

Nov. 9, 1926.

1,605,940

W. L. HANCOCK  
HULLER AND OPENER

Filed Feb. 12, 1926

3 Sheets-Sheet 1

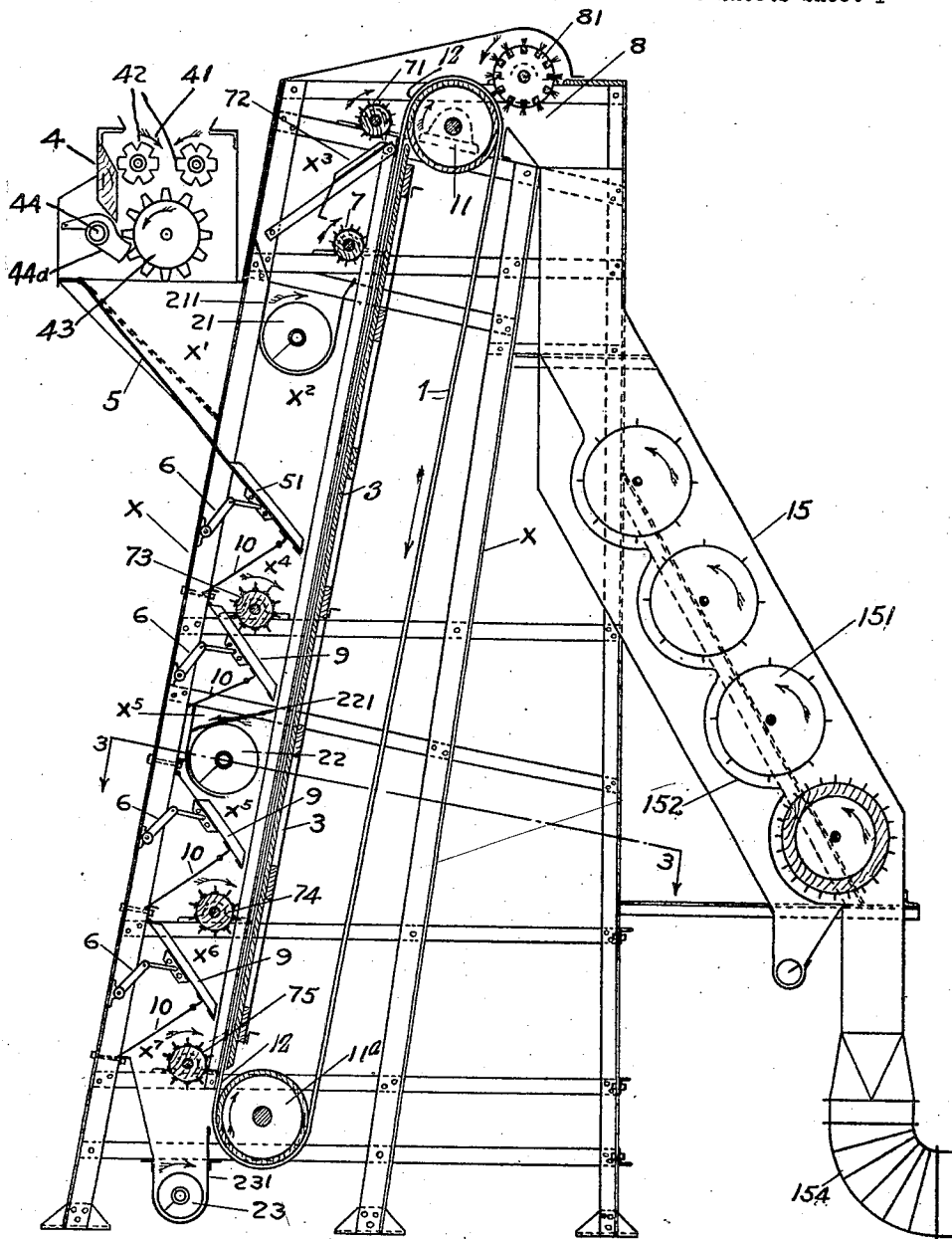


FIG 1

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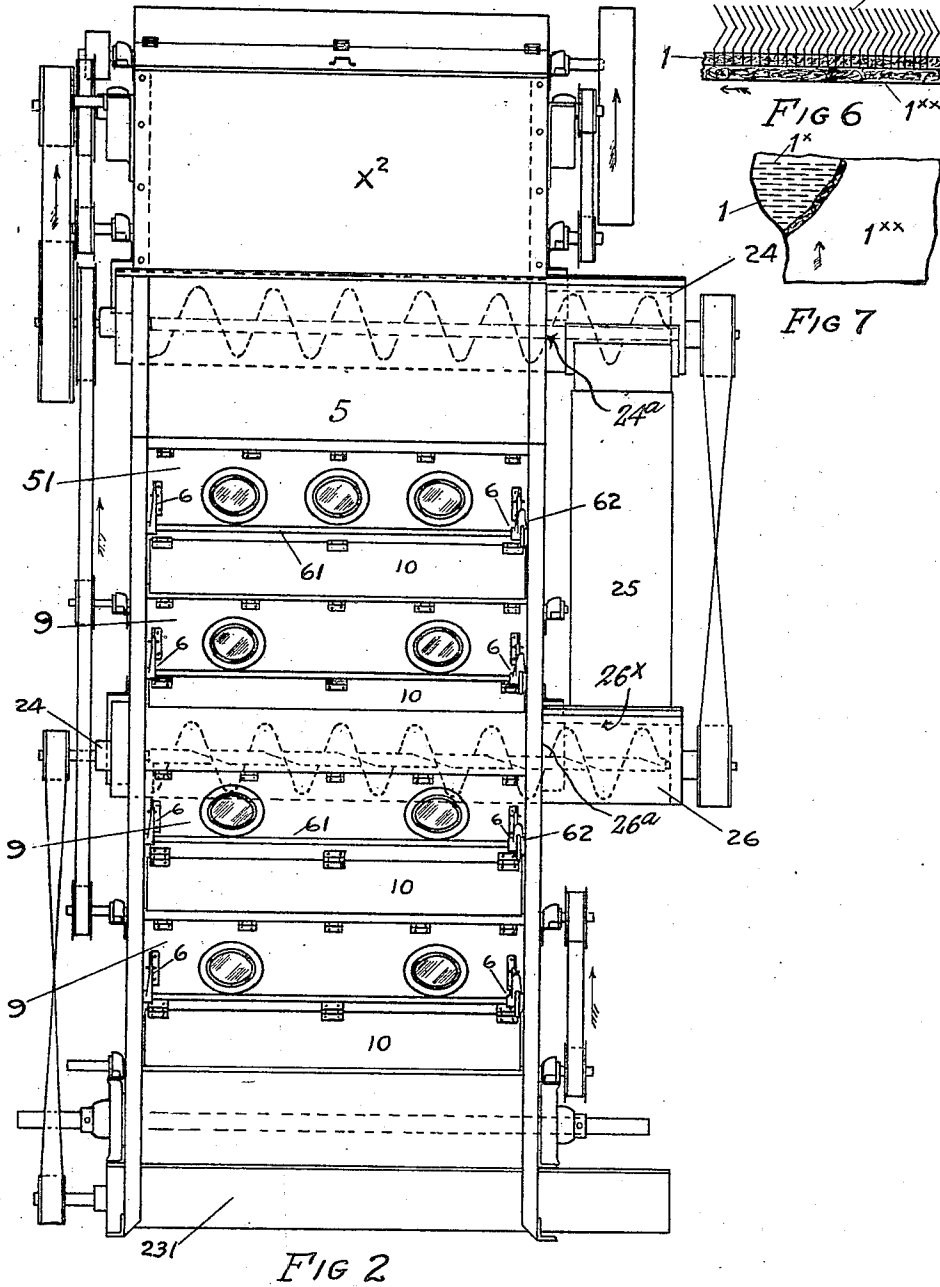
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3 Sheets-Sheet 2 1<sup>x</sup>



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3 Sheets-Sheet 3

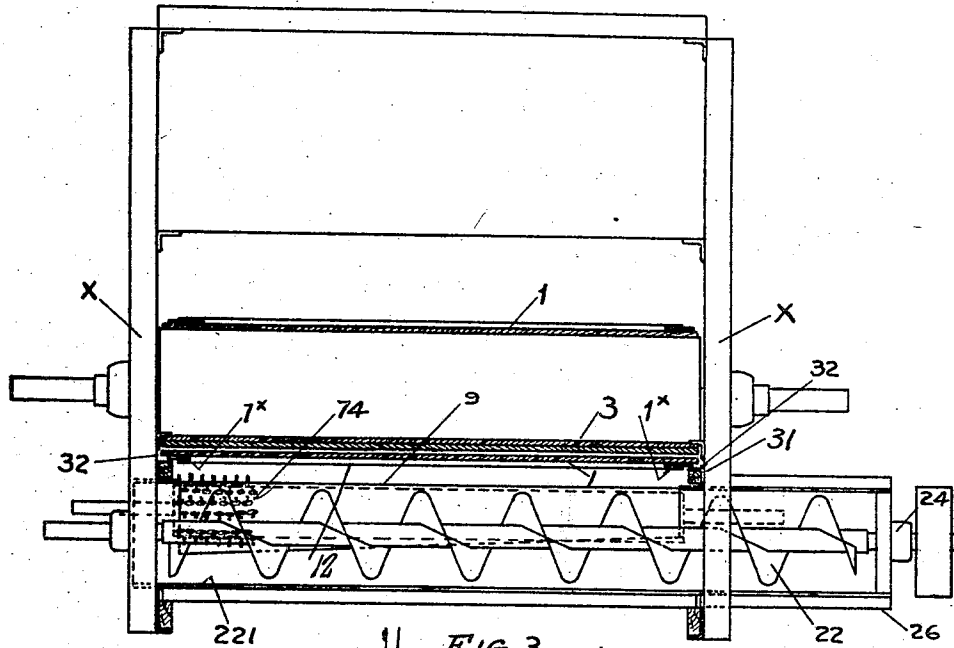


FIG 3

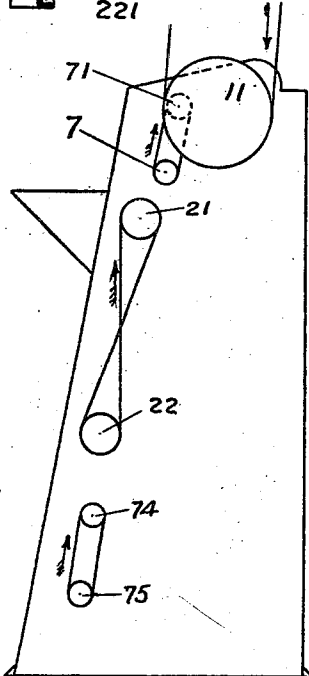


FIG 4

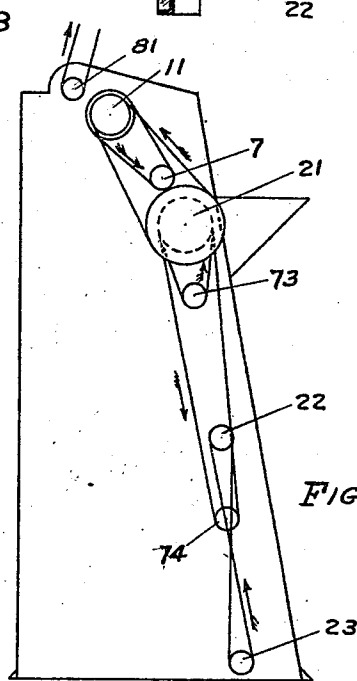


FIG 5

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## UNITED STATES PATENT OFFICE.

WILLIAM L. HANCOCK, OF DALLAS, TEXAS, ASSIGNOR TO THE MURRAY COMPANY, OF DALLAS, TEXAS, A CORPORATION OF TEXAS.

HULLER AND OPENER.

Application filed February 12, 1926. Serial No. 87,937.

My invention is an improvement in machines for cleaning seed cotton from burrs, hulls and picking the seed cotton therefrom.

In the drawings:

5 Figure 1 is a vertical, sectional elevation of my improved machine;

Figure 2 is a front elevation and

Figure 3 is a cross section on line 3—3 of Figure 1;

10 Figures 4 and 5 show in diagrammatic form the belting layout, Figure 4 showing the near side of Figure 1 and Figure 5 the other, or far side of Figure 1;

Figure 6 is a view on an enlarged scale of a portion of the belt 1;

15 Figure 7 is a similar view of the rear or back of the belt, a portion of the backing sheet being removed to show the arrangement of the wire staples.

20 The frame X which encloses and supports the moving parts of my machine is of angle iron of rectangular shape in plan and supports the bearings for the various moving parts of the machine, as will be plain without further specification.

25 The main element of my device is a belt, 1, traveling vertically upon two supports, preferably rotating rollers, 11 11<sup>a</sup>, by the upper one 11 of which it is actuated, so that the inner stretch 12 of belt 1 moves upward, as shown by the arrow, Figure 1. This belt in its preferred form is covered with innumerable projecting wire teeth, imbedded in the substance of the belt, which belt may be of woven fabric or leather or rubberized canvas fabric. The wire teeth 1\* are preferably of tempered steel wire, bent and imbedded in the belt material as is common in the fabrication of sheets of so-called card clothing, but my improved belt differs from these card-clothing sheets, not only in being a continuous belt, continuously covered with upstanding wire teeth, but also, in its best form, in being provided with a back sheet 1\*\* of fabric, cemented to the back of the belt and covering the exposed embedded ends of the teeth as they appear upon the back of the main belt sheet. This backing sheet has the effect of preventing the teeth from being forced backwards by the impact of foreign material in the seed cotton and adds to the tensile strength and durability of the belt and its frictional grip upon its actuating roller, so that it is moved steadily and smoothly. It is especially useful however

because the continual working and bending of the belt in its passage over the rollers or supports at each end, has a distinct tendency to work the wire teeth backward, out of the belt fabric. There is no such problem in the carding art, as the sheets of card clothing are nailed upon a surface with which they travel and are subjected to no bending action in use. The wire teeth are ground to a sharp edge, after being set in the belt fabric, by means of an emery covered roller set in light contact with the teeth and rotated and reciprocated as the belt is also actuated, until the required sharp point is achieved. While in this specification the term "needle point" is used, it is not strictly correct, since the result of the grinding process is a somewhat flat V-shaped edge, pointing in the direction of movement of the tooth in use.

At the inside of the front of the machine upon the cross and side frame members, are secured the various mechanical elements which jointly and severally cooperate with the belt element in performing the necessary operations upon the seed cotton.

Referring now particularly to Figure 1, it will be noted that three conveyors, 21, 22 and 23, are placed across the machine and carried in suitable bearings, at their respective ends, one end of the conveyors 21 and 22 passing outside the frame, on the same side, and being contained severally in boxes, 24, 26 (see Figure 2) the underside of box 24 being open and directly above box 26 and connected therewith by a chamber 25, the upper side of box 26 being open. The conveyors are severally provided with troughs, 211, 221 and 231, to sustain and guide the material being conveyed, as required.

The upwardly moving reach 12 of belt 1, which is that part of the belt which I have called herein the inner reach, and which is opposed to the upper inlet opening *w'* lies against and is supported and backed up by a smooth slide or support 3 preferably of sheet metal, which does not warp and is practically indestructible. The function of this element is to back up and define with certainty the line of travel of the inner reach of the belt 1, preventing sagging and giving an unyielding reaction to the impact of the seed cotton. At the upper part of the front of frame X the feed opening *w'* is formed across the face of the casing and im-

mediately adjacent this opening without the frame, is placed and secured a boll breaking mechanism 4, as shown made up of feed rolls 42, turning in the direction of the arrows and drawing the seed cotton through the inlet opening 41 and presenting it in the form of a loose bat to the toothed breaker cylinder 43 by which the cotton is struck and thrown against the teeth 44<sup>a</sup> of the breaker bar 44 past which the cotton is forced. In this preliminary step the bolls are crushed and opened. The treated seed cotton is then delivered to a slanting chute 5, which is common to the boll breaker and the separator and down this chute 5 the seed cotton slides and shoots against the needle toothed belt 1.

The intra-casing end 51 of the chute 5 is preferably adjustable to and from the face of the belt, to vary the width of the opening between the two parts. The chamber  $x^2$  into which the cotton is introduced is closed above by the trough 211 and below by the adjustable end 51 of chute 5. The adjustability is effected by connecting the end 51 of chute 5 with a toggle arm 6, which may be operated from without the casing by a shaft 61 and handle 62, which may be secured in adjusted position by a sector and thumb-screw or other suitable detent mechanism not shown. The inner end of the toggle arm may be secured to the underside of the chute in any one of several positions, as indicated in the drawings (Figure 1). Within the trough 211 is helical conveyor 21, a passage being left between the inner side of trough 211 and the upwardly moving reach of belt 1. Above the conveyor 21 is a knocker roll 7, rotating as indicated by the arrow, and beyond and above this is a second roll 71. Beneath roll 71 is a chute 72, any material that may be placed upon said chute sliding downward and being dropped upon conveyor 21 in trough 211. This upper chamber I have indicated by the letters  $x^3$ .

It will be convenient here to indicate the operation of the means just described. Seed cotton is introduced into chamber  $x^2$  through the upper feed opening  $x'$ , sliding down the chute 5, 51 and the mass, as it enters is shot against the belt 1, by the needle-sharp teeth of which lint is engaged, some of the broken bolls and the like being carried by the adhering lint, but the teeth generally not engaging the hulls, as the teeth are very closely set and the hulls cannot easily enter between the teeth or be impaled. The lint cotton mass with any adhering hulls is carried upward past trough 211, and knocker roll 7, rotating as indicated by the arrow, beats back hulls and most of the material not engaged by the belt, this material falling into trough 211. Any material carried beyond knocker 7 encounters knocker 71 by which all still adhering hulls and lint not belt-

engaged are knocked onto chute 72 and so delivered by gravity to trough 211. The adhering lint is carried with the belt over the upper belt-support 11 to the exit 8 and removed by any suitable mechanism. I have indicated a rotary brush 81, as such suitable means. Any hulls or lint not carried up from chamber  $x^2$  will work downward through the space between belt 1 and the adjusted end 51 of chute 5, into chamber  $x^4$  where the material will be thrown by roller 73 against the belt and, the fibre engaging with the needle-teeth of the belt, will be carried up to the exit 8.

The material delivered into conveyor 21 is moved longitudinally of the trough 211 to one end of the casing and through a lower exit opening 24<sup>a</sup> in the end of the machine to a box 24, through the open bottom of which it falls through a chamber 25 into the box 26, where it is engaged by helical conveyor 22 lying in trough 221, which conveyor rotating in the opposite direction from conveyor 21 receives the seed cotton through an opening 26<sup>x</sup> in the upper side of box 26 and moves the material longitudinally of trough 221 through an inlet opening 26<sup>a</sup> into and across the machine. The underside of trough 21 is cut away in part, so that as the material is moved along a part of it is constantly being spilled onto chute or baffle 9, below the trough and thus guided against the upwardly moving reach of belt 1. The beaten up lint, now having a larger proportion of hulls is engaged by the belt and carried up where it comes under the action of beater 73 which disengages hulls and the like from the belt engaged lint and permits them to fall again into and through chamber  $x^5$  and into chamber  $x^6$  where roller 74 will coact with the belt. That part of the material which was not engaged in chamber  $x^5$  also falls into chamber  $x^6$  and successively into chamber  $x^7$ , where roller 75 operates upon it.

Finally the rejected hulls and trash reach conveyor 23 by which they are removed from the machine. At the end of these repeated operations the lint is separated, shaken and beaten free from hulls and trash, the freed fibre ascending with the belt and the rejected material descending to a lower level for another operation, until finally the rejected material, consisting of hulls and trash is deposited upon the trash conveyor, 23. It will now be apparent that in a very real sense my machine is made up of an upper mechanism, having an upper inlet  $x'$  and an upper exit, 8, and having also a lower exit 24<sup>a</sup> through which a portion of the entering material is passed to a lower inlet 26<sup>a</sup> and to a conveyor 22 which feeds the material across the machine and causes it to undergo a series of operations to enable the belt 1 to gather and convey to the upper lint exit 8, all clean lint.

It is advantageous and economical to hinge to the underside of the several chutes 5 and 9 a cover member 10, which moves with the chutes as they are adjusted and automatically adjusts itself to the new position, forming a roof or cover for each chamber to prevent material from being scattered and aid in condensing and guiding it to the belt.

I have shown in the drawings, the rolls 7 and 71 as provided with angle iron beating surfaces. This is preferable for these rollers whose main function is as knockers, to knock material back and off the belt. In the other rollers, 73, 74, and 75, I prefer to use pins, as preferable where the function of the roller is more largely to engage and feed seed cotton onto the belt.

In Figure 3 is shown in detail the engagement of the edges of the belt 1 between the slide 3 and a batten 31 to hold and guide it in its movement. I also provide (see Figure 3) a slot 32 in the side of the casing. Trash and dust which works to the side of the belt and might get between the belt and the slide 3 find their way through slot 32 out of the machine.

I have shown, to the right of Figure 1, a semi-vertical cleaner, 15, made up of a multiplicity of beater rollers, 151, arranged in echelon and moving as indicated by the arrows, cooperating with curved wire mesh surfaces or screens, 152. The treated lint cotton delivered from exit 8 of the huller passes downward through the cleaner, where small particles of hull and the like, dust, etc. are beaten through the screens 152 and pass to a conveyor 153 to be removed from the machine. The cleaned lint passes through the pipe 154.

I have shown in Figures 4 and 5 a diagram of the belting layout for the hull separator and opener. In these diagrams the actuating pulleys are indicated by the lettering of the working elements within the mechanism. Thus the pulleys upon the upper belt roller 11, are marked "11" in the diagrams. The direction of movement of the belts is indicated by arrows. The pulley 11 in Figure 4 is belted direct to a driving shaft and the pulley 81 in Figure 5 is also belted direct to a driving shaft. The boll breaker 4 and the cleaner 15 (Figure 1) are also independently belted to a driving shaft. The belting of these elements is so simple that I have not thought it desirable to illustrate it.

I claim as my invention:

1. In a cotton hull separator and opener, a frame casing having upper and lower cotton feed openings and upper and lower cotton exit openings; a traveling toothed picker belt, supported on upper and lower supports within the casing; the inner reach of the belt moving upward to a lint exit open-

ing; a chute adjacent the upper feed opening to receive the entering material and shoot it against the upwardly moving belt, a knocker roller adjacent the upper part of the upwardly moving belt, to beat back hulls and loose material while permitting the belt-engaged lint to pass on; means to remove the lint from the belt; a trough below the knocker roll to receive the material beaten back; a conveyor within the trough to move said material along the trough to a lower cotton exit; a second conveyor below said exit to receive the descending material and return it within the casing through the lower feed opening; a chute over which the conveyor moves the material and down which it is guided against the toothed belt.

2. In a cotton hull separator and opener, a frame-casing having a feed opening and a lint exit opening; a traveling belt clothed with needle pointed wire teeth, supported on upper and lower supports, the inner face of the belt moving upward to the lint exit opening; a chute adjacent the feed opening, to receive the material and shoot it against the upwardly moving belt; a knocker roller adjacent the upper part of the upwardly moving belt, to beat back hulls and loose material, while permitting the belt-engaged lint to pass on; means to remove the lint from the wire teeth.

3. As in claim 2, with a plane-surface supporting slide behind and supporting the wire toothed belt.

4. In a duplex cotton hull separator and opener, a frame casing having a cotton inlet opening in its side into an intermediate inlet feed compartment; a compartment above the inlet feed compartment; a knocker roller in said compartment; a compartment below said feed compartment; a beater roller in said compartment; a by-pass from the upper compartment to a lower compartment; means to move the material from the upper compartment to the by-pass; means to move the material from the by-pass into the machine; a toothed belt, one face of which moves upward through lower, intermediate and upper compartments, forming one wall thereof.

5. In a cotton hull separator and opener, a frame casing having an upper feed opening and an upper lint exit opening; a toothed picker belt, supported for travel on upper and lower supports within the casing; the inner face of the belt moving upward to the upper lint exit opening; a lower exit opening and a lower feed opening; a multiplicity of beater rolls adjacent the belt spaced one above the other; chutes arranged below the several rollers coacting therewith to guide and sustain the material for the action of the belt and beater rolls.

6. As in claim 5, the several chutes being

adjustable toward and from the belt, to vary the opening between the inner end of the chute and the face of the belt.

7. As in claim 5, the several chutes being adjustable toward and from the belt, to vary the opening between the inner end of the chute and the face of the belt, and having hinged to the underside of each chute a cover plate to enclose the upper side of the chamber beneath the several chutes, the cover moving with the chute when the opening adjustment is made.

8. In a cotton hull separator and opener, a frame casing having upper and lower cotton feed openings and upper and lower cotton exit openings; a traveling card clothing belt supported on upper and lower supports within the casing, the inner reach of the belt moving upward to a lint exit opening; a boll breaking mechanism adjacent the upper feed opening; a chute common to the boll breaker and the hull separator, to receive the cotton from the boll breaker and support and shoot it against the upwardly moving belt; a knocker roller adjacent the upper part of the upwardly moving belt, to beat back hulls and loose material while permitting the belt-engaged lint to pass on; means to remove the lint from the belt; a trough below the knocker roller to receive the material beaten back; a conveyor within the trough to move said material along the trough to a lower cotton exit; a second conveyor below said exit to receive the descending material and return it within the casing through the lower feed opening; a chute over which the conveyor moves the material and down which it is guided against the card-clothing belt.

9. As in claim 1, the toothed picker belt being made up of a sheet of leather or fabric; a multiplicity of close set wire staples, their free ends projecting from the face of the sheet, their other ends embedded in the back of the sheet; a second sheet of leather or fabric, connected to the back of the first sheet to cover and sustain the staple ends and form a smooth friction surface for the compound belt.

10. As in claim 1; a boll-breaking mechanism operatively secured adjacent the feed opening; a chute common to the boll breaker and the hull separator, to receive the seed cotton from the boll breaker and support and shoot it against the upwardly moving

belt; a vertical cotton cleaner, made up of a multiplicity of beater rolls arranged in echelon, one above the other; a multiplicity of concave screens, cooperating adjacent the several beater rollers; an inlet opening to the vertical cleaner cooperating adjacent the exit 8 of the hull separator and opener; an exit opening from the vertical cleaner, below the beater rolls.

11. In a cotton hull opener and separator, a frame casing having a feed opening and a lint exit opening; an endless belt of card clothing traveling on upper and lower rotating supports, the inner face of the belt opposed to the upper feed opening, moving upward to a lint exit opening; a boll breaking mechanism adjacent the upper feed opening; a chute adjacent the upper feed opening to receive the cracked boll seed cotton from the boll breaker and shoot it against the upwardly moving belt; a knocker roller adjacent the upper part of the upwardly moving belt, to beat back hulls and loose material while permitting the belt-engaged lint to pass on; means to remove the lint from the wire teeth.

12. In a cotton hull opener and separator, a frame casing having upper and lower feed openings and upper and lower exit openings; an endless belt of card clothing, traveling on upper and lower rotating supports, the inner face of the belt, opposed to the upper feed opening, moving upward to the upper exit opening; a boll breaking mechanism adjacent the upper feed opening; a chute adjacent the upper feed opening to receive the cracked boll seed cotton from the boll breaker and shoot it against the upwardly moving belt; a knocker roller adjacent the upper part of the upwardly moving belt, to beat back hulls and loose material while permitting the belt-engaged lint to pass on; means to remove the lint from the belt; a trough below the knocker roller, to receive the material beaten back; a conveyor within the trough to move said material along the trough to a lower exit; a second conveyor below said exit to receive the descending material and return it within the casing; a chute, over which the conveyor moves the material and down which it is guided against the upwardly moving belt.

Signed at Dallas, Texas, this 29th day of January, 1926.

WILLIAM L. HANCOCK.