

July 18, 1933.

S. GREEN

1,918,330

UNLOADING SYSTEM

Filed July 28, 1931

2 Sheets-Sheet 1

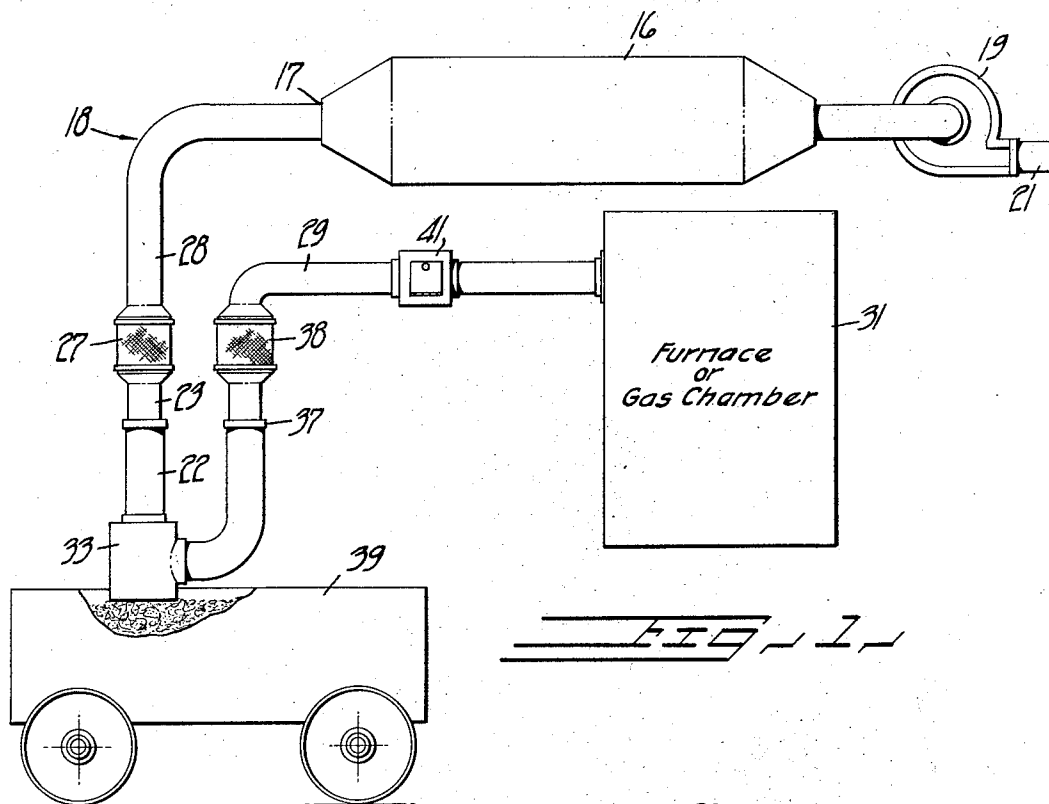


FIG. 1

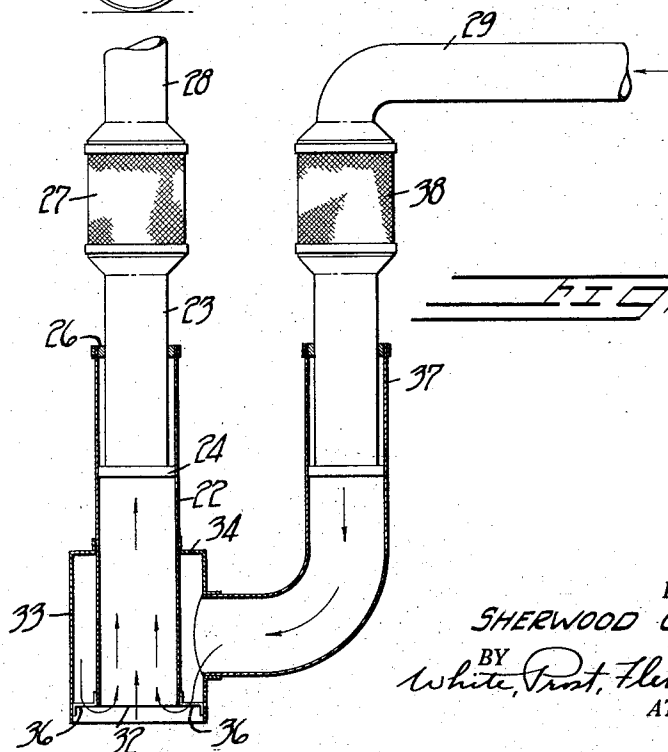


FIG. 2

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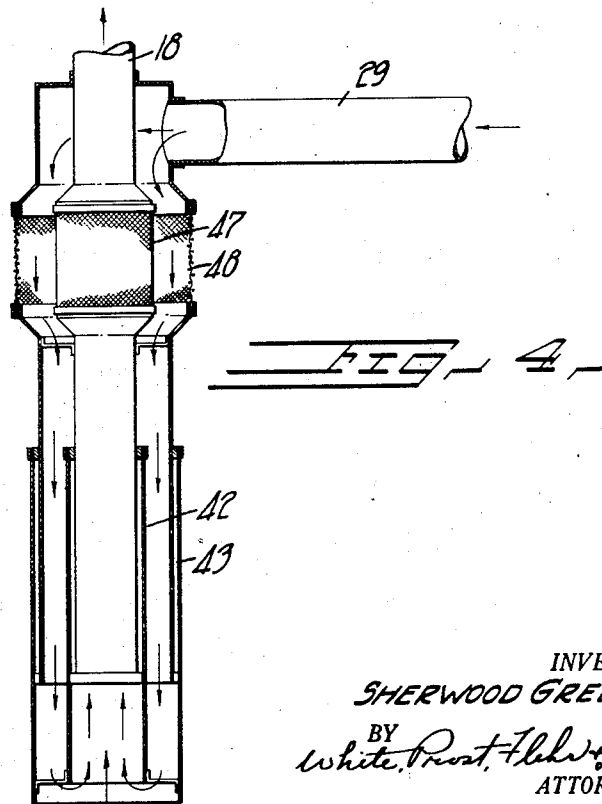
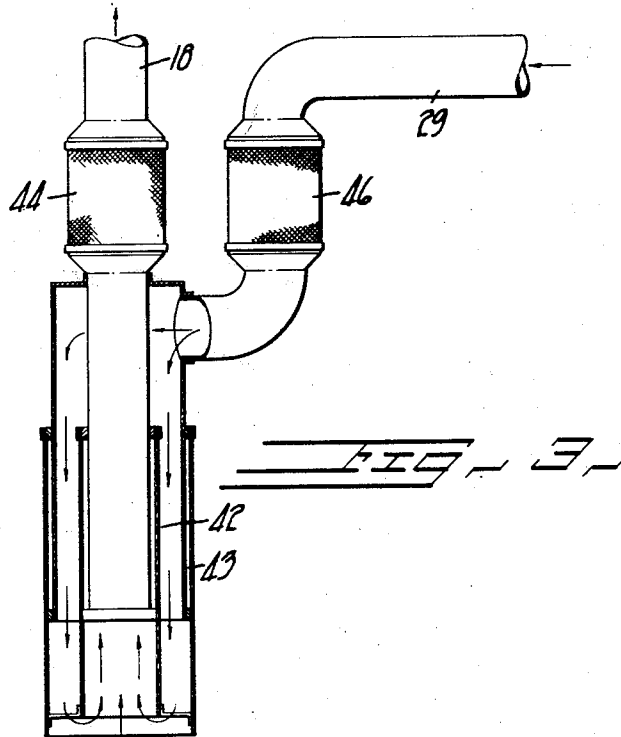
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UNITED STATES PATENT OFFICE

SHERWOOD GREEN, OF BERKELEY, CALIFORNIA

UNLOADING SYSTEM

Application filed July 28, 1931. Serial No. 553,595.

My invention relates to unloading systems and more particularly it relates to a method and apparatus for unloading cotton, grain or other materials while simultaneously subjecting the same to the atmosphere of a treating gas.

In drying, bleaching and sterilizing cotton, grain, and the like, it has been common to use gases for effecting the desired treatment and pneumatic conveyors have been commonly utilized for unloading and for delivering the material to be treated to the treating chamber. In such systems it has been the usual practice to provide a conduit through which the material is drawn by air suction to a point near the entrance of the treating chamber, at which point the material and the excess air in the suction conduit are separated, part of the air being expelled into the atmosphere, and the material and the remaining air being introduced into the treating chamber together with a stream of the gases to be used for treating the material. The use of separate conduits for delivering the material to the chamber and for directing the treating gases to the chamber necessitated the use of at least two separate blowers or suction fans and also necessitated the use of a separator for separating the material and the air, so that the gases in the treating chamber would not be unduly diluted with the air used to convey the material to be treated.

It is one object of my invention to devise a treating system utilizing pneumatic conveying means in which less apparatus is used than is required in prior systems for accomplishing similar results.

Another object is to devise a treating system in which the treating gases are used as a medium for carrying the material to be treated to the treating chamber.

Another object is to devise a treating system of the character described in which undesired dilution of the treating gases by air is minimized, any desired dilution being under accurate control, thereby insuring more uniform results in the treated material.

Another object is to simplify the appa-

ratus required in a system of the character described, thereby reducing the cost of installation as well as the cost of maintenance and operation.

These and other objects and advantages are attained in the embodiments of my invention illustrated in the accompanying drawings, in which

Fig. 1 is a view of a cotton treating system utilizing apparatus embodying certain principles of my invention, parts of the system being shown diagrammatically.

Fig. 2 is an elevational view on an enlarged scale, partly in section, showing the portion of the system illustrated in Fig. 1 to which the present invention is directed.

Fig. 3 illustrates a modification in which certain telescopic joints in the pneumatic cotton conveyor and in the gas conduit are concentric.

Fig. 4 illustrates another modification in which the pneumatic cotton conveyor and the gas supply conduit have concentric universal joints and concentric telescopic joints.

In the preferred form of my invention pneumatic conveying means is provided for removing the material to be treated from a bin, from a wagon, or from the hold of a ship and for conveying the same to a treating chamber. In order to eliminate the necessity of separating the material from the conveying medium prior to discharging the material into the treating chamber, I prefer to utilize as the conveying medium the gas which is to be used in the actual treatment of the material. The gas thus used can be heated air or a bleaching or a sterilizing gas or any one or more of the gaseous constituents of a gaseous mixture to be used in the treatment of the material. By this expedient a single suction fan or a single blower can be utilized to conduct both the material and the treating gases to the treating chamber and it is not necessary, as in prior systems, to utilize two separate sources of power, one for conveying the material and one for directing the treating gases. Also, no separator is required for separating the material from the carrying medium, since the carrying medium is to be used in the

treatment of the material and can enter the treating chamber with the material. Preferably, the treating gas to be used as the carrying medium for the material enters the pneumatic conveyor at the same point that the material enters and for accomplishing this object means is provided for surrounding the inlet end of the conveyor with an atmosphere of the treating gas. It is desirable that the inlet end of the conveyor be made capable of movements vertically and horizontally so that it can be directed adjacent all parts of the mass of material to be conveyed to the treating chamber and in order that the atmosphere of the treating gas can be made to follow the movements of the inlet of the conveyor, the gas conduit can be made to have corresponding freedom of movement. If desired, the treating chamber can be dispensed with when the treatment afforded during the conveying of the material is sufficient. The invention will be described with particular reference to a system for treating cotton, but it is to be understood that the invention is equally applicable to the treatment of various other materials.

Referring now to the drawings and first to Fig. 1 thereof, I have shown diagrammatically a cotton treating chamber 16 adapted to subject the cotton to any one of a number of different gaseous treatments. For example, heated air may be employed in the chamber for drying the cotton and expelling moisture therefrom or a suitable bleaching gas or a sterilizing gas or a combination of gases can be employed, as may be desired. The chamber 16 can be stationary or rotatable, but since the details of construction of the treating chamber do not form an essential part of the present invention, they will not be described in detail. In prior systems the cotton to be treated was elevated to a point above the inlet end 17 of the chamber and was allowed to drop into a stream of the treating gas entering the chamber. Different quantities of air were drawn into the chamber under this method, the quantity of air being determined by the operating conditions at any given instant. Sometimes, therefore, the treating gases were highly diluted with air and at other times there was insufficient dilution, resulting in non-uniform treatment in the finished product.

To overcome this disadvantage I provide a pneumatic conveyor 18 for delivering cotton to the chamber in a stream of the treating gases. A suction fan 19 beyond the outlet end of the chamber 16 serves to draw the cotton and the treating gases through the conveyor tube 18 and through the chamber 16 after which the cotton is discharged at the outlet 21 of the fan 19 for subsequent handling.

In Fig. 1 I have shown the end of pneumatic conveyor 18 as being disposed within a wagon for unloading the cotton therein. For enabling the end of the conveyor to be lifted above the sides of the wagon and to be lowered into the mass of cotton, a telescopic joint can be provided formed by an outer sleeve 22 slidably disposed about a relatively fixed tube 23. For precluding complete separation between the members and also for making the joints more nearly air tight an outer band 24 can be mounted on the tube 21 which is adapted to abut against a band 26 secured to the inner side of the sleeve 22 when the parts are in their full extended position. For enabling lateral or side movements of the inlet end of the conveyor a universal joint 27, commonly termed a bell, can be interposed between the tube 23 and the tube 28 leading to the chamber 16. The bell or universal joint 27 can be conveniently made of canvas or other suitable flexible material.

A gas conduit 29 extending from the furnace or gas storage chamber shown diagrammatically at 31 serves to conduct the hot air or other treating gas to the inlet end 32 of the pneumatic conveyor. The gas conduit terminates in a jacket 33 which is disposed about the tube 22 and is preferably concentric therewith. The jacket 33 is open at its lower end, as shown, and the gases conducted through the conduit 29 are directed through an annular passage defined by the outside of tube 22 and the inside of jacket 33 from whence they pass upwardly into the tube 22 and to the treating chamber. If desired, the lower end of jacket 33 can extend beyond the lower end of the tube 22, so that the gases will pass readily into the tube 22 when the open end of the jacket is placed adjacent a mass of cotton.

When the device is in operation the gas flows downwardly into contact with the cotton and then turns upwardly into the tube 22 carrying with it the cotton which is disposed adjacent the mouth 32 of the pneumatic conveyor. Placing of the lower end of the jacket 33 against a mass of cotton serves to close the opening sufficiently to complete the suction line between the conveyor 18 and the gas conduit 29, so that heated air or other gas, as the case may be, is forcibly drawn from the furnace or gas chamber 31. The jacket 33 is provided with an end wall 34 which closes the upper end of the annular space from the atmosphere and suitable brackets 36 can be employed for spacing the jacket from the tube 22 and for strengthening the structure.

To make the jacket 33 movable together with the tube 22, a telescopic joint 37 and a universal joint 38 can be provided in the conduit 29 which permit movements corresponding to the movements afforded by the

telescopic joint and the universal joint of the pneumatic conveyor. Thus, the inlet end of the pneumatic conveyor can be raised or lowered or moved from side to side without disturbing the relationship between the jacket 33 and the tube 22. As the inlet end of the pneumatic conveyor is moved about the mass of cotton, the cotton is lifted from the wagon or other container and is simultaneously intermingled with the treating gas. The same fan 19 which draws the treating gas from the source of supply to the treating chamber is in this manner employed to unload the cotton and convey the same through the treating chamber. If it is desired to separate the treating gas and the cotton at the fan 19, suitable means, such as those already known in this art, can be provided for this purpose.

If desired, suitable means, such as a damper 41 can be provided for admitting air into the gas conduit to obtain any desired amount of air dilution of the treating gas.

In Fig. 3 I have shown a modification in which a telescopic joint 42 in the pneumatic conveyor is arranged concentrically within a telescopic joint 43 of the gas conduit, thereby forming an annular gas passage between the telescopic sections. In this embodiment the universal joints 44 and 46 of the pneumatic conveyor and the gas conduit, respectively, can be disposed side by side as in the embodiment shown in Fig. 1.

In the modification shown in Fig. 4, not only the telescopic joints 42 and 43 are concentric, but also the universal joints 47 and 48 of the conveyor and of the gas conduit are arranged concentrically, thus providing an annular passage which extends from a point above the universal joints to the inlet end of the pneumatic conveyor. The operation of the embodiments illustrated in Figs. 3 and 4 is practically identical with the operation of the form shown in Figs. 1 and 2.

If desired, the gas chamber and the treating chamber can be transposed so that the treating gas flows downwardly through the inner conduit and the material to be treated flows upwardly through the surrounding annular conduit.

Reviewing briefly the operation of the apparatus when used as illustrated in the system of Fig. 1, it will be noticed that the suction fan 19 furnishes the power for unloading the cotton or other material from the wagon 39 or from a storage bin, for conveying the material through the treating chamber 16 and for directing the treating gases from the source of supply to the treating chamber. It will be noticed also that the material is subjected to an atmosphere of the treating gases throughout the entire path of its travel, thus utilizing the

time required for the material to pass from the wagon to the treating chamber in the actual treatment of the material. Also, more intimate intermingling of the treating gases with the material is afforded than when the material and the gases are introduced separately into the treating chamber, as in prior systems. Frequently, as when the conveyor is long or when the desired treatment can be accomplished quickly, the treating chamber can be eliminated from the system, the pneumatic conveyor by itself affording adequate treatment.

While I have shown and described certain preferred embodiments of my invention, I do not wish to be limited thereto, since the invention as defined in the appended claims can be embodied in a plurality of other forms.

I claim:

1. Apparatus for unloading cotton comprising a pneumatic conveyor, a telescopic joint in said conveyor for enabling longitudinal adjustment of the conveyor, a universal joint in the conveyor for enabling lateral positioning of its inlet end, and a conduit for conducting treating gas to the cotton prior to its travel through the conveyor, a telescopic joint and a universal joint in said conduit for enabling said conduit to follow the movements of the inlet end of said conveyor, the telescopic joint of said conveyor being concentric with the telescopic joint of said conduit.

2. Apparatus for conveying cotton to a treating chamber comprising a pneumatic conveyor, a telescopic joint in said conveyor for enabling longitudinal adjustment of the conveyor, a universal joint in the conveyor for enabling lateral positioning of its inlet end, and a conduit for conducting treating gas to the cotton prior to its travel through the conveyor, a telescopic joint and a universal joint in said conduit for enabling said conduit to follow the movements of the inlet end of said conveyor, the telescopic joint of said conveyor being concentric with the telescopic joint of said conduit and, likewise, the universal joint of said conveyor being concentric with the universal joint of said conduit.

3. Apparatus of the character described comprising a pneumatic conveyor, a telescopic joint in said conveyor for enabling movement of its inlet end, a conduit for conducting a gas into the inlet end of said conveyor, and a telescopic joint in said conduit for enabling the conduit to follow the movements of the inlet end of the conveyor, the telescopic joints in said conveyor and in said conduit being concentric.

4. Apparatus of the character described comprising a pneumatic conveyor, a universal joint in said conveyor for enabling movement of its inlet end, a conduit for con-

ducting a gas into the inlet end of said conveyor, and a universal joint in said conduit for enabling the conduit to follow the movements of the inlet end of the conveyor, the universal joints in said conveyor and in said conduit being concentric.

5 5. Apparatus of the character described comprising a pneumatic conveyor, a telescopic joint and a universal joint in said conveyor for enabling longitudinal and lateral

movements of its inlet end, a conduit for conducting a gas into the inlet end of said conveyor, and a telescopic joint and a universal joint in said conduit for enabling the conduit to follow the movements of the inlet end of the conveyor, said telescopic joints being concentric and said universal joints also being concentric.

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