

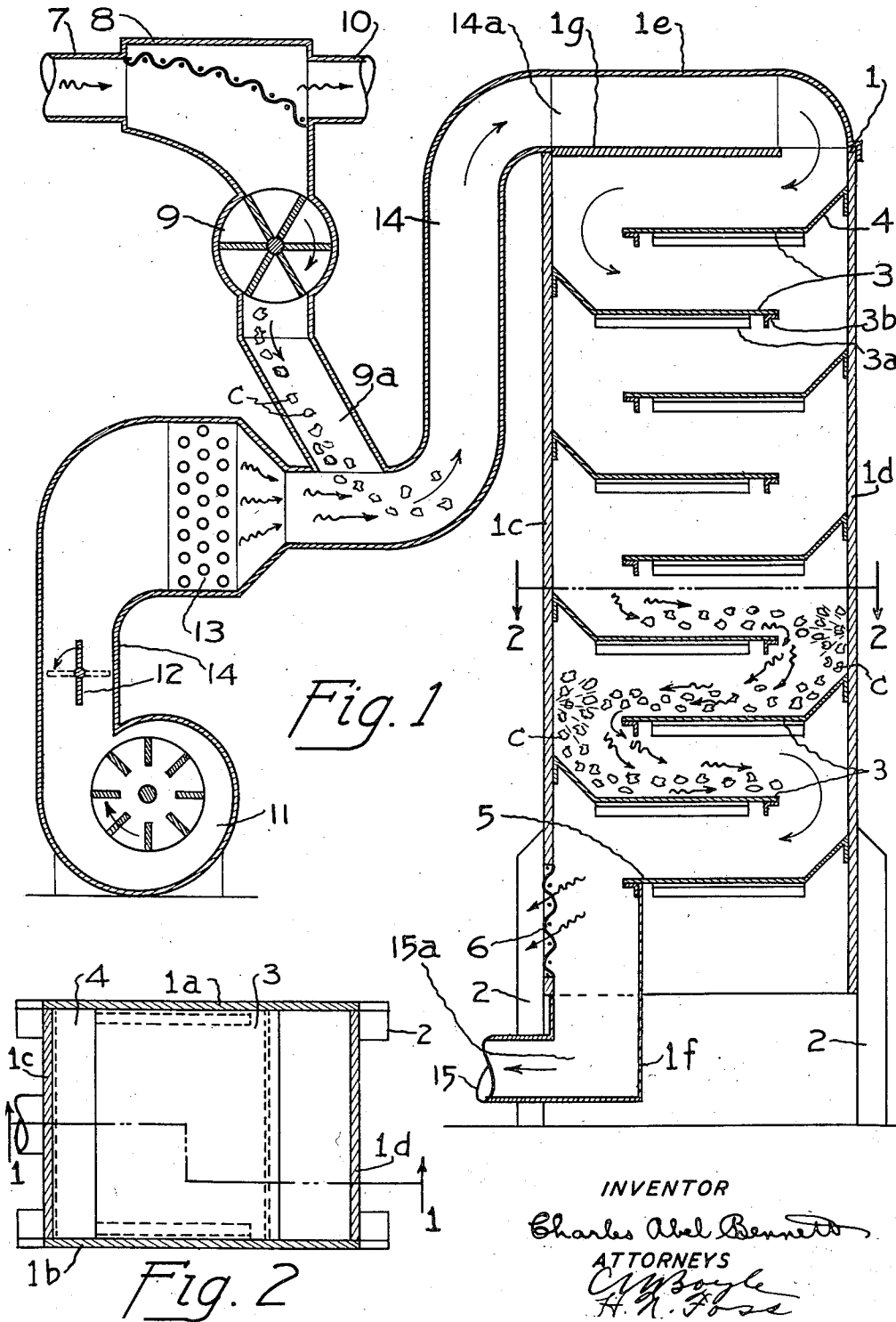
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APPARATUS FOR DRYING SEED COTTON

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UNITED STATES PATENT OFFICE

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APPARATUS FOR DRYING SEED-COTTON

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(GRANTED UNDER THE ACT OF MARCH 3, 1883, AS AMENDED APRIL 30, 1928; 370 O. G. 757)

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 improvements in seed-cotton drying apparatus in which the drying process (now generally known as the "Government Process") developed by the United States Department of Agriculture is applied, and in which concurrent volumes of heated atmosphere and seed-cotton are pneumatically forced along paths or channels so as to thoroughly expose the said seed-cotton to the penetration and drying action of the heated atmosphere for a sufficient length of time to secure an adequate degree of dryness essential to optimum cleaning, extracting and ginning of said seed-cotton.

Prior to my invention all driers for seed-cotton have utilized apparatus including moving mechanical parts within the drier, such as trays, conveyors, aprons, vibrating shelves, revolving tubes or cylinders, and the like; the designs of which usually precluded construction by the average cotton planter or ginner. My invention eliminates all moving mechanisms within the drier by blowing the seed-cotton at a pre-determined velocity through the dried tower, and thus permits any cotton planter or cotton ginner to construct the same.

Driers produced prior to my invention have usually lacked accessibility or means for the purposes of cleaning out the apparatus from time to time in order to avoid a mixing of pedigreed or special seed. As will be seen hereinafter, my invention provides a most simple and effective means for cleaning out the drier at any time.

In my research work and investigations for the United States Department of Agriculture as a drying engineer and as the engineer for the U. S. Cotton Ginning Laboratory, I have discovered certain facts further bear-

ing upon the drying of seed-cotton which are as follows:

First, that damp seed-cotton may be moved very slowly by pneumatic means when an enclosed passage with smooth horizontal surfaces is provided, and when the velocity of the continuous current of atmosphere is reduced to 1000 feet per minute or less. Obviously, this merely requires a correct proportioning of said enclosed passage areas for any given volumes of atmosphere to be delivered therein, or a volume control to suit the given passage areas.

Second, that it is a characteristic of all seed-cottons to fluff up under exposure to currents of heated atmosphere, especially when violently thrown against a vertical flat surface, and by this phenomenon we note that damp portions of seed-cotton are quickly and readily dried.

Third, that by providing numerous short horizontal passages and abrupt reversals of flow within an enclosed pneumatic passage, together with means for regulating the volume and velocity of the currents of heated atmosphere, a simple cotton drying apparatus may be constructed which eliminates moving mechanical parts within the drier itself.

The objects, therefore, of my invention, are,—

First, to afford a dependable cotton drying apparatus of such simple design and cheapness as to render it possible of construction at all cotton gins and plantations; second, to provide a continuous method and apparatus for drying seed-cotton in quantities commensurate with the customary rates of delivery of seed-cotton to the cotton gins; and third, to provide a design of drier which requires small floor space and may be readily installed in any existing cotton ginning establishment.

I attain these objects by the apparatus for drying seed-cotton illustrated in the accompanying drawing, in which—

Figure 1 is a vertical section of the apparatus as it appears on the section line 1—1 in Figure 2, showing by partial diagram the flow of seed-cotton and heated atmosphere within the drier; and

Figure 2 is a plan section of the apparatus as it appears on section line 2—2 in Figure 1.

Similar numerals refer to similar parts throughout the several views.

- 5 Referring to the drawing it will be seen that my drier comprises a vertical tower 1 having sides 1—*a*, 1—*b*, 1—*c*, 1—*d*, a top hood 1—*e*, and bottom funnel or hopper 1—*f*, a fixed floor 1—*g*, and suitable supports 2.
- 10 Inlets 9—*a* and 14—*a* are provided for introducing volumes of seed-cotton and heated atmosphere into the tower 1, and outlet 15—*a* and optional outlet 6 are provided as discharges for the dried seed-cotton and a portion of the moisture laden drying medium respectively.

The vertical tower 1 is of fairly tight construction to eliminate air leaks, and may be constructed either of wood or metal. If constructed of wood it is desirable to line the inner surfaces of the tower 1 with thin sheet metal (not shown) to secure both smoothness and air-tightness.

The general plan of the vertical tower 1 is rectangular, and the optimum form of rectangle secured in Government tests appears to be in the proportions shown.

A series of fixed deflectors 4 are alternately positioned between the tower side walls 1—*a* and 1—*b*; the said deflectors 4 being attached to the tower side walls 1—*a*, 1—*b*, 1—*c* and 1—*d* by suitable means (not shown). The deflectors 4 are preferably constructed of metal forming an integral part of the floors 3 and may be supported and stiffened by suitable supports which are attached to the inner faces of the tower side walls 1—*c* and 1—*d* by suitable means (not shown).

Floors 3 and 5, preferably of metal, extend between the tower side walls 1—*a* and 1—*b* as shown, being supported by the members 3*a* and 3*b* which are attached to the tower side walls 1*a* and 1*b* by any suitable means.

Damp seed-cotton and heated atmosphere may be delivered into the top of the tower 1 by several conventional cotton handling methods, one being here shown which comprises a cotton separator 8 having a cotton pipe 7, an unloading suction pipe 10 connected to a fan not shown, and a vacuum wheel 9 which delivers the said seed-cotton through the cotton inlet 9—*a* and thence through duct 14 into the tower 1 without loss of heated atmosphere. The continuous blast of heated atmosphere enters the tower 1 at the air inlet 14—*a*, and said heated atmosphere is provided by the conventional means of a fan 11 which forces the current of atmosphere thru the air-tight duct 14 in which is positioned a blast heater or radiation elements 13. A boiler (not shown) or other source of heat provides the said blast heater 13 with adequate means for raising the temperature of the atmosphere to a predetermined degree.

Control of the volume of heated atmosphere is achieved by use of a damper 12, or by varying the speed of the fan 11 by any suitable means. Control of the temperature is primarily achieved by the design of the blast heater and its control valves (not shown), in conventional manner.

A discharge outlet for the dried cotton is provided at the bottom funnel or hopper 1—*f* of the vertical tower 1. The regular ginning suction pipe (not shown) connects to suction pipe 15 into which the hopper 1—*f* discharges. It is optional to provide a course screen or perforated plate 6 opposite the bottom floor 5 to permit discharge of excess hot air, loose trash and dirt as the dried seed-cotton enters the bottom funnel 1*f*.

It should be understood that the method of feeding or discharging cotton as well as the positioning of piping, fans and heaters are of secondary importance to my invention, and may be effected without departing from the spirit of my invention. Some planters will desire to discharge into a bin.

In such case the suction pipe 15 may be omitted. Others may desire to place the separator 8, fan 11 and heater 13 on the level of their ginning floors, which is feasible with my device.

Referring to the operation of my drier and the application thereto of the Government drying process, it will be seen that the damp seed-cotton is dropped into a continuous blast of heated atmosphere and is thence blown into the top hood 1—*e* of the vertical tower 1, thereafter passing along the floor 1—*g* and thence traveling in a tortuous descending path along the several floors 3 and 5 to the outlet 15—*a*.

The Government drying process prescribes a temperature of not more than 200 degrees Fahr., a volume of heated atmosphere of from 40 to 100 cubic feet per pound of damp seed-cotton, and an exposure of from 45 to 180 seconds. My control of volumes and temperatures has hereinbefore been explained. I control the period of exposure by predetermining the number of floors 3, and their spacing to form ducts of desired cross-sectional area.

Figure 1 indicates diagrammatically the flow of the heated atmosphere or drying medium by the conventional arrows. Figure 1 also delineates an illustration of the impacts and violent agitation which occur to the locks of seed-cotton C as it leaves each floor 3. Thus the seed-cotton locks C impinge violently, but without damage, against the tower sides 1—*c* and 1—*d* while the currents of heated atmosphere whip around the floor members 3—*b* in abrupt reversals of approximately 180 degrees. Following the impingement of the seed-cotton locks C against the heated vertical surfaces formed by the tower sides 1—*c* and 1—*d*, the said seed-cotton drops down to the deflectors 4 and thence

again into the conveying currents of heated atmosphere.

By selecting an adequate number of floors 3 for this vertical drier, it is also feasible to 5 adapt my invention to the varying moisture content conditions which are to be found in the different sections of the cotton growing regions of the United States.

I am aware that prior to my invention 10 various cotton driers have been made which employ the Government process. I do not claim such a combination broadly, therefore, but

I claim:

15 A cotton drying apparatus of the character described comprising an enclosed vertical tower of substantially air-tight construction, means for introducing and pneumatically conveying seed-cotton therein, staggered non- 20 foraminous floors arranged horizontally within said tower to form a descending zig-zag plenum chamber for both said seed-cotton and heated atmosphere, a heated atmosphere generator, inlets and outlets for continuous 25 flow of heated atmosphere and seed-cotton concurrently through said descending zig-zag plenum chamber within said vertical tower, means for discharge of foreign matter and excess heated atmosphere from said ver- 30 tical tower, and means for discharge of dried seed-cotton from the bottom of said vertical tower.

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