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SEED COTTON DRYING APPARATUS

Filed March 22, 1928

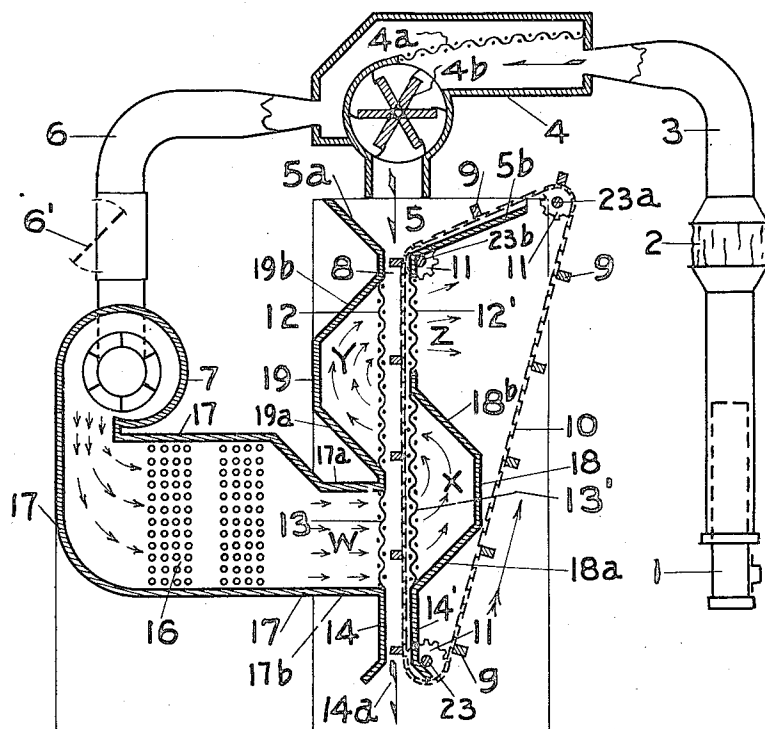


FIG. 1

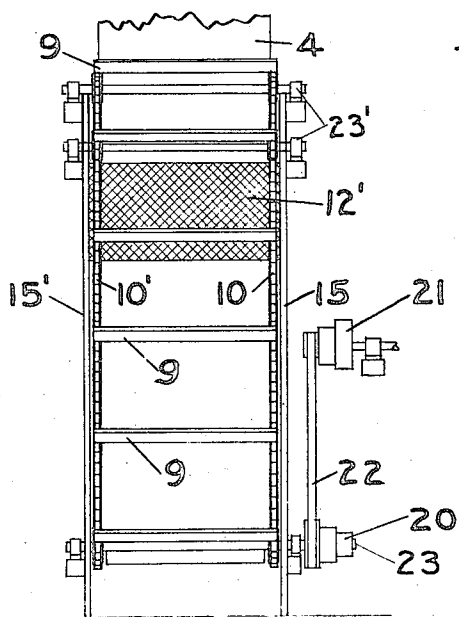


FIG. 2

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SEED-COTTON-DRYING APPARATUS.

Application filed March 22, 1923. Serial No. 263,812.

(GRANTED UNDER THE ACT OF MARCH 3, 1883, 22 STAT. L. 625.)

This application is made under the act of March 3, 1883, chapter 143 (22 Stat. 625) and the invention herein described and claimed may be used by the Government of the United States or any of its officers or employees in the prosecution of work for the Government, or any person in the United States, without payment to me of any royalty thereon.

My invention relates to new and useful improvements in apparatus for drying seed-cotton continuously at a quantity rate, and the following is a specification:

Seed-cotton is the raw cotton product harvested directly from the cotton plant, and is the original cotton product combining the seed and lint (or fibre) together in natural form, and may have portions of the bolls, hulls, plant parts and foreign matter adhering to it when harvested.

One object of my invention is to provide an apparatus of the character described which will be capable of drying quantities of seed-cotton preparatory to either storing or ginning the same. Unless the seed-cotton is sufficiently dry, the storing or ginning may lessen the possible value and quality of both fibre and seed through various deteriorating agencies such as "sweating", "souring", "molding", "discoloring", "napping", "machining", "mutilating", and so forth. By properly drying or curing the combination of seed and fibre in its natural original state known as "seed-cotton" it is possible to provide an effective check and prevention of the above mentioned destructive and deteriorating agencies.

Another object of my invention is to provide a very simple and relatively inexpensive apparatus which will have a minimum number of parts, a minimum requirement for power, a long life of usefulness with minimum maintenance, and which will contain the essential features of control over the drying and curing of seed-cotton regardless of the many variations to be found in the degrees of dampness of the seed-cotton as well as in atmospheric conditions and in the weather generally.

In my scientific investigations upon the subject of drying seed-cotton, undertaken as an employee of the Department of Agriculture of the United States of America, I

have found the basic requirements concerning length of time of exposure, temperature of the drying medium and volume of heated atmosphere required per unit weight of seed-cotton—all as set forth in my description of a drying process claimed concurrently herewith in one of two inventions on other apparatus for drying seed-cotton.

I attain the objects aforesaid by the apparatus illustrated in the accompanying drawing, in which—

Figure 1 is a vertical section of the entire machine, connected to pneumatic-mechanical cotton-handling equipment (partly in section) of a type used at cotton gins, in combination with which my invention is particularly efficient;

Figure 2 is an end elevation of the machine proper, omitting the aforesaid pneumatic-mechanical cotton-handling equipment, and showing the back panel assembly of the machine, and looking toward the atmospheric screen or outlet grille.

Similar numerals refer to similar parts throughout the several views.

Referring to the drawing it will be seen that my seed-cotton dryer comprises a vertical chute assembly consisting of a screened front panel assembly, a screened back panel assembly, blank sides 15 and 15' resting upon the floor and supporting the apparatus by suitable means, a cotton inlet hopper 5 with inclined hopper-aprons 5^a and 5^b, an endless conveyor assembly, a cotton trunk outlet 14^a, and other appurtenances hereinafter fully described. This vertical chute assembly may be enclosed, if desired, by suitable means (not shown).

The vertical sides 15 and 15' are supported by the floor and form the blank side walls of the vertical chute 8 which is defined between said sides 15 and 15' and the front and back screened panel assemblies. In cotton drying practice, the "throat" or least width of the vertical chute 8 as measured for instance between the screened surfaces 12 and 12' should preferably not exceed six inches, and the breadth of the vertical chute 8 as measured between the faces of the sides 15 and 15' should preferably range between four and six feet—all for reasons set forth hereinafter.

The screened front panel assembly comprises the vertical blank panel 14 which ex-

tends laterally between the sides 15 and 15', the inlet grille 13 which extends laterally between the sides 15 and 15', the chute grille 12 similar to inlet grille 13, and the inclined hopper-apron 5^a which extends laterally between the sides 15 and 15'.

The vertical blank panel 14 and the vertical chute grilles 13 and 12 all lie in the same vertical plane and are joined to each other and to the sides 15 and 15' and to the inclined hopper-apron 5^a by suitable means at the places of junction thereto.

The screened back panel assembly comprises the vertical blank panel 14', the vertical chute grilles 13' and 12' and the inclined hopper-apron 5^b—all of which extend laterally between the sides 15 and 15' and are joined together and to said sides 15 and 15' by suitable means at the places of junction thereto.

Mounted upon the screened front panel assembly by suitable means and attached to the sides 15 and 15' by suitable means are the cabinet or duct members 17^b, 17^a, 19, 19^a and 19^b which form the chambers W and Y which are substantially air-tight ducts or passages used to confine continuously flowing currents of heated atmosphere in the channels or paths delineated by the ventilation arrows of Figure 1.

Mounted upon the screened back panel assembly by suitable means and attached to the sides 15 and 15' by suitable means are the cabinet or duct members 18, 18^a and 18^b which form the substantially air-tight duct or passage X which is used to confine the continuously flowing currents of heated atmosphere in the channels or paths delineated by the ventilation arrows of Figure 1.

The discharge of the fan 7 connects by suitable means to the heater casing trunk or duct 17 within which are disposed the heater elements or radiation surfaces 16 which may be either steam, hot water or furnace radiation surfaces.

The heater casing trunk 17 is of substantially air-tight construction and is attached by suitable means to the sides 15 and 15' and to the members 17^a and 17^b so as to make a substantially air-tight junction with the chamber W.

The fan 7 may be driven by any source of power (not shown) such as a line shaft, or motor or engine. The suction intake of the fan 7 may draw its atmosphere either directly from the atmosphere or from the cotton-handling apparatus pipe 6 as delineated, or from other cotton handling devices (not shown).

Disposed between the sides 15 and 15' is the endless conveyor assembly which comprises the shafts 23, 23^a and 23^b, the chains 10 and 10', the sprockets 11, the bearings 23', the cross-members 9 and the variable speed mechanism 20, 21 and 22.

The shafts 23, 23^a and 23^b rotate within the bearings 23' which are attached to the sides 15 and 15' by suitable means. Secured upon the said shafts 23, 23^a and 23^b are the sprockets 11 upon which the endless chains 10 and 10' are conveyed.

Disposed upon the chains 10 and 10' by suitable means are the cross-members 9 whose dimensions are such as to permit travel through the vertical chute 8. Power is delivered to the endless conveyor assembly by means of the cone-and-belt combination as delineated or by other suitable reduction gearing (not shown), and travel of the endless conveyor assembly is counterclockwise as shown in Figure 1.

The run diagonally upward between the shafts 23 and 23^a is preferably exposed for ready access and repair purposes; the run along the surface of the hopper-apron 5^b and between the shafts 23^a and 23^b is preferably adjusted so as to keep the said hopper-apron cleared of such seed-cotton as may be delivered thereto; and the downward vertical run within the vertical chute 8 and between the shafts 23^b and 23 is preferably adjusted to maintain a uniform clearance of the chains 10 and 10' and the cross-members 9 with respect to the various screened surfaces and panels which comprise the said chute 8.

From the foregoing it will be evident that operation of my drying apparatus is very simple.

Seed-cotton is preferably delivered to the hopper 5 by means of the pneumatic-mechanical cotton-handling devices delineated, in which the seed-cotton is sucked from bins or wagons (not shown) into the telescope 1 and passes thence through the flexible bell joint 2 and cotton piping 3 into the cotton separator or dropper 4 where the seed-cotton is automatically separated from the currents of flowing atmosphere by means of screen devices such as 4^a and the revolving vacuum wheel 4^b.

After passing through the screen member 4^a the atmosphere continues through the cotton pipe 6 and air-valve 6' into the suction and intake of the fan 7 or to some other source of suction (not shown). Cotton gins make use of the conventional air-valve device 6' in order to control the rate of feed of cotton to the various devices, and it is here delineated with the devices 1, 2, 3 and 4 to illustrate one method by which my apparatus may be fed with seed-cotton in continuous quantities commensurate with the delivery of seed-cotton to the gins.

The fan 7, as before described, delivers its atmospheric discharge into the duct 17 and through the heater elements 16 into the chamber W whence it continues in the course delineated by the ventilation arrows through the screens 13 and 13' into the chamber X where it is deflected so as to pass through the

screens 13' and 12 into the chamber Y whence it is again deflected so as to pass through the screens 12 and 12' out into the external atmosphere at Z.

5 Incoming seed-cotton is fed into the hopper 5 and passes downward through the chute 8 and out at the cotton trunk outlet 14^a where it is disposed of by suitable means.

10 Passage downward through the chute 8 is mainly by gravity, but the action of the cross-members 9 upon the endless conveyor chains 10 and 10' is such as to prevent the moving layer of seed-cotton from dropping too rapidly or from becoming choked within the
15 chute 8.

It is preferable to start the drying operation by filling the chute without movement of the endless conveyor mechanism until the chute is filled, after which the feeding of the
20 seed-cotton into the hopper 5 and downward through the chute 8 in conjunction with the moving endless conveyor mechanism provides a substantially continuous layer of seed-cotton passing through the chute 8 and
25 receiving the direct penetration by the drying medium during the length of time of exposure within the vertical chute 8. I employ the cotton trunk outlet 14^a to act as a seal which will prevent undue escape of the drying
30 medium by short-circuits or leaks as it passes from the chamber W to the chamber X.

I also preferably confine the "throat" distance of the chute 8 to six inches or less, because a greater thickness of seed-cotton traveling in a layer of the character described
35 will offer undue pressure resistance to the flow of the drying medium, and will not secure a uniform drying effect or penetration. I also preferably retain the breadth of the
40 vertical chute 8 (between the sides 15 and 15') within the limits of four to six feet, so that standard feeding apparatus on the market may be used as delineated.

From the foregoing it will be evident that
45 my apparatus provides a multi-stage or multi-pass drying apparatus arranged to have the incoming damp seed-cotton make a contact with the outgoing moisture-laden drying medium, and to have the outgoing
50 dryest seed-cotton receiving its final penetration from the hottest, incoming currents of the drying medium. By the construction em-

ployed it is evident that a minimum loss of the drying medium through leaks will be maintained, and that the moving parts of the
55 apparatus are simple to construct, operate and maintain.

Changing the speed of travel of the conveyor assembly will give control over the length of time of exposure of the seed-cotton
60 to the drying process, and proper selection of the fan size and speed will enable the adequate providing of sufficient volumes of heated atmosphere to dry a large variety of damp seed-cottons. Means for controlling the
65 speed of the endless conveyor assembly may be accomplished by reduction gearing such as is shown in Patent No. 1,329,082, issued January 27, 1920.

I claim:

70 A seed-cotton apparatus of the character described, in combination with a substantially vertical enclosed screened chute or passage having a cotton inlet and a cotton outlet, grilles or screens disposed within the
75 planes of the faces of the said chute so that seed-cotton may be conveyed through said chute while being subjected to currents of heated atmosphere without losing seed-cotton from said chute, an endless conveyor
80 mechanism disposed to convey seed-cotton from the cotton inlet of said chute to the cotton outlet of said chute, means for regulating the speed of movement of the conveyed seed-cotton within said chute, a heated-atmosphere generator or radiation surfaces, a series of ducts and chambers disposed with relation to said radiation surfaces and said vertical chute so as to provide a substantially airtight series or passages for the continuous
85 flow of heated atmosphere, a fan or blower for delivering atmosphere through the said radiation surfaces and through said series of chambers and alternately back and forth through the layer of seed-cotton being conveyed through said chute, an outlet grille or screen for discharge of outgoing moisture-laden drying medium and for observation of the rate of feed of seed-cotton into the said chute, and suitable means for feeding seed-cotton continuously into said chute at a pre-determined rate.
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