shaft in the zones of said screens traversing said screens, said casing providing an opening at the lower end of said separating chamber terminating in a discharge passage, and a rotary cotton discharge valve in said opening between said separating chamber and discharge passage, occluding said opening and seated against opposite walls thereof.

4. Cotton separator as claimed in claim 3, including means for driving said cotton discharge valve in such direction that its upper arc exposed to said separating chamber, moves in a direction away from the cotton deflecting side of said partition wall.

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