

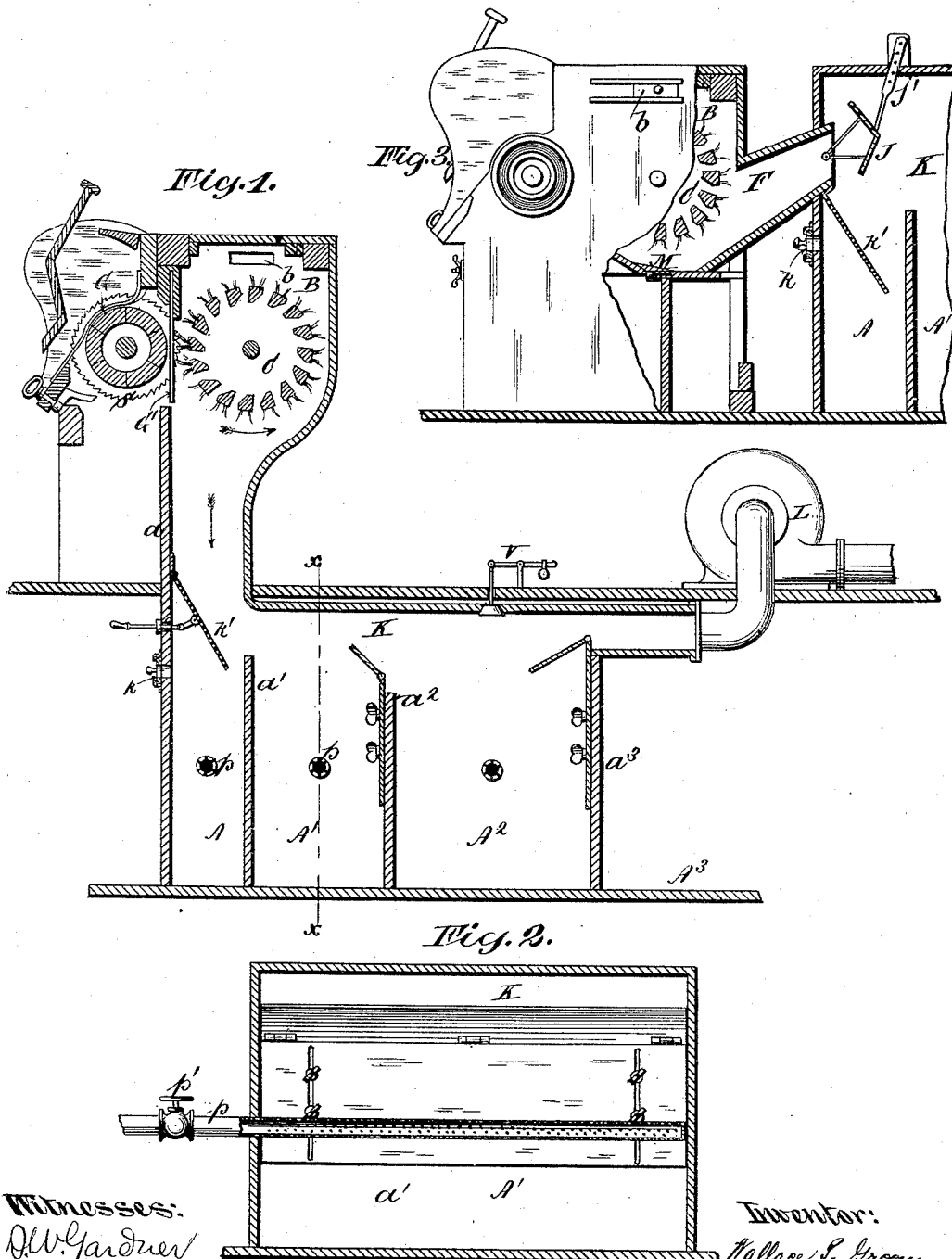
(No Model.)

W. P. GROOM.

PROCESS OF AND APPARATUS FOR GINNING COTTON.

No. 469,559.

Patented Feb. 23, 1892.



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PROCESS OF AND APPARATUS FOR GINNING COTTON.

SPECIFICATION forming part of Letters Patent No. 469,559, dated February 23, 1892.

Application filed May 22, 1891. Serial No. 393,755. (No model.)

To all whom it may concern:

Be it known that I, WALLACE P. GROOM, a citizen of the United States, residing in the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Processes of and Apparatus for Ginning Cotton, of which the following is a description sufficient to enable others skilled in the art to which the invention appertains to make and use the same.

The object of my invention is to obtain cotton free from seed, motes, sand, or foreign substances of any kind. All cotton as now found in the market and as it is delivered to manufacturers is contaminated more or less with impurities that cling to it through the various stages of manipulation, even to the spun thread and woven fabric. Obviously the proper and advantageous time for separating the cotton from impurities is during its treatment prior to baling for shipment; but heretofore this separation has been only imperfectly accomplished in practice. The brush-cylinder of the cotton-gin drives forward the impurities commingled with the cotton, and no provision has heretofore been made for effecting at this stage the greatly-desired separation, notwithstanding the fact that when the cotton leaves the brush-cylinder of the gin it is in a more favorable condition for separation from impurities than ever afforded at any time thereafter.

The distinguishing feature of my invention consists in lifting out pure cotton and floating it away from the heavier materials, which also pass through the cotton ribs or grate in the ginning process. I accomplish this separation by means of a current of air induced from the exterior atmosphere by a partial vacuum created by a suitable exhaust device connected with the discharge-passage of the apparatus. Thus it will be seen that my method is the reverse of that heretofore known and practiced, in which the cotton is blown out of and away from the gin, in which there is an excess of pressure.

By creating and maintaining a partial vacuum within the apparatus I am enabled to introduce auxiliary currents of air at certain desirable points in such manner as to sift out and remove the cotton from the heavier foreign substances, which latter are retained in

the apparatus. In other words, I remove from the discharge end of the apparatus a larger volume of air than that which enters the gin through the ribs, grid, or grate with the cotton, and consequently by working at a steady or uniform pressure below that of the atmosphere I can control and manipulate the cotton more perfectly than by any means heretofore devised, since the cotton is readily carried off by a gentle constantly-receding air-current of low tension, which is insufficient to carry the heavy impurities which pass through the grate or grid of the gin with the cotton.

In the accompanying drawings I illustrate means for carrying out my improvements practically, although I do not wish to confine myself to the special form or construction of parts shown, since it is obvious that various modifications may be made in detail without deviating from the spirit and intent of my invention.

Figure 1 is a vertical longitudinal section of the essential parts of a cotton-gin constructed according to my invention. Fig. 2 is a transverse section upon plane of line x , Fig. 1; Fig. 3, a sectional elevation illustrating a modified arrangement of parts in which an adjustable fender is employed to check the momentum of the air as well as of the cotton and heavier substances which pass through the grid of the gin.

In carrying out my invention practically the form and construction of the apparatus are of secondary importance.

My improvements may be applied to or used in conjunction with any suitable form of cotton-gin.

In the accompanying drawings I illustrate my invention as incorporated in a "saw-gin" of ordinary construction.

In all cotton-gins heretofore made other than roller-gins the rapidly-revolving brush-cylinder C has been depended upon not only to force the cotton from the teeth of the saws S, but also to drive out whatever comes under its control either horizontally or upward through a flue F either into a "lint-room" or into a "condenser."

Incidentally it may be mentioned here that it is immaterial to my process what disposition is made of the pure cotton as discharged

from the apparatus. It may be discharged into a lint-room or condenser of any kind, as desired.

In the old form of gin above referred to the supply of air which is driven out by the rapid rotation of the brush-cylinder enters chiefly through the front of the gin below the saws. Cotton-seeds, (immature as well as broken,) sand, and motes of all sorts that pass with the revolving saws through the ribs, grate, or grid G G' are driven out together with the ginned cotton through the flue F , with the exception of the small portion thereof, which by mere chance falls in front of the movable mote-board M .

In my construction I close the front of the cotton-gin, as by the partition a , so that the only air entering from the front of the apparatus is that which passes in with the cotton through the ribs, grid, or grate G . The brush-cylinder is thus practically inclosed in a chamber B .

In carrying out my invention it is essential that the momentum imparted by the brush-cylinder to the air, seeds, motes, and other impurities which pass through the grid or grate G of the gin with the cotton be checked in order to facilitate the withdrawal of the pure cotton therefrom. Where the old form of gin is used, as indicated in Fig. 3, this result may be readily attained by means of an adjustable fender J of almost any form placed in front of the discharge end of the flue F . Under these conditions the fender J checks the momentum of the air, cotton, &c., and the heavier impurities impinging with force against the fender fall into the receptacle A , while the cotton and light motes are carried into the passage K by the receding current of air induced by the exhaust-fan L or other device for withdrawing the air and cotton from the apparatus. The fender J may be provided with an adjusting device j , by which its position may be varied as desired. I prefer, however, to dispense with the fender J and to conduct the flue F downward, as shown in Fig. 1, the receptacle A for the heavier impurities being situated underneath said flue. Any desired number of settling-compartments A A' A'' may be arranged successively below the air passage or flue K to receive the impurities and such cotton as will not separate therefrom. The heavier material settles out of the receding air-current in the passage K first and the cotton which is retained in the apparatus by reason of its contamination with foreign substances is separated from the almost worthless stuff in the first compartment A , while the cotton containing only a small percentage of foreign substances is collected in the last compartment, the pure cotton being carried off through the air-exhaust apparatus L and delivered as may be desired. It is obvious that practically the same result may be attained without resorting to separate settling-compartments, since the material pre-

cipitated from the gentle and uniform air-current in the passage K will naturally arrange itself in order upon the floor A'' , according to relative weight, and I do not confine myself to the use of the partitions a' a'' . The use of the said partitions, however, is convenient in affording means for regulating, sorting, and grading the residual material, as hereinafter set forth.

Only a comparatively small amount of air enters with the cotton, &c., through the ribs, grate, or grid G , as before stated. The brush-cylinder rotates in the direction indicated by the arrow in Fig. 1. Air is admitted into the brush-chamber B above the brush-cylinder C through dampers or valves b b , and is both thrown and drawn downward (under the action of the revolving brush and of the air-exhaust L) between the brush and the saws and through the passages F and K and out through the said exhaust. In passing between the brush and the saws the induced current of air aids in loosening up and holding apart and carrying the cotton, &c., so that when the loosened material reaches the end of the flue F the cotton may readily move away from the heavier substances. The latter is effected in a large degree by a supplementary current of air admitted at a point opposite or near the entrance to the air-passage K , substantially as shown at k , which is a damper by which the admission of air may be regulated. This provides for a rising cross-current, by which means the cotton is lifted up and carried away from the heavy motes, sand, and other impurities into the horizontal passage K . In order to distribute the cross-current of air evenly and to assist somewhat in changing the course of the lighter portions of the descending material, an inclined perforated adjustable screen k' may be interposed between the damper k and the entrance to the horizontal passage K . Provision is also made in each of the compartments A A' A'' for admitting air below the passage K . The air thus admitted meets the descending material as it settles from the receding air-current in the passage K and lifts out pure cotton from the heavier impurities, carrying the cotton thus separated back into the passage K . Thus by the time the last settling-compartment is reached and passed nothing but pure cotton remains in the said passage K to be withdrawn and transferred by the exhaust device L . Of the residual material the last compartment will contain cotton only slightly contaminated with foreign matter, while the preceding compartments will contain inferior grades.

The admission of air into the compartments may be provided for and regulated in any desired manner. As shown in the drawings, perforated pipes p pass horizontally through the compartments, the inflow of air being regulated by valves p' .

The partitions a' , a'' , and a''' are preferably

made variable in height, (or hinged,) so as to increase or diminish the degree of their projection into the air-passage K at pleasure.

An automatic vacuum-valve V is arranged in connection with the passage K to admit air thereto when the internal pressure is reduced below a prescribed degree, so that a uniform air tension may be maintained in the apparatus.

It will be seen that by my method the cotton is drawn out and away from the impurities by a steady gentle receding current of air so attenuated by suction that, while it has sufficient strength to float the pure cotton, it is insufficient to sustain the heavier impurities; also that by my method the material is repeatedly sifted by separate auxiliary air-currents, which oppose the settling of the cotton, while offering slight impediment to the settling of the impurities. By careful regulation of the air admitted the process of separation may be carried on with the greatest delicacy and accuracy.

The advantages attained by my method of ginning cotton in partial vacuo cannot be attained in any other manner. A forced current at or greater than atmospheric pressure cannot perform the same functions.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The process, substantially as herein described, of cleaning fiber, which consists in loosening up the fiber and then subjecting such loosened-up fiber to the action of currents of air in a partial vacuum.

2. The process, substantially as herein described, of cleaning fiber, which consists in loosening up the fiber and subjecting it to the action of currents of air in a partial vacuum and then removing the fiber from the impurities by a current of air induced by the partial vacuum.

3. The process, substantially as herein described, of cleaning fiber, which consists in loosening up the fiber and subjecting it to the action of currents of air in a partial vacuum and then discharging the impurities from the fiber through an induced incoming current of air.

4. The process, substantially as herein described, of separating cotton fiber from seed, which consists in ginning the seed-cotton and then subjecting the cotton to the action of air-currents in a partial vacuum.

5. The process, substantially as herein described, of separating cotton fiber from its seed and impurities, which consists in ginning the cotton and then subjecting the cotton to the action of air-currents induced by a partial vacuum.

6. The process, substantially as herein described, of separating fiber from cotton-seed, which consists in ginning the seed-cotton and

in removing the cotton from the impurities and carrying it off through the action of a series of air-currents induced by a partial vacuum.

7. The combination, with an apparatus for ginning cotton, substantially as described, of an air-exhausting device arranged to create a partial vacuum in the brush-cylinder compartment and thereby to remove the cotton from the cylinder, substantially as and for the purpose set forth.

8. The combination of cotton-ginning mechanism having an inclosed brush-cylinder chamber, a closed compartment opening into and forming a continuation of said chamber, and mechanism for exhausting air from said compartment, substantially in the manner and for the purpose described.

9. The combination of cotton-ginning mechanism having an inclosed brush-cylinder chamber, a closed compartment opening into and forming a continuation of said chamber, the inclosing walls being provided with air valves or dampers for admitting and regulating the supply of air thereto, and mechanism for exhausting the air from said compartment, substantially in the manner and for the purpose described.

10. The combination of cotton-ginning mechanism having an inclosed brush-cylinder chamber, a closed compartment opening into and forming a continuation of said chamber, said closed compartment being subdivided into a plurality of compartments, each provided with means for admitting air independently thereto, and mechanism for exhausting air from the inclosure, substantially in the manner and for the purpose described.

11. The combination of cotton-ginning mechanism having an inclosed brush-cylinder chamber, a closed compartment opening into and forming a continuation of said chamber, said closed compartment consisting of several separate sections opening in a common air-passage above and each provided with independent means for admitting and regulating the supply of air thereto, and mechanism for exhausting air from the inclosure, the whole arranged and operating substantially as and for the purpose described.

12. The combination, with cotton-ginning mechanism having an inclosed brush-cylinder chamber, of a closed compartment opening into and forming a continuation of said chamber, mechanism for exhausting air from said inclosure, and an automatic safety-valve connected with said inclosure to limit the tension of air within the apparatus, substantially in the manner and for the purpose described.

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