J. C. GARNER.

MECHANISM FOR COLLECTING AND CONDENSING COTTON.

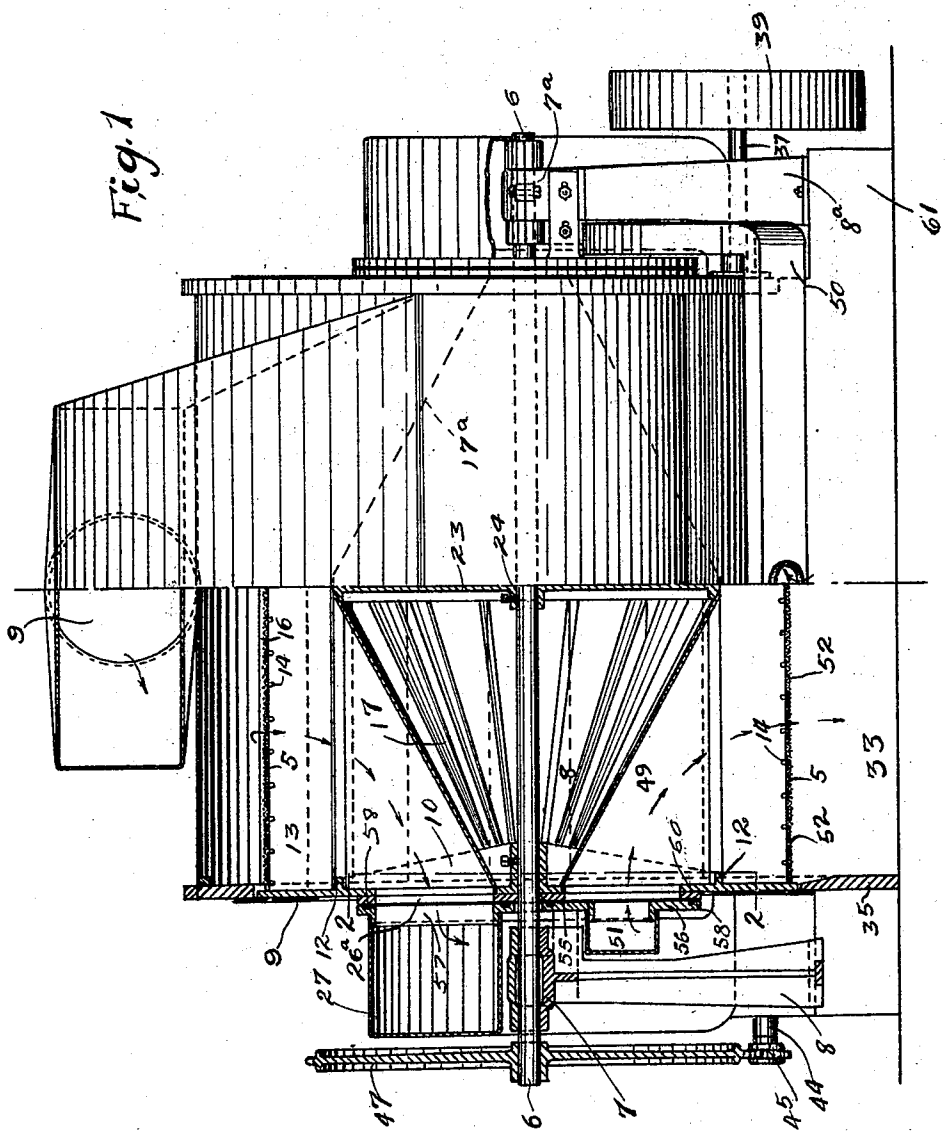
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1,409,540.

Patented Mar. 14, 1922.

3 SHEETS—SHEET 1.

Fig. 1



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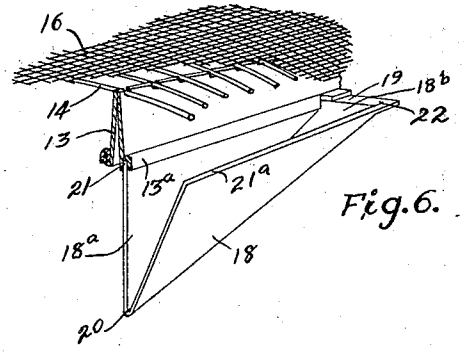
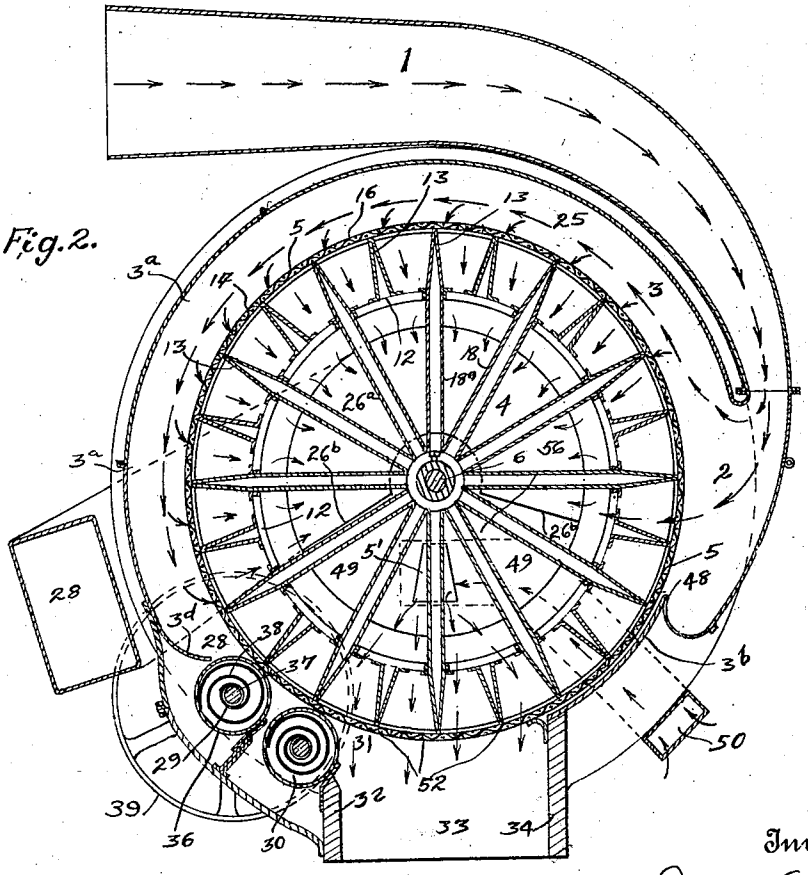


Fig. 6.

Fig. 2.



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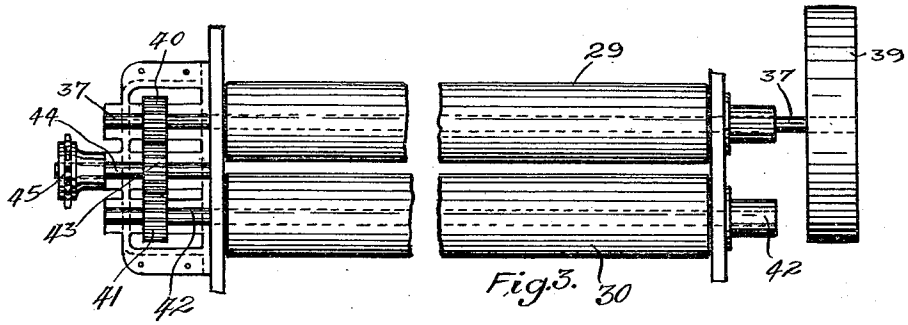


Fig. 3.

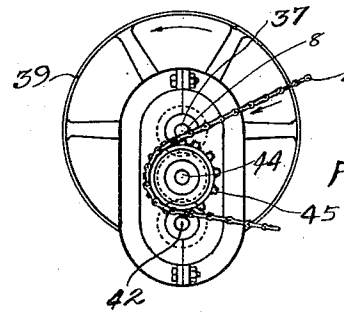


Fig. 4.

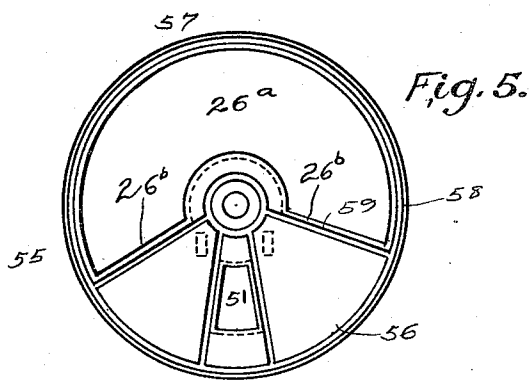


Fig. 5.

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR COLLECTING AND CONDENSING COTTON.

1,409,540. Specification of Letters Patent. Patented Mar. 14, 1922.

Application filed February 3, 1920. Serial No. 355,934.

To all whom it may concern:

Be it known that I, JAMES C. GARNER, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in Mechanism for Collecting and Condensing Cotton, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in the mechanisms which are used in treating cotton to separate the fibers from streams of air. For many purposes the cotton is pneumatically picked up at one point or another, and conveyed through ducts to places where it is to be stored, or to places where it is to be subjected to the action of machinery. It must be separated from the air at whatever points it is to be deposited. And machines have been designed for this separating work which have included rotary screen drums, each arranged so that the stream of incoming cotton-laden air is caused to travel inward through the screen and deposit the cotton on the outer surface; after which the air escapes from the interior of the drum through its ends.

Heretofore difficulty has been experienced because of the tendency of the air to move copiously through the screen at points in the central transverse planes, while relatively smaller quantities move through the screen at points in the transverse planes near the ends. This results in the depositing of varying quantities of cotton on the screen, and in forming a bat of varying thickness.

One of the objects of the present invention is to provide a mechanism (including such a screen drum) which will cause the air to be uniformly distributed over the screen surface from end to end of the drum.

Another object is to provide a simple and durably constructed separator, which will require only light and inexpensive parts, but which when the parts are assembled will be rigid throughout, and will insure a more thorough separating of the cotton from the air than has been the case with earlier mechanisms.

In the accompanying drawings I have shown one form of machine which embodies my improvement.

Fig. 1 is a view thereof partly in side elevation, partly in vertical section.

Fig. 2 is a vertical transverse section on the lines 2—2 of Fig. 1.

Fig. 3 is a view of the bat-forming rolls.

Fig. 4 is an end view of the parts shown in Fig. 3.

Fig. 5 is a face view of the parts providing an exit for the air after it has been separated from the cotton, and also providing an inlet for another body of air by which cotton is dislodged from the screen.

Fig. 6 is a perspective of a section of the screen and adjacent supporting devices.

In the drawings a duct for incoming air and cotton is shown at 1. 2 is the delivery mouth of this duct. It communicates with the casing 3 which has the larger section 3^a, a smaller section 3^b, and an inward turned section 3^d at the end of the part 3^a.

Within the casing there is a drum or cylinder, indicated as a whole by 4 and comprising a screen 5 and supporting devices. It is carried by the central shaft 6 which, at its ends, is mounted in the bearings 7, 7^a, carried by the standards, 8, 8^a. Intermediate of the shaft 6 and the cylinder 5, and connected to the latter, are annular heads 9 and spiders 10, the latter being secured to hubs 11, which are fastened to the shaft 6. On the annular heads 9 are circular flanges or ribs 12, concentric with the axis. 13, 13 are ribs parallel to the axis and extending from end to end of the drum. Each of these is preferably formed by bending a sheet of light metal so as to double it and provide a rib which is V-shaped in cross section. Of these V-shaped ribs 13 there are a suitable number uniformly distributed around the axis. The inner edges of the side plates of each rib are, at their ends, fitted upon and fastened to the aforesaid circular flanges 12, projecting inward from the annular heads 9. 14, 14 are rings or hoops of wire extending around the drum and supported upon the outer edges of the ribs 13, they being fitted in seats or recesses therein. Upon these hoops or rings 14 is fitted the screen cloth 16, there being such number of the rings as to give a firm support for the screen and hold it rigidly in stretched cylindrical conformation. The rings 14 may be formed by coil-

ing a single wire around the axis a sufficient number of times to provide the required screen support.

Inside of the cylindrical part of the drum and at each end are a series of trough-like devices, those at one end being indicated by 17 and those at the other end by 17ª. Each is formed by bending a sheet of metal to provide the two walls 18, 18ª and the connecting wall 18ᵇ. The connecting wall 18ᵇ of each trough slopes downward from the inner end 19 to the outer end 20. The edges at 21, 21ª of each trough are connected to the inner edges of alternate ribs of the series at 13 above described. If these elements of the mechanism are formed of sheet metal the edges of the trough walls can be crimped with, or otherwise secured to, the inner edge parts 13ª of the ribs 13. At 22 the connecting wall 18ᵇ of each trough is turned laterally to provide a lip or flange, and by this the trough is secured, at the center of the drum, to a disk or spider 23, having a hub at 24 which is fastened to the shaft 6. Considering the entire series of troughs around the axis, it will be seen that they may be regarded as constituting a deeply corrugated cone; and that there is one such structure axially arranged inside of each end of the cylindrical part 5 of the drum.

And it will be further seen that when the above elements of the mechanism are assembled there are formed a large number of air ducts leading from the annular chamber 25, (around the drum), through the screen 5, then through the radial spaces between each rib 13 and the next, and then through the passages provided by the trough-like devices 18, 18ª and 18ᵇ, just described, to the openings at 26 in the spiders or heads at the ends of the drum. The air ducts at both ends of the drum, during part of each revolution, register respectively with the outlet openings 26ª in the end plates 55, adjacent the hoods 27, which are positioned outside of the ends of the drum, and adjacent to the bearings 7, 7ª of shaft 6.

The hoods 27 communicate with, and deliver air to, an outside duct 28. If suction is depended on the duct 28 extends to a suction fan.

Fig. 5 shows the aforesaid cut-off plate 55, it having a bottom segment shaped part 56, and an upper circular part 57 extending around the air outlet port 26ª. At 58 there is a groove with a packing. The groove and packing extend around the upper ringlike part 57 and down to the plate part 56. They then extend inward to plate 59 toward the axis. At 60 there is a ring secured to the drum head against which the plate with the packing is fitted. And a sealed joint is formed to prevent the intake of air. To the part 55 is attached a hood 27.

The aforesaid inward turned part 3ᵈ of the casing 3 cuts off to some extent the air chamber of the duct 25. But the throatway 28 is tightly closed by a roll 29 arranged closely adjacent to the cylindrical screen 5 and the edge of the casing at 3ᵈ. And near this roll is positioned another roll 30. The latter is arranged to tightly close the slot or throatway at 31 between the drum surface and the edge of the wall 32 of the duct 33. Through this duct the collected cotton escapes from the outer surface of the drum. The opposite wall of the escape passage or duct is indicated by 34 and the end walls by 35.

The roll 29 is formed of a tube 36 carried by a shaft 37, there being between the tube and the shaft a spiral spring connection 38. The tube will be rotated by the shaft, but at the same time will be flexibly positioned so that it can yield when necessary during its rotation. To one end of the shaft 37 is secured a belt wheel 39, the other end carrying a small gear wheel 40. Power is taken from this wheel through an intermediate wheel 43 to the wheel 41 on the shaft 42, which carries the second roller 30. The gear wheel 40 through the intermediate gear 43 also drives the short shaft 44, which carries a sprocket pinion 45. This pinion is connected by a chain 46 with a large sprocket wheel 47 on the main shaft 6.

The devices in this train of parts, extending from the belt wheel 39 to the sprocket wheel 47 on the shaft 6, constitute a simple driving mechanism giving the proper movements and relative speeds for the parts, and drive the active parts of the two rolls 29 and 30 and the surface of the screen 4 in proper relations. The cotton which is carried around on the screen surface in the chamber 25 is guided by the inward turned part 3ᵈ of the casing to the inner or active part of the surface of the bat roll 29, it being gradually compressed as it approaches the roll, and it is then forced between the screen surface and the roll, this being accomplished without any entrance of air notwithstanding the movements of these parts. A hood or box cover 3ᵉ may be used to entirely enclose the space around the rolls and insure their being positioned in a dead air chamber.

By supporting the drum in the way described and mounting its shaft 6 in bearings which are supported on brackets or standards such as described, and securing the latter to the bottom or base 61 of the structure I am able to place the bearings on the outside of all the paths of the incoming and outgoing air currents, and the tendency for air to be drawn in through the journals is overcome. At the same time the journals are left free for oiling and I am able to apply driving power to the drum shaft at one point as by the use of a single sprocket.

The parts above described which are positioned in the interior of the drum cause

the stream of air entering from the duct 1 to divide into two streams, and the air and cotton in these are distributed uniformly over the screen surface from the central transverse plane to the ends. Earlier separating drums in machines of this class have been so made that of the total amounts of cotton deposited in a given time, those deposited on the screen in the central transverse planes were considerably greater than those deposited in the transverse planes of the end parts of the drum. Consequently the bats that were formed were uneven and varied considerably in thickness along their transverse lines.

But in the present mechanism the double cone-like element inside of the drum presents resistance to the air at the central parts of the screen while at the ends the air goes through more freely; and this air, after passing through the screen, turns, in its path and travels on axial lines, toward the outside ducts. That is to say, I combine with the drum means for increasing the resistance to the air, through the drum, from transverse planes at the ends of the drum, along axial lines, to the transverse planes of the central parts thereof.

The same devices in the interior of the drum divide the inclosed space or chamber at each end into two sub-chambers. The upper sub-chamber may be regarded as extending from one terminal 26^b of the outlet port 26^a around to the other terminal, and through this sub-chamber the outgoing air passes after it has deposited the cotton. This sub-chamber is itself divided up into the plurality of ducts or smaller chambers above described which are cut off from each other. As the drum rotates the outer open ends of these ducts, during part of each revolution, as above noted, travel successively in communication with the exit opening 26^a. During the other part of each revolution they successively travel across the axial lines of the plate 56. This plate, together with the traveling walls 18, 18^a of the rotating ducts form the other sub-chamber 49, referred to, which (not having air communication with the upper sub-chamber, and therefore being a dead chamber) permits the dropping of the cotton from that part of the screen surface which is opposite thereto, as will be more fully described.

With the parts in the interior of the drum, and with the cut-off plate 55, other parts, exterior to the drum, co-act in forming the sub-chambers (one for outgoing air, and the dead chamber). Thus the duct 25, which extends around the greater part of the screen, is cut off from the external air, at one end by the roll 29, as above described, and at the other end by the casing section 3^b, the point 48 of which is close to the outer surface of the screen. These external cut-offs and the casing wall are so positioned that the interior dead air sub-chamber 49 is immediately opposite to the delivery duct 33.

When the cotton collected on the surface of the screen is composed of heavy or coarse fibers the layer that passes the rolls 29 and 30 will have so little adhesion to the screen surface that it will drop, under the action of gravity alone, when it reaches that part of the cycle which is between the dead air chamber 49 and the cotton withdrawing duct 33.

But when the cotton is composed of fibers which are fine and light it is frequently found necessary to assist it in escaping from the screen surface. For this purpose a stream of air can be taken from the outside into the interior dead air sub-chamber 49, above described. A duct 50 and an inlet passage 51 through the cut-off plate 56 are shown. When air is so introduced it passes from the dead chamber downward through the cut-off part 52 of the screen cylinder. It causes the dislodging from that part of the screen surface of the cotton which has been collected thereon and has been compressed by the bat rollers 29 and 30.

When such a stream of air for dislodging the cotton is used it may be forced through the duct 50 by a supplemental pressure fan; or it may be taken from the air which, after separating from the cotton, passes out through the outlet passage 26^a.

The screen after the cotton is dislodged passes on around the axis toward the duct 25, and is ready for another cycle of cotton separating work.

The air which initially comes to the machine and carries the cotton may be forced through the duct 1 and through the screen by an outside pressure fan; or it may be drawn through the mechanism by a suction fan; or both pressure and suction can be combined if occasion requires.

What I claim is:

1. The combination of the casing, the screen therein, an exhaust duct at each end of the casing, the supply duct delivering air and cotton to the central part of the casing, the means within the screen for gradually increasing, along axial lines from each end of the screen toward the center thereof, longitudinally, the resistance to the air which passes through the screen.

2. In a machine for separating cotton from air, the combination of the screen, the casing providing an outside air chamber extending part-way around the screen, means for supplying air and cotton to said chamber, a duct for conducting air out from the interior of the screen, means within the screen for dividing the space surrounded by it into a sub-chamber communicating with the last said duct, and a second sub-chamber, a cotton receiving duct communicating,

through the screen, with the second sub-chamber, rolls arranged to form a cut-off between the surface of the screen and the walls of the aforesaid outside air chamber and to form a cut-off between the cotton escape duct and the adjacent surface of the screen.

3. In a machine for separating cotton from air, the combination of a screen, means within the screen for dividing the space surrounded by it into two sub-chambers, a duct for taking air from one sub-chamber to the outside of the screen, and means for taking air from the outside of the screen into the second sub-chamber, a duct for supplying cotton and air to that part of the screen which is opposite the first sub-chamber, rolls for pressing against the cotton on the external surface of the screen, and an escape passage for the cotton radially opposite the second sub-chamber.

4. The combination with the screen, a casing providing an air chamber extending part-way around the surface of the screen, means for supplying cotton and air to said chamber, an escape passage for the cotton which is removed from the surface of the screen, and rolls arranged as described to close air-tight the end of the air chamber and to close air-tight the upper-end part of the side wall of said escape passage.

5. In a machine of the class described, the combination of a rotary screen, pneumatically acting devices for supplying cotton to one part of the surface of the screen, means for receiving cotton which is removed from another portion of said surface, and a spring held roller arranged to bear against the cotton on the screen and positioned between the last said means and the end of the first said part of the screen.

6. In a machine of the class described the combination of the rotary drum screen, a duct extending around the surface of the screen, pneumatically acting devices for delivering air and cotton to the said duct and to the part of the surface of the screen adjacent the duct, a spring held roller arranged to press against the cotton on the screen at the end of the said duct, and means supplemental to the roller for discharging the cotton from the screen.

In testimony whereof I affix my signature.

JAMES C. GARNER.