

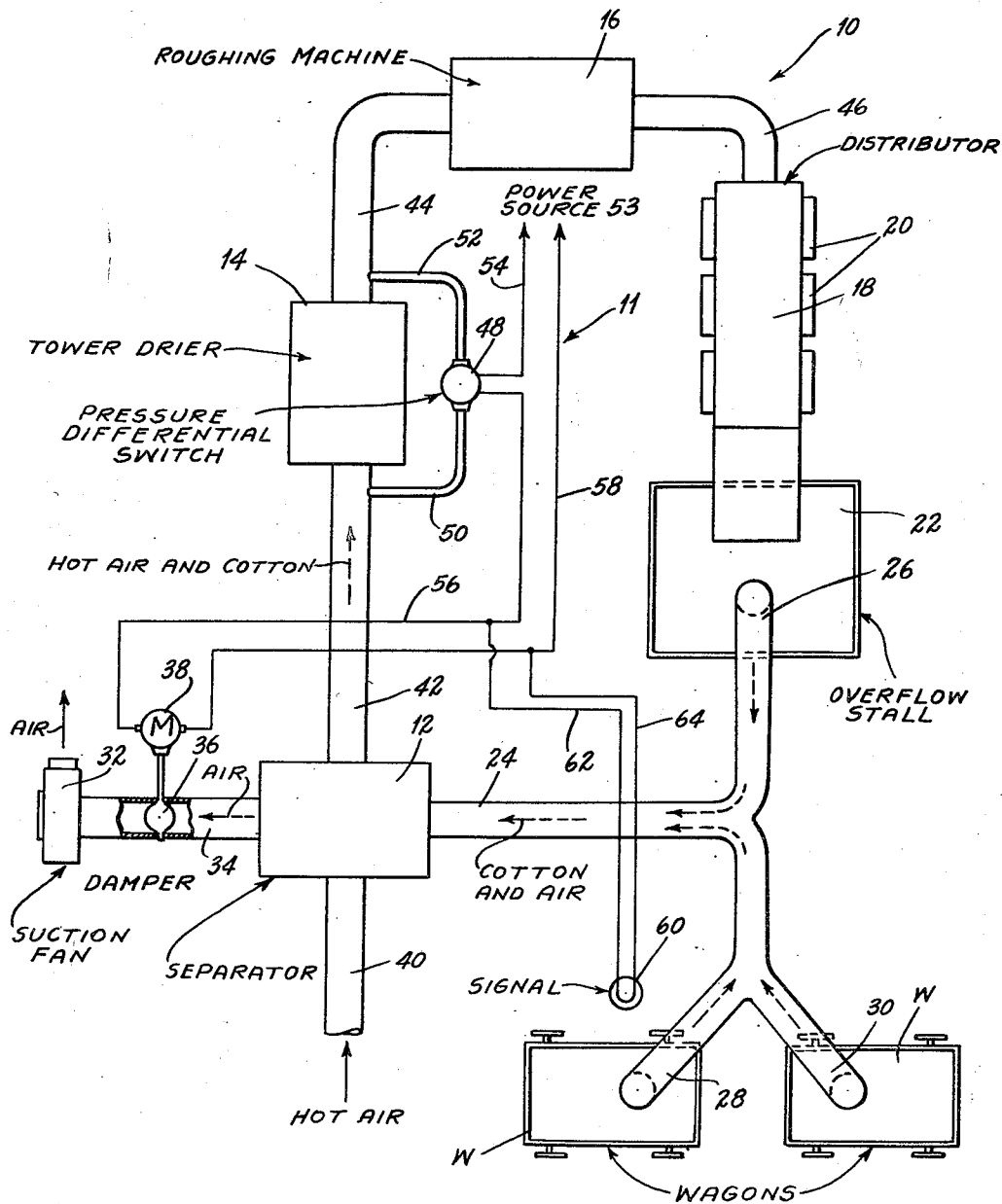
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AUTOMATIC CONTROL FOR COTTON PROCESSING EQUIPMENT

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AUTOMATIC CONTROL FOR COTTON PROCESSING EQUIPMENT

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The present invention relates generally to the cleaning and processing of mechanically picked cotton, and more particularly to an automatic control for controlling the flow of uncleaned cotton into the processing equipment to prevent the jamming-up or packing of the cotton in the equipment when a stoppage occurs.

As is well known to those familiar with the cotton cleaning art, the uncleaned cotton is picked up from wagons by means of a suction pipe or pipes, and then passes through various pieces of equipment to remove the trash and hulls and excess moisture, one of which is usually a tower drier. Unfortunately, there is a tendency for the cotton to catch in certain pieces of the equipment, and particularly in the tower drier so as to stop the flow of uncleaned cotton through the equipment. In the known constructions, there is no way of automatically stopping the flow of cotton into the processing equipment when this type of trouble occurs, with the result that the cotton continues to pile up at the obstruction and clog the equipment until it cannot take any more. The equipment then has to be shut down, and considerable time and money are spent in order to open the clogged passageways.

It is an object of the present invention, therefore, to provide a novel automatic control for stopping the flow of cotton into the cleaning equipment when a stoppage occurs so as to prevent the cotton from piling up against the obstruction. More particularly, it is an object to provide a control which automatically cuts off the suction at the inlet when the pressure differential between two selected positions in the equipment exceeds a predetermined normal amount so as to prevent additional cotton from being fed into the equipment.

Another object is to provide an automatic control which stops the flow of cotton into the equipment when a stoppage occurs and, at the same time, energizes a warning device to indicate an abnormal condition in the equipment.

Further objects and advantages of the present invention will be apparent from the detailed description, reference being had to the accompanying drawing wherein a preferred embodiment of the present invention is shown.

Broadly, the present invention comprises a suction pipe for conveying the cotton from the wagons and introducing it into the processing equipment, a damper for controlling the vacuum in the pipe, a pressure differential switch connected to two different parts of the equipment and constructed to become operative when the pressure difference between the two parts rises above a predetermined normal value, and motor means for closing the damper when the pressure differential switch becomes operative so as to stop the flow of cotton into the processing equipment. A signal, of either the visual or audible type, is also connected to the pressure differential switch so as to indicate when an abnormal condition exists in the equipment, and thereby warn the operators.

In the drawing, the figure represents a top plan schematic view of a conventional cotton processing plant employing an automatic control embodying the teachings of the present invention.

Referring to the drawing more particularly by refer-

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ence numerals, 10 indicates generally a conventional cotton processing plant provided with an automatic control constructed according to the teachings of the present invention and generally indicated by the numeral 11. The processing plant includes a separator 12, a tower drier 14, a roughing extractor-cleaner machine 16, and a distributor 18, which is disposed over a plurality of gin stands 20. An overflow stall 22 is positioned at the outlet end of the distributor 18 so as to catch the overflow from it when the cotton entering the distributor exceeds the amount which can be handled by the gin stands 20.

A suction pipe 24 is provided which is connected to one side of the separator 12. This pipe contains an inlet portion 26 disposed in the overflow stall 22, and inlet portions 28 and 30 positioned in the wagon yard so that they can be worked around in the wagons W by the operators.

A suction fan 32 is connected to the other side of the separator 12 by means of a pipe 34, and a damper valve 36 is contained in the pipe 34 for controlling the flow of air through it. The damper valve 36 is normally biased toward the open position and is closed by means of an electric motor 38 which forms part of the automatic control 11. The motor 38 is responsive to the flow conditions in the equipment so as to close the damper valve 36 and stop the introduction of cotton into the separator when a stoppage occurs, as will be described more fully hereinafter.

In the separator 12 there is an air seal dropper similar to that shown at 25, 26 in Mitchell Patent 1,942,868. A hot air supply pipe 40, and eduction pipe 42 are connected into the separator below the dropper so that cotton from the dropper is blown by the hot air into pipe 42 which connects to the top of the tower drier 14. A pipe 44 leads from the bottom of the tower drier 14 and connects it with the inlet of the roughing extractor-cleaner machine 16, and the outlet of the roughing extractor-cleaner machine 16 is connected to the inlet of the distributor 18 by means of a pipe 46.

The control 11 for automatically controlling the flow of cotton into the processing equipment includes a pressure differential assembly 48, one side of which is connected to the pipe 42 by a conduit 50 and the other side of which is connected to the pipe 44 by a conduit 52. Thus, the pressure differential assembly 48 is connected between the inlet and the outlet of the tower drier 14 so that it will respond to any increase over a predetermined normal pressure difference between the inlet and the outlet of the drier, as will occur when there is an obstruction in it.

The pressure differential assembly 48 contains an electrical switch which has one side connected to one side of an electric power source 53 by a conductor 54. The other side of the switch is connected by means of a conductor 56 with one side of the motor 38, and the other side of the motor 38 is connected to the other side of the power source 53 by a conductor 58. Thus, when the switch in the pressure differential assembly 48 is closed, the motor 38 is energized so as to move the damper valve 36 to the fully closed position and completely stop the flow of air to the suction fan 32.

An electrically operated signal 60 is located in the wagon yard in the vicinity of the operators working the suction inlets 28 and 30 so as to warn them when a stoppage has occurred. The signal 60 is connected in parallel with the conductors 56 and 58 by conductors 62 and 64, respectively, and is preferably of the audible and visible type, although it can be either audible or visible alone.

Operation

During normal operation, the damper valve 36 is maintained in the open position by the biasing means so that

the suction fan 32 causes a vacuum at the ends of pipes 26, 28 and 30 which draws the uncleaned cotton from the overflow stall 22 and wagons W and causes it to enter into the separator 12. In the separator 12, the uncleaned cotton is separated from the air and drops downwardly through an air seal into a receiver (not shown) below the separator. The air passes out of the separator, through the pipe 34 and past the damper valve 36, into the suction fan 32.

Heated air enters the pipe 40 and picks up the cotton from the receiver that has dropped through the air seal below the separator and carries it through the pipe 42 into the top of the tower drier 14. The cotton then passes downwardly through the tower drier 14 and out through the pipe 44 into the roughing extractor-cleaner machine 16. The cotton leaves the roughing machine and passes through a pipe 46 and into the distributor 18 which distributes the cotton to the various gin stands 20 disposed below it. If the amount of cotton entering the distributor exceeds the amount that can be handled by the gin stands 20, the excess cotton passes out of the outlet end of the distributor and falls into the overflow stall 22.

When the cotton is flowing through the equipment, there is a normal difference between the pressure in the pipe 42 at the top of the tower drier 14 and the pressure in the pipe 44 at the bottom of the tower drier 14. These two different pressures are transmitted to the pressure differential assembly 48 through the conduits 50 and 52, and as long as the pressure difference between these two points in the system is normal, the switch in the pressure differential assembly 48 remains open. However, when a stoppage occurs in the tower drier 14, the cotton will pile up and form a barrier within the tower drier and cause a substantial decrease in the flow of air to the pipe 44. This will cause a decrease in pressure in the conduit 52 and an increase in the pressure in the pipe 42 and the conduit 50. When this pressure exceeds the amount for which the pressure differential assembly 48 has been set, the switch will close and complete the electric circuit to the motor 38. The circuit is from one side of the power source 53, through the conductor 54, the pressure differential assembly 48, the conductor 56, the motor 38, and the conductor 58 back to the other side of the power source 53. When the motor 38 is energized, it actuates the damper valve 36 so as to cause it to close the pipe 34, thereby destroying the vacuum in pipes 24 and pipes 26, 28 and 30. This prevents additional cotton from being sucked up into the separator and from being introduced into the air stream passing through the pipe 42, thereby preventing additional cotton from piling up on the obstruction and clogging the tower drier 14.

Although the pressure differential assembly is shown connected across the tower drier, it is apparent that it can be connected across any part of the equipment where a stoppage is apt to occur.

Simultaneously with the completion of the electrical circuit through the motor 38 by means of the closing of the switch in the pressure differential assembly 48, a second circuit is completed through the signal 60 so as to inform the operators in the wagon yard that a stoppage has occurred. The circuit to the signal device 60 is made from one side of the power source 53 through the conductor 54, the switch in the pressure differential assembly 48, the conductor 56, the conductor 62, the signal device 60, the conductor 64, and the conductor 58 back to the other side of the power source 53.

Even though the vacuum is destroyed in the inlet pipe 24, the heated air continues to flow through the pipes 40 and 42 into the tower drier 14 so that, in the event the obstruction frees itself, the pressure balance or normal pressure differential between both sides of the tower drier will be restored and cause the system to resume normal operation. Thus, when the pressure difference returns to normal, the switch in the pressure differential assembly 48 will open, thereby opening the circuit to the motor 38.

This permits the biasing means to return the damper valve 36 to the fully open position, thereby restoring the vacuum in the pipe 24. As soon as the vacuum is restored in the pipe 24 and its branches 26, 28 and 30, the flow of cotton from the overflow stall 22 and the wagons W will resume. If the operators are not at the wagons when the vacuum is restored, the deenergization of the signal device 60 caused by the opening of the switch in the pressure differential assembly 48 will indicate that operation has returned to normal so that they can resume the feeding of the cotton into the pipes 28 and 30.

Thus, it is apparent that there has been provided a novel automatic control which fulfills all of the objects and advantages sought therefor. As soon as a stoppage occurs in that part of the equipment between the conduits 50 and 52, the increase of the pressure differential above normal will stop the flow of additional cotton into the equipment, thereby preventing it from piling up against the obstruction. At the same time, it will cause the energization of a signal to indicate to the operators in the wagon yard, and elsewhere if desirable, that a stoppage has occurred.

It is to be understood that the foregoing description and the accompanying drawing have been given only by way of illustration and example, and that changes and alterations in the present disclosure, which will be readily apparent to one skilled in the art, are contemplated as within the scope of the present invention, which is limited only by the claims which follow.

What is claimed is:

1. A device of the type described, comprising means for processing raw cotton; means for causing air to flow through the processing means for carrying the cotton therethrough; separate means for introducing raw cotton into the air stream flowing through the processing means including a suction fan, a pipe connected to the suction fan, and a damper valve in the pipe for controlling the flow of air to the suction fan, said suction means being air sealed from said air flow causing means; a pressure differential switch connected to different parts of the processing means which have a predetermined pressure differential on normal operation of the processing means, the switch becoming operative when the pressure differential increases a predetermined amount above normal; and means operatively connected to said switch for actuating the damper valve to stop the flow of air to the suction fan upon operation of the pressure differential switch.

2. A device of the type described, comprising means for processing raw cotton including a tower drier; means for causing air to flow through the processing means for carrying the cotton therethrough; means for introducing raw cotton into the air stream including a suction fan, a pipe connected to the inlet of the suction fan, a damper valve in the pipe, and an electric motor for operating the damper valve; a pressure differential switch connected to the inlet and the outlet of the tower drier, the switch being closed when the pressure difference between the tower drier inlet and its outlet exceeds a predetermined amount; and electrical connections between the switch and the motor for energizing the latter when the switch closes so as to cause the damper valve to close and stop the passage of air to the exhaust fan.

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