Dec. 17, 1935. J. E. MITCHELL 2,024,469

AUTOMATIC FEED CONTROL APPARATUS FOR SEPARATING COTTON FROM AIR

Filed May 16, 1934 2 Sheets-Sheet 1

FIG. 1.

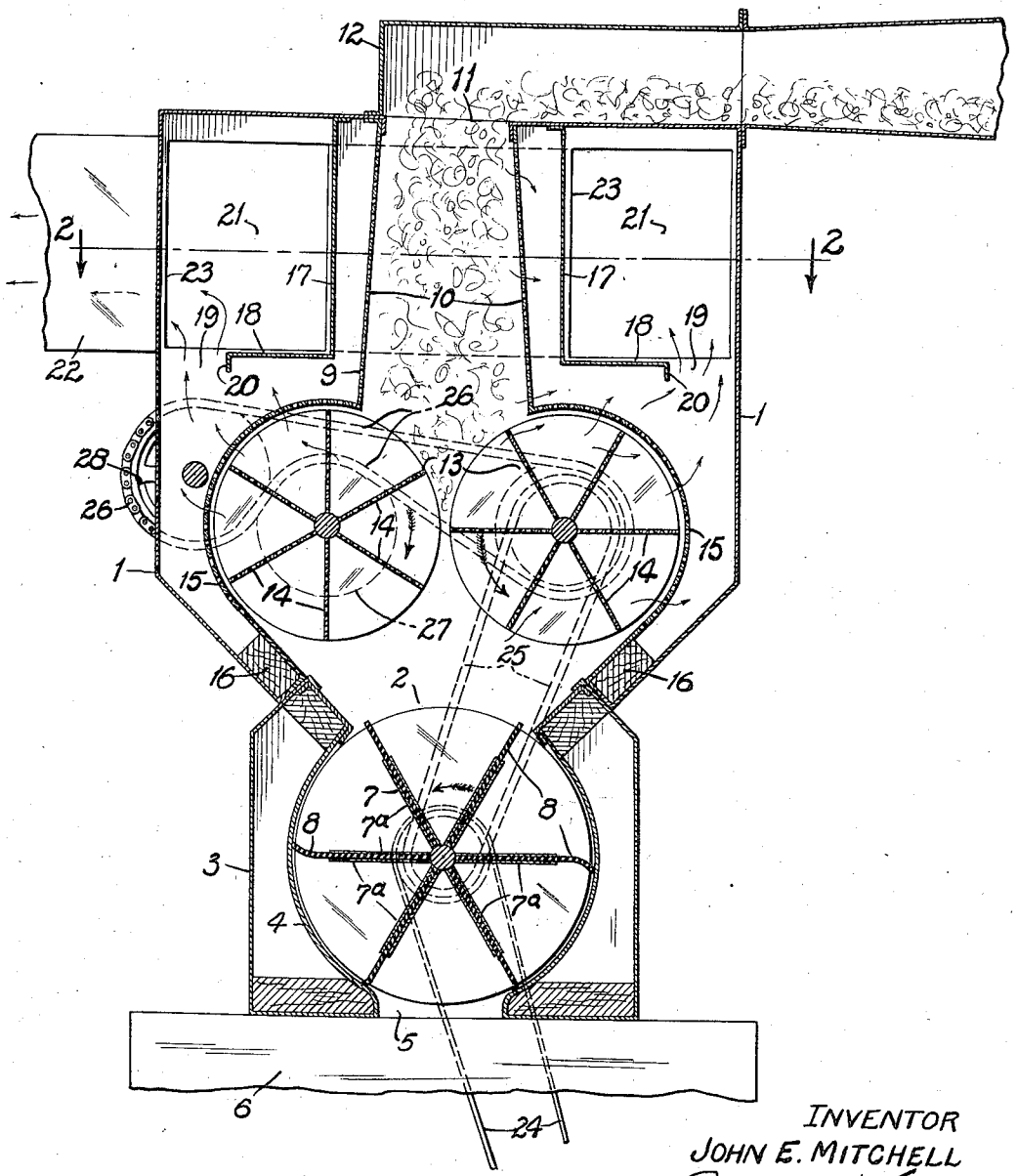

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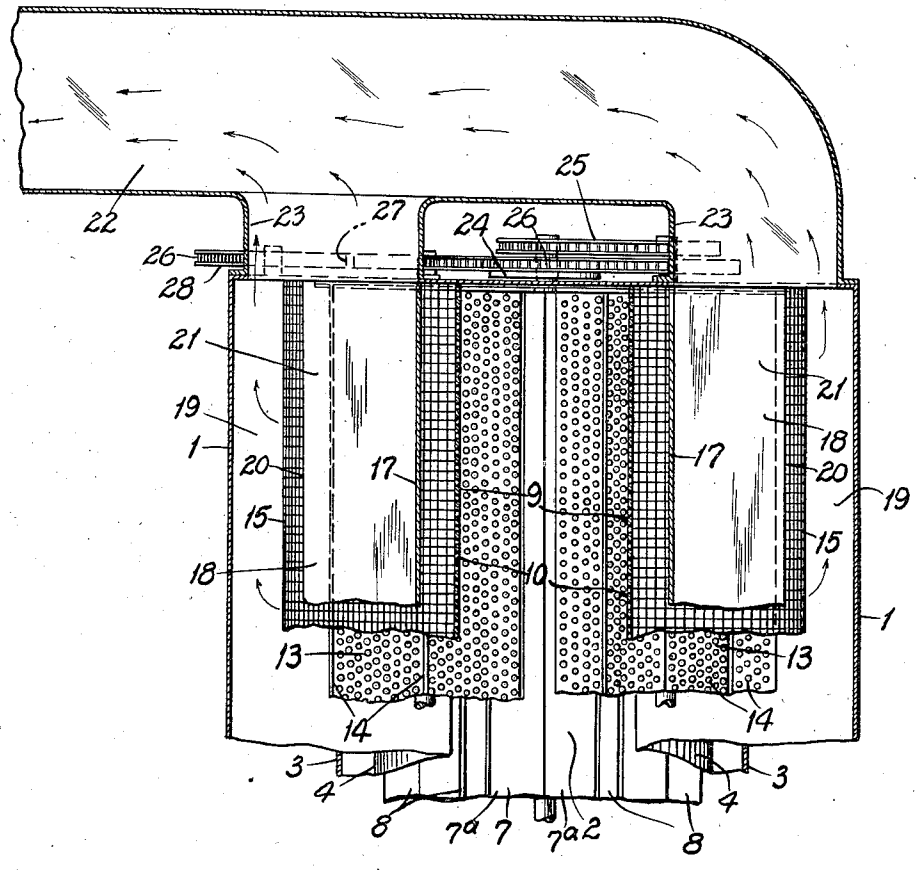
FIG. 2.



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AUTOMATIC FEED CONTROL APPARATUS FOR SEPARATING COTTON FROM AIR

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8 Claims. (Cl. 19—75)

This invention relates to novel apparatus for separating cotton from air employed for unloading by suction field cotton from a wagon, or other source, and elevating it to cleaning and distributing machinery inside the gin building.

The separators heretofore employed for the purposes referred to are of various types and designs, but invariably employ screens in some form through which the air escapes, but through which the cotton cannot pass.

In ordinary separators heretofore used, there are no means whatever for controlling the amount of cotton unloaded, and the stream of cotton elevated from the wagon and delivered to distributor or cleaning machinery is very irregular, varying from none at all to intermittent heavy wads or loads, which often chokes down the cleaning machinery; and, since the supply of cotton being elevated is not shut off, the separator itself becomes badly choked and rendered inoperative, making it necessary to remove the accumulated cotton from both cleaning machinery and separator, which often results in serious loss of time.

The present invention is distinguished from all prior types of separators heretofore employed for use ahead of mechanical distributors chiefly by the fact that it automatically controls or determines the rate at which cotton can be unloaded from the wagons and delivered to the distributor, or to the cleaning machinery ahead of the distributor.

In installations where no cleaning machinery is used ahead of the distributor, the separator is mounted directly on top of the distributor, and the cotton delivered from the separator is distributed to the battery of extracting and cleaning machinery mounted on the gin stands.

In sections where very rough cotton is handled, many installations are equipped with cleaning machinery through which the cotton passes before it reaches the distributor. In such installations, my improved separator is mounted on the cleaning machine, or on the first of a series of cleaning machines, if more than one be employed, and serves to regulate the stream of cotton passing through the cleaning machine, or machines, before it reaches the distributor.

One of the objects of the invention is to provide a receiving hopper with perforated metal or screen walls through which the air may escape, but through which the cotton cannot pass, and to cause the suction, exerted in a supply conduit to draw in the cotton, to be created by withdrawing the air from the conduit through said hopper, so that to the extent the hopper becomes filled with cotton, the amount of suction at the wagon or other source of supply is decreased.

Another object of the invention is to provide a pair of feeding rollers, located beneath the hopper, the distance between the axes of the two rollers being at least equal to, and preferably greater than, the width of the hopper, and being otherwise constructed to avoid compressing the cotton too much in withdrawing it from the hopper.

Another object of the invention is to provide the feeding rollers with perforated blades through which air currents can pass in reverse directions.

A still further object is to partially enclose the feeding rollers with circular screens, or, perforated housing members, through which air passing in reverse directions through the perforated blades can escape from the inside of the machine.

As to the method, the broad idea involved consists in causing cotton to be drawn from a source of supply through a conduit into a hopper by suction exerted through the hopper, whereby to the extent cotton accumulates in the hopper the power of suction in the conduit will be diminished to cause a diminution of the feed of cotton to the hopper.

Other objects of the invention relate to certain novel details of construction and combinations and arrangements of parts, whereby the objects of the invention are the more readily attained.

The invention is illustrated, as to its preferred embodiment, in the accompanying drawings, in which:

Figure 1 is a cross-sectional view through a separator constructed according to my invention, showing the same mounted on, and, as to its operating mechanism, driven from, a conventional cotton cleaning machine, shown diagrammatically; and

Figure 2 is a horizontal sectional view taken on the line 2—2 of Figure 1.

Referring now to the drawings, the numeral 1 indicates an air-tight casing housing the main operating parts of my improved apparatus and providing a discharge opening, 2, for cotton in its bottom.

Depending from the bottom of the casing 1 is a smaller casing, 3, in which is housed a circular chamber, 4, communicating at its upper end with the casing 1 through the opening 2, and having a similar opening, 5, at its lower end for the delivery of cotton either directly to a distributor, or as shown, to a cotton cleaning machine, 6, on

which my separating apparatus is mounted. Rotating within the chamber 4 is a rotary cotton dropper, 7, of conventional design, that is to say, the blades, 7a, being provided along their outer edge with rubber or other flexible strips, 8, which in the rotation of the dropper engage the walls 4 to form an air seal, whereby cotton passing through the opening 2 into the pockets between the blades 4 may be carried around and discharged through the opening 5, while air is prevented from passing upward through said opening 5 into the separator.

The casing 1 is rectangular in shape, and extending centrally from end to end thereof is a hopper, 9, having perforated walls, 10. The hopper 9 communicates through an opening, 11, in the top of the casing with a conduit, 12, which, as usual, leads to a source of field cotton, usually a wagon. As is well known, such conduits are provided outside of the gin house with a flexible extension, (not shown), which may be moved to various positions in the wagon to enable the cotton to be withdrawn therefrom by suction.

Rotatably mounted below the lower end of the hopper 9 are two similar cooperating feeding rollers, 13, each of which is provided with equally spaced perforated blades, 14. Extending outward from the lower end of each side of the housing 9, is a perforated housing member, 15, these housing members being circular in form and surrounding the outer sides of the feeding rollers 13, their lower ends being suitably secured to longitudinal frame bars, 16, to which the lower ends of the walls of the casing 1 are also secured. The housing members 15 are, as shown, spaced from the side walls of the casing 1 to permit of the passage of air through the perforations of the housing members when suction is induced in the air-tight casing 1, as later described.

Extending from end to end of the machine on either side of the hopper 9 are two imperforate, sheet-metal walls, 17, which are spaced from the side walls of the hopper 9 and, at a greater distance, from the side walls of the casing 1, each of the walls 17 being bent outwardly at right angles at its lower end to provide bottoms, 18, extending part way only to the side walls of the casing 1, leaving a restricted opening, 19, preferably defined by a depending portion, 20, of the bottom member 18 and the corresponding side walls of the casing 1. The walls 17 with their bottom members 18 form air chambers, 21, extending along opposite sides of the hopper 9 from end to end of the casing 1 and of substantially the depth of said hopper.

Suction is induced in the casing 1 through the medium of a suction pipe, 22, having branches, 23, extending at right angles thereto and communicating with corresponding ends of the respective air chambers 21.

While, as previously indicated, my separator may be mounted to deliver the cotton directly to a conventional distributor which supplies cotton to a battery of gins, or to cotton extracting machines mounted on the gins, I have shown my apparatus as mounted on a cleaning machine 6, which is frequently interposed between the separating mechanism and the distributor, especially where roughly harvested cotton is being dealt with. When my improved apparatus is so mounted I drive the rotary cotton dropper 7 from the shaft of the cleaning machine through the medium of a belt, 24, and one of the feeding rollers 13 from the shaft of the rotary dropper through the medium of a sprocket chain, 25. When the cotton dropper 7 is rotated in the direction indicated by the arrow in Figure 1, the feeding rollers 13 are rotated in the directions indicated by the arrows in said figure through the medium of a sprocket chain, 26, surrounding a sprocket wheel fast on the shaft of the driven feeding roller 13 and having its lower run extending over a sprocket wheel, 27, on the shaft of the companion feeding roller 13, that at the left in Figure 1, the outer end of the sprocket chain passing over an idler pulley, 28.

This manner of driving the rotary members of the cotton separating apparatus when the same is mounted on a cleaning machine enables me to accomplish a very important result, namely, to automatically stop the operation of the separator and prevent further delivery of cotton to the cleaning machine should the latter, for any reason, be stopped by becoming choked, or, as sometimes occurs, by the passage into the cleaning mechanism of a stone, or other hard substance.

Mainly, however, my invention aims to provide for automatically controlling the feed of the cotton by the separator, as will now be understood from the following description of the operation.

The extended end of the conduit 12 being applied to the cotton, usually field cotton in a wagon, to be drawn into the apparatus, suction created in the pipe 22 will draw air from said conduit through the perforated walls of the hopper 9, housing members 15, blades 14, restricted openings 19 and air chambers 21 into the suction pipe. The restricted openings 19 insure that the suction will be distributed uniformly over the screen surfaces and thus prevent excessive suction through any one point of the screen surfaces inside the machine. The suction thus induced in the conduit 12 will draw the cotton into the same and through the opening 11 into the perforated hopper 9, whence it is removed uniformly by the bladed feeding rollers 13 and delivered to the cotton dropper 7, which in turn delivers it to the cleaning machine 6. The feeding rollers 13 are so proportioned, and run at such speed, as normally to deliver cotton to the dropper 7 in quantities which can be readily handled by the cleaning machine, or by a plurality of cleaning machines, if more than one be employed. It is impossible, however, to draw the cotton through the conduit 12 with any degree of uniformity, as at one time a maximum amount of cotton will be drawn through the conduit, and then, while the mouth of the conduit is being moved to a new position in the wagon, very little or no cotton will be drawn in, followed by varying amounts, according to the position of the mouth of the conduit relative to the cotton in the wagon.

If at any time a larger volume of cotton is drawn through the conduit than can be at once removed by the feeding rollers, this will result in the cotton piling up in the hopper 9 and closing off the perforations in the walls thereof to the extent of the height of the cotton in the hopper, thereby diminishing the degree of suction that can be exerted in the conduit 12 and consequently decreasing the quantity of cotton that can be drawn through said conduit. As the cotton is removed from the hopper by the feeding rollers the suction in the conduit will be proportionately increased, permitting an increase in the supply of the cotton to the hopper. Thus, in the case of an excess supply of cotton

to the hopper, the cotton itself serves to automatically diminish the supply, and this in substantially direct proportion to the amount of excess cotton fed into the hopper.

In operation, the feeding rollers are rotated at a speed sufficient to supply an excess amount of cotton beyond what is needed to feed the battery of cleaning and extracting or ginning machinery supplied by the distributor, the excess going to what is known as the overflow at the end of the distributor. While it is necessary to have some cotton discharged at the overflow in excess of the amount needed to supply the machines beneath the distributor, it is, for several reasons, desirable to keep the quantity in the overflow as low as possible. One of the reasons for this is that cotton being unloaded from wagons often catches fire through rocks or matches getting into the cotton. With a small amount of cotton in the overflow pile, it is not difficult to extinguish the fire; whereas, with a large quantity, it is often impossible to do so, with the result that the entire gin plant is destroyed. According to my invention, the amount of cotton going to the overflow can be readily controlled by the operator through merely changing the speed of the feeding rollers.

The feeding rollers also serve the very important purpose of delivering a uniform stream of cotton either direct to the distributor, or to the cleaning machinery, which not only prevents overloading either the distributor or cleaning machinery, but improves the results obtained from the use of cleaning machinery by reason of the more continuous but lighter load.

With my improved feed control separator, when a heavy wad or load of cotton is drawn into the hopper 9, the feeding rollers 13 prevent its falling in a body through the separator into the cleaning machinery or distributor below; and if such heavy bodies continue to follow each other rapidly, by reason of the cotton being unloaded too fast, the hopper will fill up and obstruct the passage of air through the screens, thus automatically either stopping the supply of cotton, or decreasing the rate at which the cotton can be unloaded from the wagon.

By this I prevent, or greatly reduce, the loss of time resulting from such machinery becoming choked with cotton.

As additional protection against delays from shut downs, my improved separator, when mounted on top of cleaning machinery, is, as stated and shown, preferably driven from the cleaning machinery it supplies, so that if the cleaning machinery chokes down for any reason, when the cleaner stops the separator also stops, which instantly prevents any further delivery of cotton to the cleaners. It is then a comparatively simple matter to remove the foreign substance from the cleaner, and to start in operation again, with a minimum loss of time.

My improved feeding rollers are not only characterized by having perforated blades, but by the fact that they are of such size and so located with reference to the hopper, as to prevent an excessive compression of the body of cotton in withdrawing it from the hopper. While my invention is not limited to any exact size of feeding rollers, I prefer to use, and in certain claims have specifically described, feeding rollers so positioned that the distance between their axes is at least equal to the width of the hopper; or, as otherwise expressed, the axes of these feeding rollers are substantially in line with the side walls of the hopper. This arrangement provides relatively large spaces between confining blades of the rollers as they rotate, which permits of the removal of the cotton from the hopper without undue compression thereof.

The main purpose of having the blades of the feeding rollers perforated is to permit air currents to pass in reverse directions through these blades. This not only prevents decreasing the amount of suction which may be rendered effective in the conduit, as would result if solid blades were employed, but also decreased resistance to the movement of the blades, as will be understood.

While I have illustrated and described the best embodiment of my invention now known to me, I do not thereby intend to be limited to the exact form, arrangement or proportion of parts described, as various changes in, and modifications of, the construction illustrated could be made without departing from the broad idea of my invention as outlined in the claims following.

I claim:

1. Apparatus for separating air from cotton drawn by suction from a source of supply comprising, in combination, an air-tight casing, a hopper having perforated walls mounted in said casing, a conduit leading from the source of cotton and communicating with the upper end of said hopper, a pair of cooperating feeding rollers positioned below the bottom of said hopper for removing regulated amounts of cotton therefrom, perforated housing members surrounding the outer sides of said feeding rollers, means for creating suction in said casing and thereby withdrawing air from said conduit through the walls of said housing members and hopper to draw cotton into the latter, and a rotatable air seal dropper for delivering the removed cotton from the casing.

2. Apparatus for separating air from cotton drawn by suction from a source of supply comprising, in combination, an air-tight casing, a hopper having perforated walls mounted in said casing, a conduit leading from the source of cotton and communicating with the upper end of said hopper, a pair of cooperating feeding rollers positioned below the bottom of said hopper for removing regulated amounts of cotton therefrom, each of said rollers having perforated blades, and the axes of said rollers being separated a distance at least equal to that of the width of said hopper, perforated housing members surrounding the outer sides of said feeding rollers, means for creating suction in said casing and thereby withdrawing air from said conduit through the perforations in said housing members, blades and hopper to draw cotton into the latter, and a rotatable air seal dropper for delivering the removed cotton from the casing.

3. Apparatus for separating air from cotton drawn by suction from a source of supply comprising, in combination, an air-tight casing, a hopper having perforated walls mounted in said casing, a conduit leading from the source of cotton and communicating with the upper end of said hopper, a suction pipe communicating with the interior of said casing, a pair of feeding rollers positioned below the bottom of said hopper, perforated housing members surrounding the outer sides of said rollers, and means for removing cotton delivered by the feed rollers from said casing while maintaining the latter air-tight.

4. Apparatus for separating air from cotton drawn by suction from a source of supply comprising, in combination, an air-tight casing, a

hopper having perforated walls mounted in said casing, a conduit leading from the source of cotton and communicating with the upper end of said hopper, a suction pipe communicating with the interior of said casing, a pair of cooperating feeding rollers positioned below the bottom of said hopper and having perforated blades, perforated housing members surrounding the outer sides of said rollers, and means for removing cotton delivered by the feeding rollers from said casing while maintaining the latter air-tight.

5. Apparatus for separating air from cotton drawn by suction from a source of supply comprising, in combination, an air-tight casing, a hopper having perforated walls in said casing, a conduit leading from the source of cotton and communicating with the upper end of said hopper, a suction pipe communicating with the interior of said casing, a pair of cooperating feeding rollers positioned below the bottom of said hopper, each of said feeding rollers having perforated blades, and axes separated by a distance at least equal to the width of said hopper, perforated housing members surrounding the outer sides of said feeding rollers, and means for removing cotton delivered by the feeding rollers from said casing while maintaining the latter air-tight.

6. Apparatus for separating air from cotton drawn by suction from a source of supply comprising, in combination, an air-tight casing, a hopper having perforated walls mounted in said casing, a conduit leading from the source of cotton and communicating with the upper end of said hopper, a suction pipe communicating with the interior of said casing, a pair of cooperating feeding rollers positioned below the bottom of said hopper and having perforated blades, the axes of said rollers being substantially in line with the walls of the hopper, perforated housing members extending from the lower ends or the walls of said hopper around the outer sides of said feeding rollers, and means for removing cotton delivered by the feeding rollers from said casing while maintaining the latter air-tight.

7. Apparatus for separating air from cotton drawn by suction from a source of supply comprising, in combination, an air-tight casing, a hopper having perforated walls mounted in said casing, a conduit leading from the source of cotton and communicating with the upper end of said hopper, a pair of cooperating feeding rollers positioned below the bottom of said hopper, perforated housing members surrounding the outer sides of said rollers, an air chamber provided in said casing having a restricted air inlet, a suction pipe communicating with said air chamber, and means for removing cotton delivered by the feeding rollers from said casing while maintaining the latter air-tight.

8. Apparatus for separating air from cotton drawn by suction from a source of supply comprising, in combination, an air-tight casing, a hopper having perforated walls mounted in said casing and depending from the top thereof, a conduit leading from the source of cotton and communicating with the upper end of said hopper, a pair of cooperating feeding rollers positioned below the lower end of said hopper and having perforated blades, perforated housing members surrounding the outer sides of said feeding rollers, a pair of air chambers located, respectively, on opposite sides of said hopper and each having a restricted air inlet, a suction pipe communicating with said air chambers, and means for removing cotton delivered by the feeding rollers from said casing while maintaining the latter air-tight.

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