

(No Model.)

3 Sheets—Sheet 1.

H. W. GRABER.
COTTON GIN.

No. 568,610.

Patented Sept. 29, 1896.

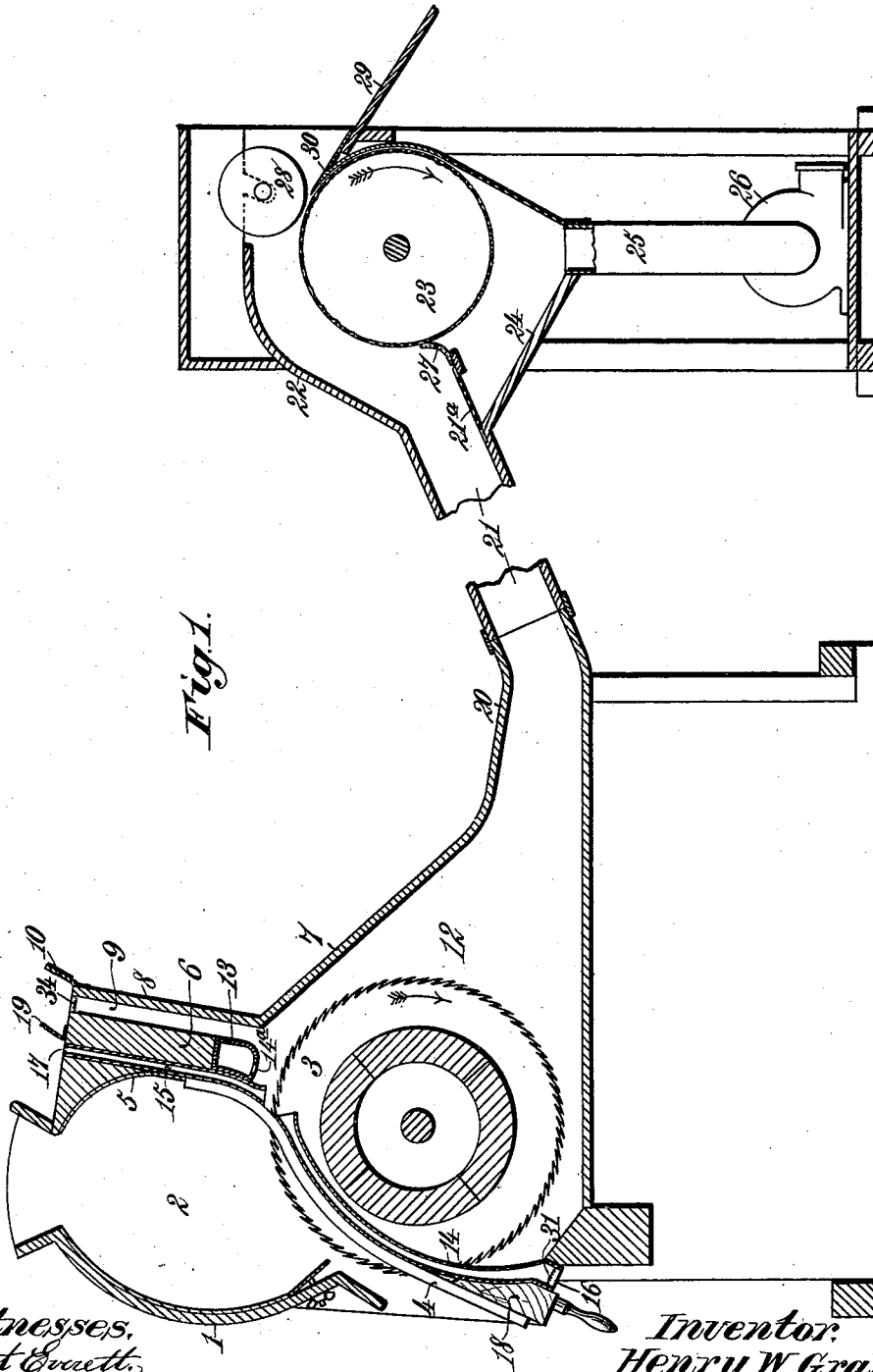


Fig. 1.

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Inventor,
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By James L. Norris,
Atty.

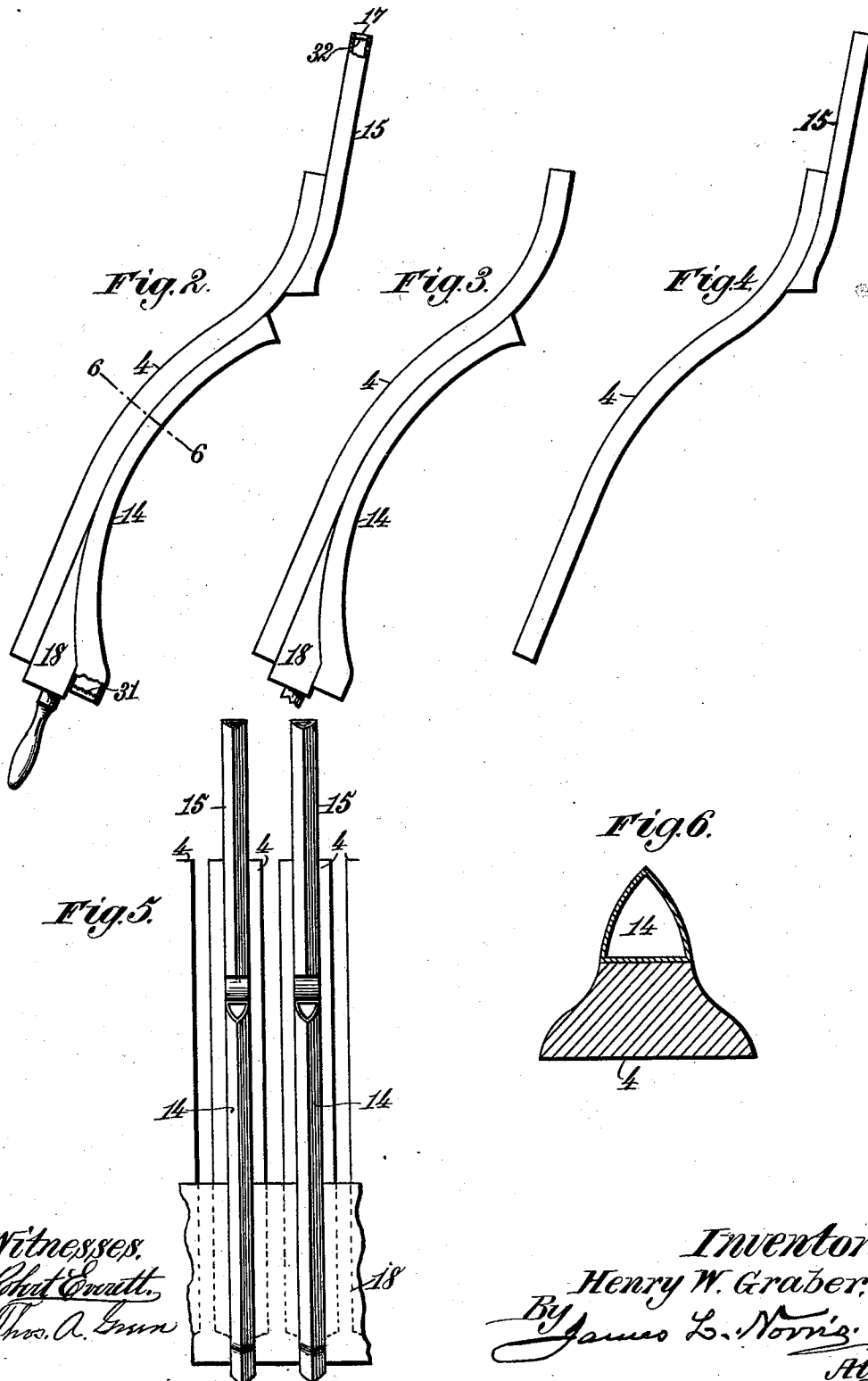
(No Model.)

3 Sheets—Sheet 2.

H. W. GRABER.
COTTON GIN.

No. 568,610.

Patented Sept. 29, 1896.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 7.

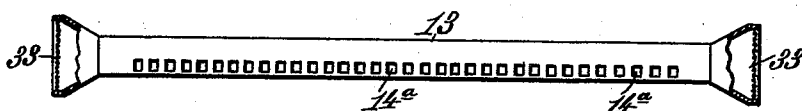


Fig. 8.

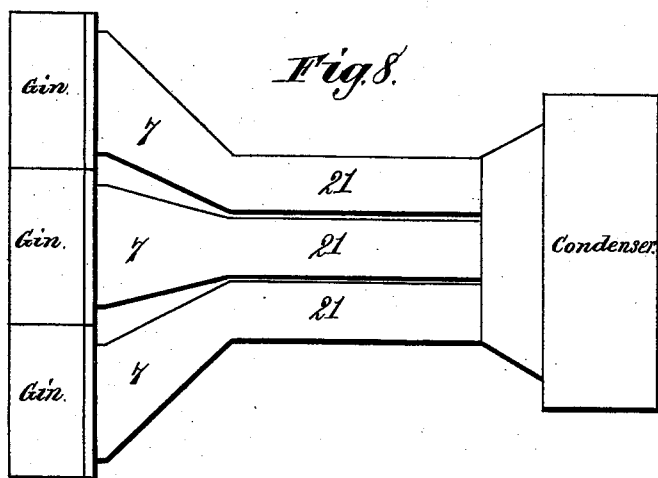
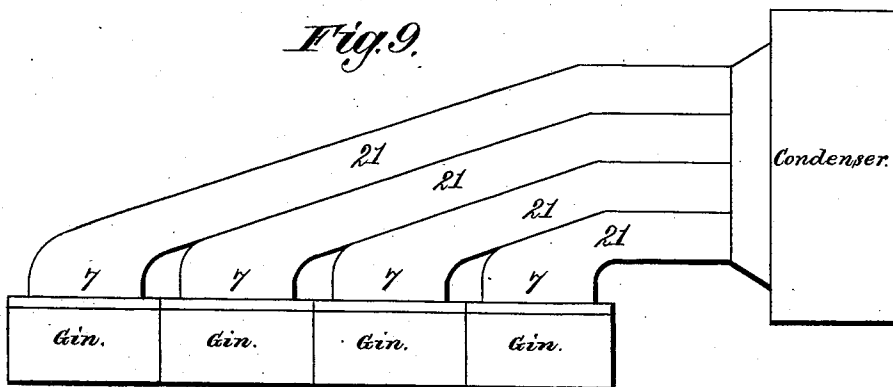


Fig. 9.



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UNITED STATES PATENT OFFICE.

HENRY W. GRABER, OF DALLAS, TEXAS, ASSIGNOR OF ONE-FOURTH TO
CECIL A. KEATING, OF SAME PLACE.

COTTON-GIN.

SPECIFICATION forming part of Letters Patent No. 568,610, dated September 29, 1896.

Application filed April 20, 1896. Serial No. 588,339. (No model.)

To all whom it may concern:

Be it known that I, HENRY W. GRABER, a citizen of the United States, residing at Dallas, in the county of Dallas and State of Texas, have invented new and useful Improvements in Cotton-Gins, of which the following is a specification.

In cotton ginning and linting machinery the rotary ginning-saws are usually arranged in operative connection with more rapidly rotating brushes, which remove the lint-cotton from the saw-teeth for its delivery to a condenser or receptacle. For various reasons rotary brushes are objectionable, chiefly because it is necessary to run them at a much higher speed than the saws, which results in excessive friction and high heat, serious danger of fire, rapid wear and wreckage of the brushes, and the employment of considerable draft-power to run the brushes at a high speed compared to the speed of the saws. Ordinarily gin-brushes require to make about four revolutions to one of the saws, and if the speed of the brushes is diminished, as by slipping of the drive-belts or from other causes, the removal of the cotton from the saws is imperfect and the gin chokes or clogs. In the operation of ordinary gins the brushes are sometimes unbalanced by the loss of balance-weights or the springing of their shafts, and the high speed of rotation heats the shaft-boxes, which sets fire to the gin or wrecks the brush, in consequence of which the saws and ribs are frequently, if not always, damaged to such extent as to require their renewal or repair.

The brush-surface of a gin-brush is usually secured to the brush body or cylinder through the medium of wrappings of wire, which are liable to become detached or loosened, catch in the saws, and cause serious damage and trouble.

The imperfections and objections above referred to render it desirable to avoid the use of a brush in a cotton gin or linter, and to this end it has heretofore been proposed to remove the lint-cotton from the saws independently of a gin-brush by the action of an air-blast mechanism designed to drive the lint-cotton off the saw-teeth into a flue leading to a condenser or receptacle, but this sys-

tem is inefficient and impracticable in that the gin-flue ordinarily contains angles, bends, or curves filled more or less with dead air, which obstructs the passage of the cotton, and the air-blast, driving the lint-cotton before it, packs the same in the flue, thus choking the same and destroying the efficient working of the apparatus for the purpose in hand.

The air-blast system for driving lint-cotton from the teeth of gin-saws is objectionable, although the gin-flue is constructed without angles, bends, or curves, in that the air-blasts cannot practicably expel dead air and move the large mass of lint-cotton with sufficient rapidity to entirely avoid packing and choking the flue, and therefore the prior system referred to does not secure the high perfection required at this day in the art of ginning and handling cotton.

The objects of my invention are to avoid the objections stated, to improve and simplify cotton-gins or linters, to dispense with gin-brushes, and to avoid choking of the gin-flue, which occurs where cotton is blown or driven by air-blasts off the saw-teeth into a gin-flue leading to a condenser or a suitable receptacle.

To accomplish these objects, my invention consists, among other things, in the combination, with a cotton-gin, of an air-suction apparatus arranged in operative connection with the gin and acting to suck the lint-cotton directly from the rear portions of the saw-teeth independently of and without a brush, and an apparatus for preventing the withdrawn lint-cotton from passing into and through the air-suction apparatus.

The invention also consists in the features of construction and in the combination or arrangement of parts hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a broken vertical sectional view of a cotton-ginning apparatus or linter embodying my invention. Fig. 2 is a detail side view of one of the gin-ribs employed in the gin represented in Fig. 1. Fig. 3 is a detail side view showing a modified construction of gin-rib. Fig. 4 is a similar view showing another modification of gin-rib. Fig. 5 is a

detail rear elevation of two ribs arranged in operative relation and constructed as represented in Fig. 2. Fig. 6 is a detail sectional view taken on line 6 6, Fig. 2. Fig. 7 is a detail plan view of the transverse tubular air-conduit. Fig. 8 is a diagram indicating the manner of applying the invention to a battery of gins, and Fig. 9 is a similar diagram showing a modified arrangement of flues in connection with a battery of gins.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, referring to the drawings, wherein—

The numeral 1 indicates the gin-breast; 2, the roll-box; 3, the saws, and 4 the gin-ribs of a cotton-gin. The rear upper circular or curved part is lined, as usual, with sheet metal or other material, as at 5, and a transverse beam or timber 6, forming a part of the gin-frame, is arranged above the saws and in rear of the upper ends of the gin-ribs. In the example shown in the drawings the rear portion of the gin-frame is provided with a funnel or hood-shaped casing 7, wholly inclosing the rear portion of the gin-saws and extending forward under the same to provide a clear space between the forward extension of the bottom wall of the casing or hood and the lowermost saw-teeth. The top wall of the casing or hood projects upwardly, as at 8, in such proximity to the transverse beam or timber 6 as to create or provide a comparatively narrow air conduit or inlet 9, comprising a transverse passage which extends the full width of the gin, or approximately so.

The outer or air-receiving end portion of the air-conduit 9 communicates with the atmosphere and may be closed or opened by a valve 10, of any suitable construction. The lower end of the conduit is in communication with the air-suction chamber 12, formed in the rear of and about the saws, through the medium of the casing or hood 7.

The gin is also provided with a transverse air conduit or inlet made in the form of a horizontal tube 13, (best seen in Fig. 7,) having an air-delivery composed, preferably, of a row of separate orifices or perforations 14^a; but obviously this delivery may be composed of a single continuous opening or slot.

The tube 13 is preferably secured to or supported in some suitable manner by the transverse beam or timber 6, and is so arranged that the air-delivery thereof lies over and in juxtaposition to the uppermost teeth of the gin-saws, as best seen in Fig. 1.

The gin-ribs 4, Figs. 1 and 2, are each provided on its back or rear side in any suitable manner with air-conduits 14 and 15, having their outer or air-receiving ends 16 and 17 in communication with the atmosphere and their inner or air-delivery ends located in juxtaposition to the uppermost teeth of the gin-saws. The air-delivery ends of the tubes 14 lie between the saws, quite near the periph-

eries thereof, while the air-delivery ends of the tubes 15 lie directly over the uppermost teeth of the saws, in close proximity thereto.

The air-conduits 14 and 15 are each preferably made in the form of a tube of metal, approximately triangular in cross-section, as best seen in Fig. 6. The tubes extend longitudinally along the gin-ribs, and the lower ends of the tubes 14 are offset from the lower ends of the gin-ribs, so that a suitable supporting beam or timber 18 can be placed between the ribs and tubes, as shown in Fig. 1. The upper end portions of the tubes 15 rise between the transverse beam or timber 6 and the sheet metal or other lining 5.

The upper or air-receiving ends of the tubes 15 may be opened and closed through the medium of a damper or valve 19, of any construction suitable for the purpose, and the same remarks apply to the lower or air-receiving ends of the tube 14 and to the ends of the conduit or tube 13.

The tubes 13, 14, and 15 are designed to permit atmospheric air to be drawn into the gin upon and in juxtaposition to the uppermost teeth of the gin-saws, as the teeth bearing lint-cotton emerge from between the gin-ribs.

The tubes 14 and 15 follow the general contour of the gin-ribs, and are preferably secured to or connected with the backs or rear sides thereof; but I do not wish to be understood as confining myself to any particular manner of constructing or providing the gin-ribs with air-conduits, as this may be accomplished in any suitable manner which will permit air to be drawn through the conduits into the gin upon and in juxtaposition to the teeth of the saws as or after they emerge from between the gin-ribs.

The rear portion of the casing or hood 7 is contracted into a neck-like portion 20, to which is connected in any suitable manner one end of an air-suction flue 21, which at its other end portion communicates with a chamber 22 in a condensing apparatus, as will be understood by reference to Fig. 1.

The chamber 22 of the condensing apparatus contains a wire-screen or other foraminous condenser-cylinder 23, which may be rotated in any suitable manner. The bottom of the chamber 22 is composed of inclined boards or walls 24, which converge to the perpendicular, or other suitable suction-pipe 25 of an air exhausting or suction apparatus 26, which may be of any desired or known construction or type.

The bottom of the wall of the delivery-end portion of the air-suction flue 21 is provided with a flexible or other suitable strip or valve 27, which lies against the periphery of the condenser-cylinder 23, and a foraminous or screen section 21^a, forming a part of the delivery end of the flue 21 in front of the flexible strip or valve 27, so that the air drawn by the air exhaust or suction apparatus is

compelled to pass through the cylinder above the strip or valve and through the screen 21^a to the pipe 25 of the suction apparatus.

A pressing-roll 28 is mounted in suitable bearings above the condenser-cylinder in such manner that the roll is adapted to rise and fall or move toward and from the cylinder.

An inclined or other suitable chute or platform 29 extends rearward from the condensing apparatus, and at its upper end carries a doffing-blade 30, which lies against or in close proximity to the periphery of the condenser-cylinder, so that cotton carried between the peripheries of the cylinder and the roll will be stripped from the cylinder and caused to traverse the chute or platform. The cotton may be delivered from the chute or platform to a roller-compress or any other desired cotton-baling mechanism.

The air exhaust or suction apparatus, in the present example of my invention, is connected with the casing or hood 7 of the cotton-gin through the medium of the condensing apparatus and the suction-flue 21, and consequently when the air exhaust or suction apparatus is in operation the air confined in the cotton-gin, in rear of the gin-ribs, is exhausted, and at the same time atmospheric air will enter through the air conduits or tubes 13, 14, and 15 and passage 9. The air-suction acts directly upon the teeth of the saws, and the natural induced draft is obviously upon and in juxtaposition to the uppermost teeth of the gin-saws, or those teeth emerging from between the gin-ribs during the operation of the gin. The suction created in the manner described and shown instantly draws or sucks off the lint-cotton from the saw-teeth as, or immediately after, the teeth bearing the lint-cotton emerge from between the ribs. This lint-cotton is swiftly exhausted from the interior of the casing or hood 7 through the suction-flue into the chamber of the condensing apparatus and is deposited on the foraminous condenser-cylinder. The dust, dirt, or other foreign matter is withdrawn through the screen 21^a and through the meshes or perforations of the cylinder, and the cleaned cotton on the periphery of the latter passes under the pressing-roll 28 and is stripped off the cylinder by the doffing-blade 30. The cotton bat then traverses the chute or platform 29 to the point desired. As before stated, the cotton may be delivered to a roller-compress or any other suitable baling mechanism, or it may be delivered to any desired carrier or receptacle.

The outer or air-receiving ends of the air conduits or tubes 13, 14, and 15 and passage 9 may be, and preferably are, provided with wire or other suitable screens, as at 31, 32, 33, and 34, to prevent dirt, dust, or trash being drawn into the gin or linter by the action of the air-suction apparatus.

It will be seen that by my invention the lint-cotton is swiftly drawn directly from the

saw-teeth by suction, and also by suction is conveyed to the condenser containing the large condenser-cylinder through which the air passes, whereby the cotton is effectually cleaned and is prepared for the roller-compress or other baling mechanism.

The suction created by the air exhaust or suction apparatus draws air through the air conduits or tubes in the cotton-gin, and the lint-cotton is effectually withdrawn or sucked off the teeth of the saws without the employment of a revolving gin-brush and without any danger or liability whatever of the lint-cotton packing in and choking the flue which serves to conduct the lint-cotton away from the cotton-gin.

As heretofore stated, it has been proposed to remove the lint-cotton from the saw-teeth by blasts of air from an air-blowing mechanism, but in this system there are difficulties which cannot be entirely overcome. The blasts of air drive or push the cotton rearward into the gin flue or flues, and, since the cotton and the blasts encounter obstructions in the shape of dead air and angles, bends, curves, or recesses in the gin and gin-flue, the lint-cotton packs in the gin or gin-flue and by accumulation clogs the apparatus and interferes with or absolutely prevents the practical operation of the same.

The blasts of air which it has been proposed to use for the purpose of driving lint-cotton from gin-saw teeth are not and cannot be as effective as suction which swiftly draws or sucks the lint-cotton from the saw-teeth, because the vacuum created by suction draws the dead air and the cotton at any angle and through any bend, curve, or recess without the possibility of choking or clogging the gin or gin-flue. The power of the air-blast is inferior to the power of suction for the purpose in hand, and, although the proposed air-blast system contemplates dispensing with the usual revolving gin-brushes, the system has proved inefficient, ineffective, and impracticable, owing to the packing and choking of the gin and gin-flue, as before explained.

In Figs. 1 and 2 I have represented lower and upper air conduits or tubes 14 and 15, connected with the gin-ribs, but I do not confine myself to this specific construction, because it is possible to use gin-ribs having only the lower conduits or tubes applied to or connected therewith, as at 14 in the modified construction, Fig. 6, or gin-ribs having only the upper conduits or tubes applied to or connected therewith, as at 15 in the modified construction, Fig. 8. In other words, the gin-ribs may be provided only with the lower set of air conduits or tubes, or they may be provided only with the upper set of air conduits or tubes, or they may be provided with both the lower and upper sets of conduits or tubes, without altering the character of my invention.

I have described and shown several air-conduits, composed of the passage 9, the trans-

verse tube 13, and the gin-rib channels or tubes 14 and 15, but I do not wish to be understood as confining myself to the use of all these air-conduits, as obviously a single air-conduit can be employed for the passage of an induced air-current upon or in juxtaposition to the uppermost teeth of the gin-saws, whereby the air exhaust or suction apparatus will draw or suck the lint-cotton from the teeth of the saws as or after they emerge from between the gin-ribs.

My invention may be employed in connection with a single cotton gin or linter or with a battery of gins, as indicated by the diagrammatic views, Figs. 8 and 9. In Fig. 8 the suction-flues 21 extend straight back from the casings or hoods 7 and communicate with a single condensing apparatus, while in Fig. 9 the suction-flues 21 run at angles to or obliquely from the casings or hoods 7 to a condensing apparatus. The suction-flues are, however, susceptible of many different arrangements relatively to the gins and the casings or hoods which provide the air-chambers in rear of the gin-ribs.

It is preferable to provide a separate suction-flue 21 for each gin in a battery, but, obviously, with a powerful air-suction apparatus it is possible to connect a plurality of casings or hoods 7 with a single air-suction flue leading to a condenser or receptacle.

It will be observed that in my invention the condenser-cylinder 23 and valve 27 cut off unobstructed communication between the exhaust-fan and the suction-flue 21 in such manner that the lint-cotton removed by suction from the gin-saws is prevented from passing into the exhaust-fan. It is impracticable to move the large body of lint-cotton withdrawn from gin-saws through an exhaust-fan, as the latter would become choked and obstruct and prevent the practicable operation of the entire apparatus.

My invention renders it possible to entirely dispense with the gin-brushes ordinarily used in cotton-gins, whereby the saws can be run at a much higher speed than where brushes are employed, friction and danger of fire are reduced, and the wear of the brushes and the use of draft-power to run them at a high speed are avoided. Where the gin-brush is dispensed with, the speed of the saws can be increased, thereby largely promoting the efficiency of the gin and rendering the ginning operation more rapid in practice.

By drawing or sucking the lint-cotton from the saw-teeth the cotton is not curled, kinked, and napped, as when removed by the use of brushes, but, on the contrary, the cotton is drawn or sucked off straight and unbroken, so that a longer staple and better sample are obtained.

Having thus described my invention, what I claim is—

1. The combination with a cotton-gin, of an air-suction apparatus arranged in operative connection with the gin and acting to

suck the lint-cotton directly from the rear portions of the gin-saws, independently of and without a brush, and an apparatus for preventing the withdrawn lint-cotton from passing into and through the air-suction apparatus, substantially as described.

2. The combination with a cotton-gin, of an air-suction apparatus arranged in operative connection with the gin and acting to suck the lint-cotton directly from the rear portions of the gin-saws, independently of and without a brush, and a condenser-cylinder and valve arranged to intercept the withdrawn cotton and prevent it from passing into and through the air-suction apparatus, substantially as described.

3. A cotton-gin having the ribs which extend between the saws provided with attached air-conveying tubes, the outer ends of which receive atmospheric air, and the inner ends of which are arranged in juxtaposition to the saw-teeth, and means for inducing air-currents through said tubes by suction for removing lint-cotton from the teeth of the saws, substantially as described.

4. A cotton-gin having the ribs which extend between the saws provided with upper and lower sets of air-conduits, the outer ends of which receive atmospheric air, and the inner ends of which are located in juxtaposition to the teeth of the gin-saws, and an air-suction apparatus for inducing air-currents through said sets of air-conduits for withdrawing the lint-cotton from the saw-teeth, substantially as described.

5. The combination with the ribs, and saws of a cotton gin or linter, of a transverse air-tube arranged over the saws, and air-tubes extending longitudinally along the gin-ribs and having their inner air-delivery ends located in juxtaposition to the saw-teeth, of an air-suction chamber extending in rear of the saws, and an air-suction apparatus in operative connection with said chamber for inducing currents of air through the air-tubes and sucking the lint-cotton from the saw-teeth, substantially as described.

6. The combination with a cotton gin or linter, of a casing or hood inclosing the gin-saws and forming an air-suction chamber in rear thereof, an air-conduit receiving atmospheric air and having its air-delivery arranged in juxtaposition to the teeth of the gin-saws, an air-suction flue connected with the casing or hood, a condenser connected with said suction-flue, and an air-suction apparatus connected with the condenser and operating to induce a flow of air through said air-conduit and to draw or suck the lint-cotton directly from the saw-teeth through the suction-chamber and suction-flue into the condenser, substantially as described.

7. The combination with a cotton gin or linter, and an air-suction flue leading therefrom, of a condensing-chamber connected with the said suction-flue and having an inclined or hopper-shaped bottom, a condenser-

cylinder or drum arranged in the condensing-chamber, an air-suction apparatus connected with the inclined or hopper-shaped bottom and acting to withdraw the lint-cotton from the gin through the suction-flue onto the cylinder or drum, and means for removing cotton from the cylinder or drum, substantially as described.

8. The combination with a cotton gin or linter, and an air-suction flue leading therefrom, of a condensing-chamber connected with the said suction-flue and having a bottom wall, a strip or valve bearing against the cylinder or drum in juxtaposition to the lower side of the suction-flue, an air-suction apparatus connected with the bottom wall of the condensing-chamber and acting to withdraw the lint-cotton from the gin through the suction-flue onto the cylinder or drum above said strip or valve, and means for removing the cotton from the cylinder or drum, substantially as described.

9. The combination with a cotton gin or

linter, and an air-suction flue leading therefrom, of a condensing-chamber connected with the said suction-flue and having an inclined or hopper-shaped bottom, a condenser cylinder or drum arranged in the condensing-chamber, a strip or valve bearing against the cylinder or drum in juxtaposition to the lower side of the suction-flue, an air-suction apparatus connected with the inclined or hopper-shaped bottom and acting to withdraw the lint-cotton from the gin through the suction-flue onto the cylinder or drum, a pressing-roller in operative connection with the cylinder or drum, and a doffing device for removing the cotton from the cylinder or drum, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY W. GRABER.

Witnesses:

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JNO. D. HARVEY.