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 MECHANISM FOR REMOVING USEFUL FIBER FROM SEEDS.
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Fig. 1.

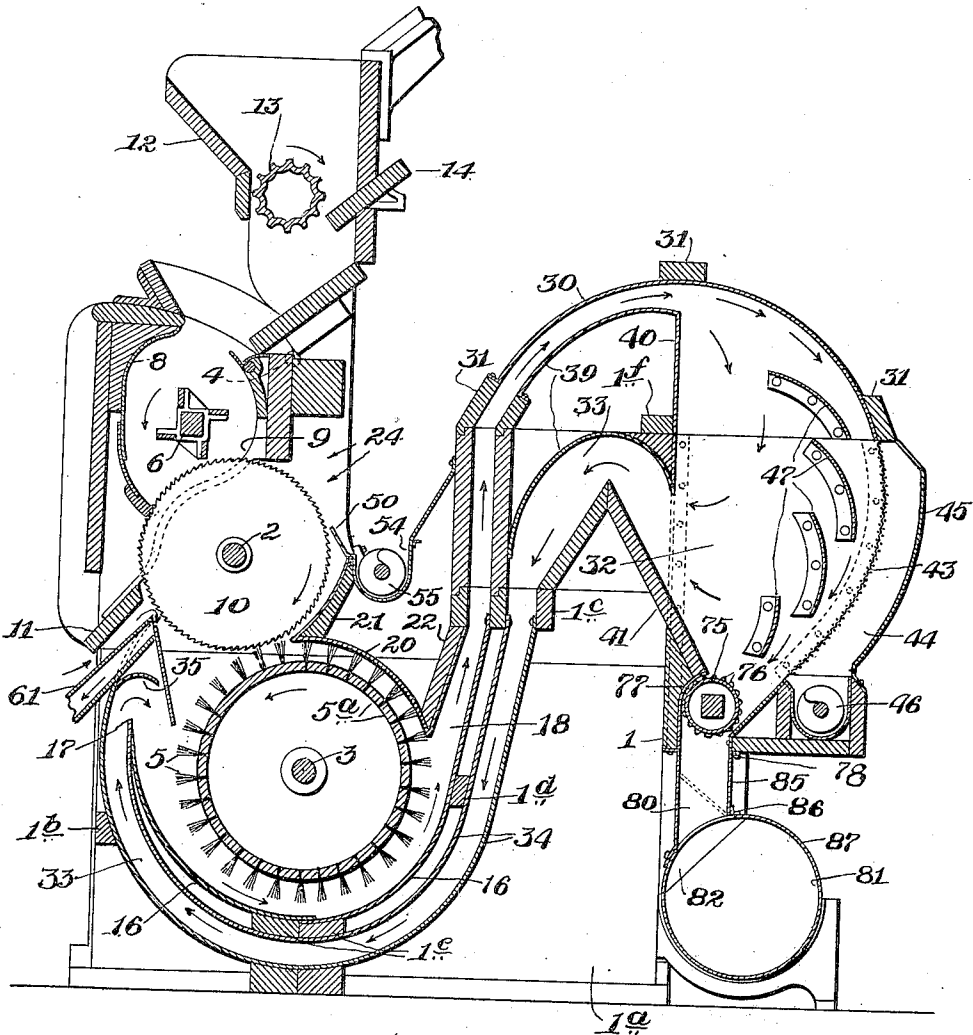
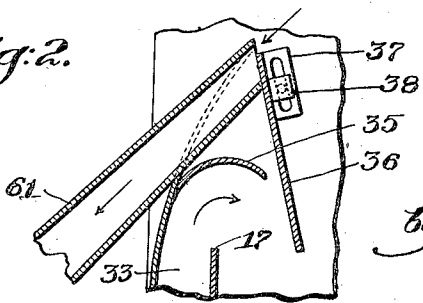


Fig. 2.



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UNITED STATES PATENT OFFICE.

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MECHANISM FOR REMOVING USEFUL FIBER FROM SEEDS.

1,375,986.

Specification of Letters Patent. Patented Apr. 26, 1921.

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To all whom it may concern:

Be it known that I, ARTHUR A. VARDELL, a citizen of the United States of America, and resident of Dallas, in the county of Dallas and State of Texas, have invented new and useful Improvements in Mechanism for Removing Useful Fiber from Seeds, of which the following is a specification.

This invention relates to the general class of machines adapted to remove fibers from their attachments, such as gins, cotton seed linters, wool-burring machines, and the like.

Machines of this type are broadly alike, but for cotton the operation is customarily carried out in two stages, the gin proper being relied upon to remove the long-fibered cotton from the seed and the linter [or delinter] gin being employed to work upon the cotton seed, the product of the gin proper, to remove from it the short adherent fibers. The gin proper and the linter gin differ from each other essentially only in the adjustments, proportions or dimensions of the parts appropriate to their specific duties. This invention has particular reference to means for the recovery of fiber or particles, applicable to saw gins and other machines adapted for either use.

Gins proper are customarily worked in a battery or multiple unit of from two to six gins delivering to a common air flue, in turn delivering to a condenser, by which the fiber is removed from the air current and the dust and some short fiber delivered as waste to the outer air. Linter gins may also be joined in a battery, but customarily heretofore linter gins have been provided with individual condensers. This is due to the greater necessity for care in the adjustment and operation of the linter gin, it being desirable for this reason to observe constantly the product of each individual machine in order to maintain its adjustments for delivering a proper portion of the lint or for making a proper type of product in regard to freedom from motes.

The individual-condenser linter, like all saw gins, delivers a great volume of air as an incident of the operation of the doffing brush forming a part of the gin. This air, charged with fine particles of lint and dust, passes into the room, menaces the health and efficiency of the operators, and constitutes a serious fire risk. I am aware of attempts to minimize these risks by connecting the

individual condensers to a suction pipe, or by air-doffing the saws by separately generated blast or suction currents, or by other expedients not wholly successful for this purpose. Such expedients not only consume much power and sacrifice the capacity, deemed essential by ginners caring for economy of operation, to examine the product of each individual linter frequently, but also result in mixing the useful fiber with a great volume of air, from which it is impossible to recover all of the good fiber. The same considerations also apply to the operation of gins proper; a great gain in efficiency, freedom from gin damage and in quality of the lint cotton follows capacity for an expert foreman to examine from time to time the product being produced by the individual gin, so that prompt discovery of need for corrections and identification of the particular gin responsible may be made.

In the best practice of which I am aware in the prior art, pneumatic doffing or the common collection of fiber by suction applied to individual condensers has resulted in unnecessary expenditure of power, often amounting to four or more horse-power per gin. The rotating elements of the gin itself move a great volume of air and expend power for this purpose. When external pneumatic means are employed the air-moving effort of the elements of the gin is waste effort.

So far as I am aware, the operation of prior gins and linters also has been defective in failure to prevent removal with the seed of a proportion of the fiber actually separated by the gin saws, and in failure properly to separate from the good lint a large portion of motes capable of such separation during the removal of the fiber from the seed, and difficult or impossible to remove at a later stage of treatment.

Principal objects of my invention are to provide for the complete and economical recovery of the fiber separated from the seed by the gin, to separate from the fiber a maximum percentage of motes and impurities, to provide capacity for determining will the behavior of each individual gin of any number of gins joined in a battery or multiple unit; and to utilize the driving force employed to work the gin elements to a larger extent than heretofore by employ-

ing the air-currents set up by the moving parts to perform new functions. Further objects are to provide a gin or linter adapted to operate without delivering into the work-
 5 room a stream of air containing dust and fibers from the material being ginned; to reduce the volume of air carrying the fiber, and to provide for pneumatically conveying and delivering fiber from a fiber-removing
 10 implement such as a gin saw, by means utilizing the same volume of air over and over. Further objects are to provide in a gin or linter gin for the improved separation of motes from the product, to provide for
 15 the improved separation from the saws of a saw gin of fibers and thereby to save lint heretofore wasted, and to provide for separating from the lint and removing from each gin a large proportion of the dirt, sand,
 20 leaf-scrap and other waste.

In some aspects the invention is not confined to gins but is applicable to opener-beaters, pickers, cards and fiber-working or other machines delivering a volume of air-borne flocculent or separated light substances carried by a current of air as an incident of the operation of the machine.

I do not herein claim the genus including certain features relating to moting, to the devices for separating the fiber from the circulating air-current and to the recovery of separated fibers heretofore commingled with the seed and lost, these generic features being described and claimed in my applications Case I, Serial No. 316,459, filed
 30 August 9, 1919, and Case III, Serial No. 319,105 filed August 26, 1919.

I have elected to illustrate the genus comprised in the invention by an example of one species for use in a linter gin, as shown in the accompanying drawings, in which

Figure 1 is a vertical central section of a linter gin according to the invention; and

Fig. 2 is a detail of a similar view showing the adjustable suction nozzle.

Referring now to Fig. 1, the machine frame may as usual comprise uprights 1, side panels 1^a and wooden or metal longitudinal struts 1^b, 1^c, etc., the end frames
 50 having thereon bearings for a saw shaft 2, a doffer brush shaft 3, and a breast pivot 4 in the desired relation. The pivoted breast, as usual, may carry a float roll shaft 6. Preferably the center of the shaft 3 for the doffer brush 5 having the usual longitudinal lags 5^a with longitudinal rows of wires or bristles thereon is placed farther forward than usual so that the contact of the saws 10 with the brush 5 occurs nearer
 60 the bottom of the saw cylinder than usual, for purposes which will presently appear.

Any usual or preferred breast 8, grate 9, and seed board 11 may be provided. The longitudinal frame member 1^c may carry
 65 any preferred feeder hopper 12 and bear-

ings and actuating means for feeder roll 13, feeder gate 14, and other desired adjuncts of the feeder mechanism. The brush 5 is as usual driven at a much higher peripheral speed than the saws 10, and as usual in the
 70 art operates by sweeping the fibers caught in the saw teeth out from the saw teeth, and then delivers these fibers from its surface by centrifugal action and by the effect of the intense air current set up by its operation. 75

In the preferred form of my device illustrated, that part of the periphery of the brush 5 moving toward the saw is inclosed by a curved metal stop 20, which may be mounted on longitudinals 21 and 22 of the
 80 frame, above which and behind the saws there is a free open passage 24.

By reason of the position of the gin brush 5 that exposed portion of the surface of the saw cylinder 10 emergent from the grate 9
 85 is a greater arc of the periphery of the saw cylinder than usual. In order to separate motes (by which I refer to all impurities such as immature seeds, sand, sticks and seed-particles or leaf-scrap having sufficient
 90 weight to be thrown from the saw by the centrifugal action of the saw) I employ the primary velocity given to the motes by the motion of the saw, relying on their separation by this means rather than by the
 95 secondary velocity given the motes after their engagement with the brush and commingling with the lint on the brush which has heretofore constituted the best practice of which I am aware. By removing the
 100 brush to a part of the periphery of the saw substantially opposite to its engagement with the roll of cotton seed in the roll box between the breast 8 and grate 9, there is sufficient room to place a deflector for the motes
 105 in position to separate the particles thrown off tangentially to the saw from the fibrous particles and fibers engaged upon the saw and traveling with it. The mote deflector may comprise a plate 50 mounted on longitudinal strut 21 and may be adjusted by being bent as desired. A mote conveyer 55 may be employed to remove the collected motes from a channel 54 provided beneath the deflector 50. The structure 50, 21, effectively separates the motes from the gin brush 5, and constitutes an air seal against air flowing out of the casing 1^a, 20.

Spaced from the lower part of the periphery of the brush 5 and extending from side
 120 to side of the gin, a curved wall 16, 16, which may be a metal plate or plates suitably mounted on longitudinals 1^d, 1^e, terminates in front of the brush 5 and preferably above its axis 3. With respect to the plates
 125 16 the brush 5 constitutes a powerful fan, delivering a current of air entering the space between the lip 17 and the brush with high velocity into a tangential passage 18 beginning behind the longitudinal 22 and extend- 130

ing upwardly around the outer curved wall of a separator chamber 32 provided at the rear of the gin.

While such a chamber is effective for some of the purposes of this invention if of any substantial size or any desired shape, I prefer the construction shown in which a cylindrical dome 30 mounted on longitudinal struts 31 continues the passage 18 on an arc about the longitudinal center of chamber 32, which is hereinafter referred to as a separation chamber of the cyclone type. It is the purpose of this structure economically and rapidly to separate the contained fiber from the air current containing the fiber set up by the rotation of the doffer brush 5, and, if desired, to partially clean the fiber of dust, sand and other fine impurities, by beating or rubbing against a screen having behind it a dead-air space. These effects are accomplished without delivering into the room occupied by the machine any substantial portion of the air employed to receive the fiber from the doffing brush and to convey the fiber to the separation chamber. To this end the chamber 32 includes the entrance preferably curved as shown, of a return passage 33, which may be completed by walls 34 preferably of curved metal, hung on the struts 1^c and 1^d and extending concentrically under the doffer brush to deliver the air over the lip 17. The returned air is deflected downwardly by a curved baffle 35 and by an adjustable plate 36 preferably held in a position substantially tangent to the brush 5 by slotted guide lugs 37 and headed bolts 38 in side panels 1^a for slight vertical adjustment in its own plane. The returned air from chamber 32 is thus all delivered to the brush 5 and delivery passage 18.

The separation chamber 32 may contain walls 39 and 40 hung on a longitudinal 1^f to define the inner walls of the air passages 18 and 33, and to exclude from the interior of the chamber 32 such space as is not desired to be occupied by the whirl, eddy, or cyclone set up in the chamber 32 by the moving air current.

One bottom wall of the chamber 32 may be comprised of an inclined board 41. The outer lower wall of the chamber 32 is made as a woven or other perforate screen 43, behind which is a dead-air space and dirt pocket 44 defined by an outer wall 45 and delivering at the bottom into a dirt conveyer 46.

Within the chamber 32 and inclined to the whirling air currents therein, a series of preferably curved metallic baffles 47 is erected. The action of the whirling air current and these baffles is respectively to separate from the air current the contained fiber and to rub the contained fiber against the screen 43, and thereby effectively to re-

move a greater part of the contained dust, sand and fine impurities.

The good and clean lint collecting in the chamber 32 falls to the bottom of the chamber and against a rotating valve 75 having flexible ribs 76 working in a fitting concave 77 and nearly but not quite touching the inclined bottom 78 of the chamber 32. The valve 75 delivers into a conduit 80 which in turn delivers into a blast conduit 81. Preferably the opening of the conduit 80 into the conduit 81 is protected by an air baffle plate 82.

To enable the frequent inspection of the individual product of any gin of a battery or series, an inwardly opening gate 85 hinged at 86 above the conduit 81 and having a latch 87 permitting it to be turned into the dotted line position is provided, in order to permit the entire delivery of the gin to take place outside of the conduit 81 for inspection of the quality of the product.

At the front of the gin immediately beneath the seed board 11 and near the peripheries of the saws between the place where they are doffed by the action of the brush 5 and the place at which the saw teeth reënter the grate 9, a suction nozzle 61 communicating with a suction pump, not shown, [which may be the intake of the fan blowing the blast in conveyer 81], is arranged. Preferably the nozzle 61 comprises the adjustable plate 36 by which its effective opening can be controlled, this opening extending the full width of the saws. In all saw gins a substantial proportion of the fibers, usually short fibers, is engaged with the side of the saws well within their peripheries, or is carried in the dead air rotating with the saws and between the same, and this proportion of the fiber is not reached and can not be removed by the bristles of the brush 5. The supposed action of the air-current from the brush to doff this space is not in fact effective. But as the rotating peripheries of the saws approach the grate an ejection current of the dead air between the saws flows out from between them and this causes a material proportion of the fiber either to be delivered through the grate bars to the roll-box, or out through the seed delivery opening, or beneath the seed board 11, in all prior gins of which I am aware. By providing a strong outflowing current of air from within the saw peripheries into the suction duct 61, lint not doffed by the brush 5 is taken from this dead air space between the saws. This may be recovered from the air moving in the duct 61 by delivering it into the conveyer 81 through the blast fan, as mentioned above.

The inflow of air to the suction duct 61 passes between the upper surface of the duct and the seed board 11, and hence traverses the current of stripped seed flowing out of

the gin, taking with it any fiber which has not been delivered by the saw, or has been returned to the roll-box by the saw.

I claim:

- 5 1. Mechanism for separating useful fibers from seeds, bolls or other aggregates of fibers having therein means for throwing the fiber into an air-current flowing in a closed circuit, and static separator means causing the
10 fiber-laden air-current to form a whirl or cyclone, and thereby drop a part of its cargo, the air current thereafter receiving more fiber from said means for throwing fiber into the current before another passage into
15 the separator means.
2. The combination of means for separating useful fibers from seeds, bolls or other aggregates of fiber with means for throwing the fiber into an air-current, and with means
20 for causing centrifugal or cyclonic motion of and separation thereby of a part of the fiber from the laden air-current.
3. Mechanism for separating useful fibers from seeds, bolls or other aggregates of
25 fiber having therein means for throwing the fiber into an air-current and means causing a cyclonic whirl of said air-current, with means for gathering and delivering the useful fiber delivered from the current by said
30 means.
4. Mechanism for separating useful fibers from seeds or aggregates of fiber having therein means for throwing the separated fibers into an air-current, means for causing
35 cyclonic motion of the air-current in a closed passage, whereby to drop a part of the air-borne fiber, means for returning the air-current to receive a further charge of fiber, and means for delivering the dropped fiber
40 from the machine.
5. Mechanism for separating useful fibers from seeds or aggregates of fiber having therein means for throwing the separated fibers into an air-current, means for causing
45 cyclonic motion of the air-current in a closed passage, whereby to drop a part of the air-borne fiber, means to receive dust and impurities thereby thrown from the fiber, and means for returning the air-current to receive a further charge of fiber, and means
50 for delivering the dropped fiber from the machine.
6. Mechanism for separating useful fibers from seeds having therein means for detaining
55 the seeds and means for stripping the fibers from the seeds, and means for doffing the fiber from the fiber stripping means, in combination with a casing comprising a continuous uninterrupted circulatory passage
60 having therein the doffing means and a cyclone-type separator for removing the fiber from an air-current circulating therein, the stripped air returning to the doffer to again serve to convey fiber.
- 65 7. A mechanism for separating useful fibers from seeds having therein means for detaining the seeds and means for stripping the fibers from the seeds, moting means and rotary means for doffing the fiber from the fiber stripping means, in combination with
70 a casing comprising an uninterrupted circulatory passage in which a current of air is adapted to be created by said doffing means, said circulatory passage including a chamber provided with air impinging surfaces
75 constructed and arranged to form an eddy in the circulating air, whereby to cause the deposit of fiber delivered into said air current by said doffer.
8. A gin or linter comprising a saw cylinder and a doffer and a casing inclosing the doffer and providing a continuous, uninterrupted delivery and return air passage substantially closed to the outer air in which
80 the doffer constantly circulates the included air, said casing having therein a chamber provided with curved air directing elements constructed and arranged to impart a whirling motion to the air current, whereby to secure the centrifugal separation of the fiber
90 from the air moving in said closed passage.
9. A gin or linter comprising a saw cylinder and a doffer and a casing inclosing the doffer and providing a continuous, uninterrupted delivery and return air passage substantially closed to the outer air in which
95 the doffer constantly circulates the included air, said casing having therein a chamber having elements constructed and arranged to change the direction of flow of the air current passing therethrough, whereby to create
100 an eddy therein, such eddy serving to cause the centrifugal separation of the fiber from the air moving in said closed passage, and means to deliver the fiber so collected from
105 the machine.
10. A gin or linter comprising a saw cylinder, a doffer and a casing inclosing the doffer and providing a continuous, uninterrupted delivery passage and a return air
110 passage substantially closed to the outer air in which the doffer constantly circulates the included air, said casing having a cavity forming a portion of said continuous passage, means for causing the air current in
115 traversing said passage to move in a path whose direction is continuously changed whereby to permit the separation of fiber from the air current by centrifugal and gravity action, said chamber having associated therewith a dead air space and a screen for collecting impurities from the fiber as it is separated from the air current.
11. A gin or linter comprising a saw cylinder and a doffer and a casing inclosing the
120 doffer and providing a continuous uninterrupted delivery and return passage closed to the outer air, in which the doffer constantly circulates the included air, said casing having therein a separator chamber constituting
130

an enlargement of said continuous passage, said chamber being constructed and arranged to cause the air flowing therethrough to move in a path of constantly changing curvature, whereby to permit the centrifugal and gravity separation of the fiber from the air moving in said passage, means for delivering the collected fiber from the closed chamber into a conveyer, and means for inspecting the delivered fiber between said chamber and said conveyer.

12. Mechanism for separating useful fibers from seeds having therein fiber removing means, rotary doffing means working in a closed air passage and a cyclone separator comprising a chamber forming a part of said passage in which air current eddies in contact with a series of baffle plates inclined to the direction of rotation of the air current.

13. Mechanism for separating useful fibers from seeds having therein fiber removing means, rotary doffing means working in a closed air passage and a condenser comprising a chamber in which the air current set up thereby eddies in contact with a series of baffle plates inclined to the direction of rotation of the air current, and having a screen against which the air current is deflected by

said baffle plates, and a dead air space behind the screen.

14. Mechanism for removing useful fibers from seeds having therein fiber removing means, rotary doffing means working in a closed air passage, and a separator comprising a chamber in which an air current eddies in contact with a series of baffle plates inclined to the direction of rotation of the air current, and having a screen against which the air current is deflected by said baffle plates, and a dead air space behind the screen, means for delivering the collected fiber from the chamber and means for delivering collected impurities from the dead air space.

15. In a ginning mechanism having a closed air-circuit for the delivery of fiber from rotary doffing means forming a part thereof, a suction nozzle for recovering waste fiber by an air-current independent of the current in said circuit, in combination with adjustable means for regulating flow in said nozzle forming a part of the walls of said air-circuit.

Signed by me at Dallas, Texas, this 12th day of July, 1919.

ARTHUR A. VARDELL.