

Jan. 3, 1950

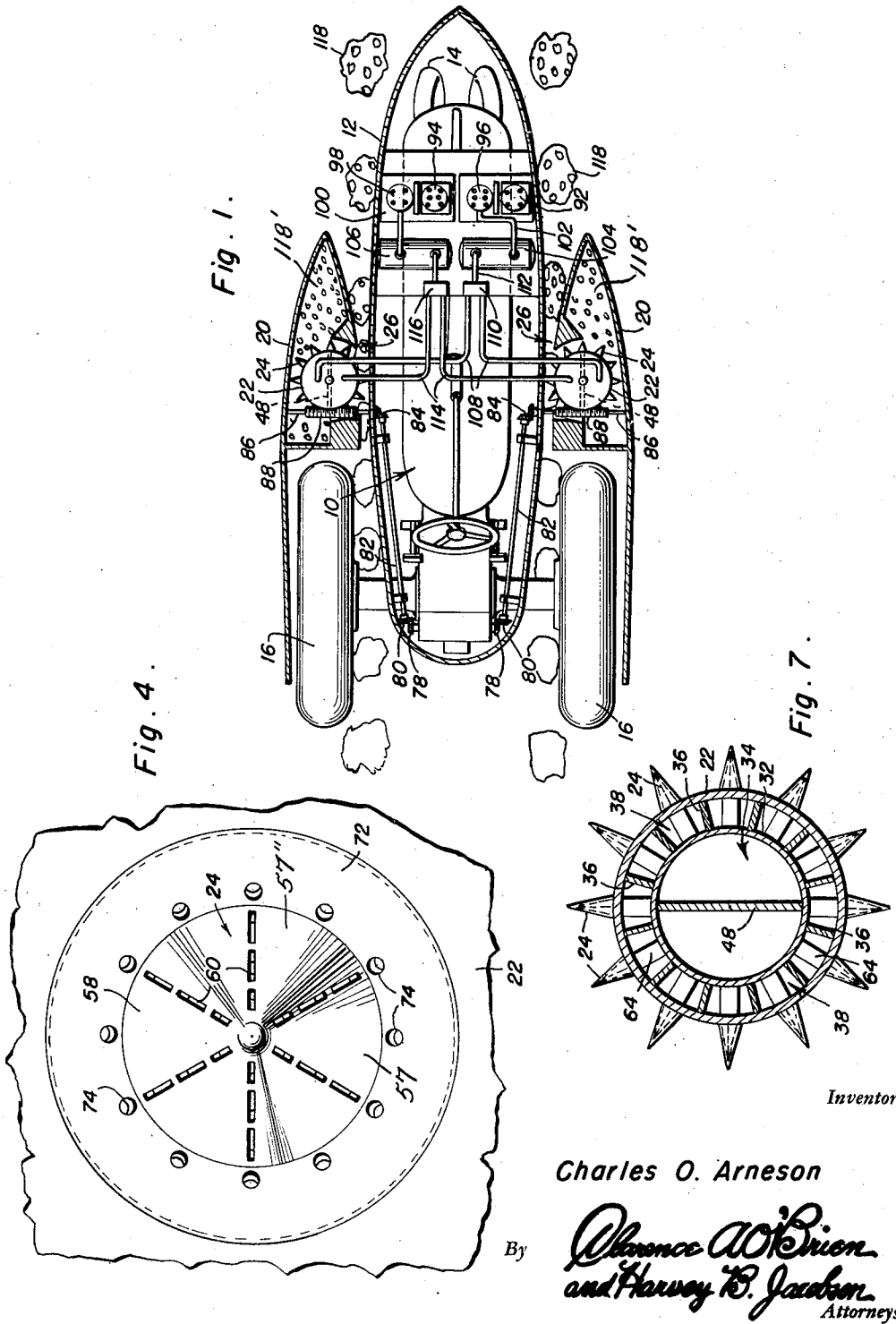
C. O. ARNESON

2,493,564

PNEUMATIC COTTON-PICKING SPINDLE

Filed May 20, 1948

3 Sheets-Sheet 1



Jan. 3, 1950

C. O. ARNESON

2,493,564

PNEUMATIC COTTON-PICKING SPINDLE

Filed May 20, 1948

3 Sheets-Sheet 2

Fig. 2.

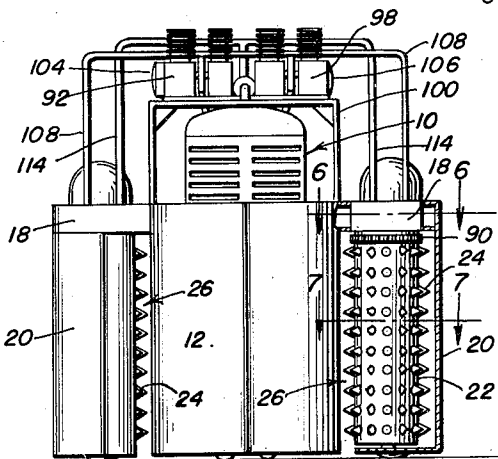


Fig. 6.

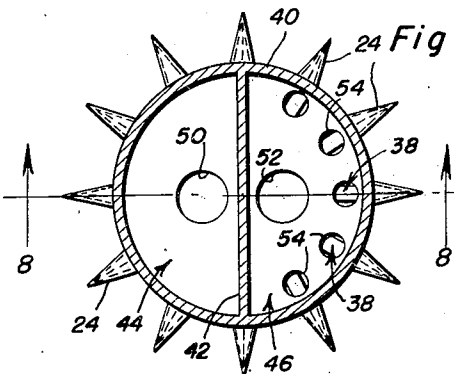


Fig. 5.

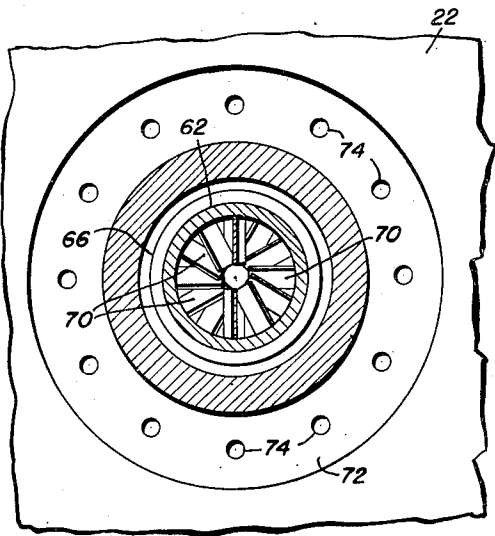
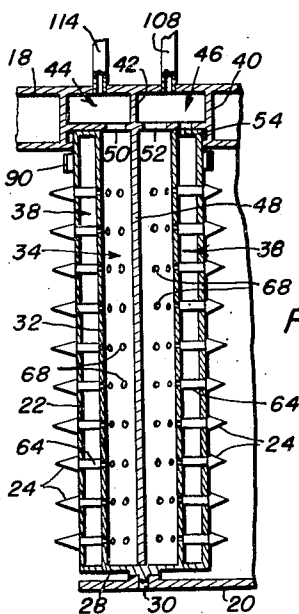


Fig. 8.



Inventor

Charles O. Arneson

By

Clarence A. O'Brien
and Harvey B. Jacobson
Attorneys

Jan. 3, 1950

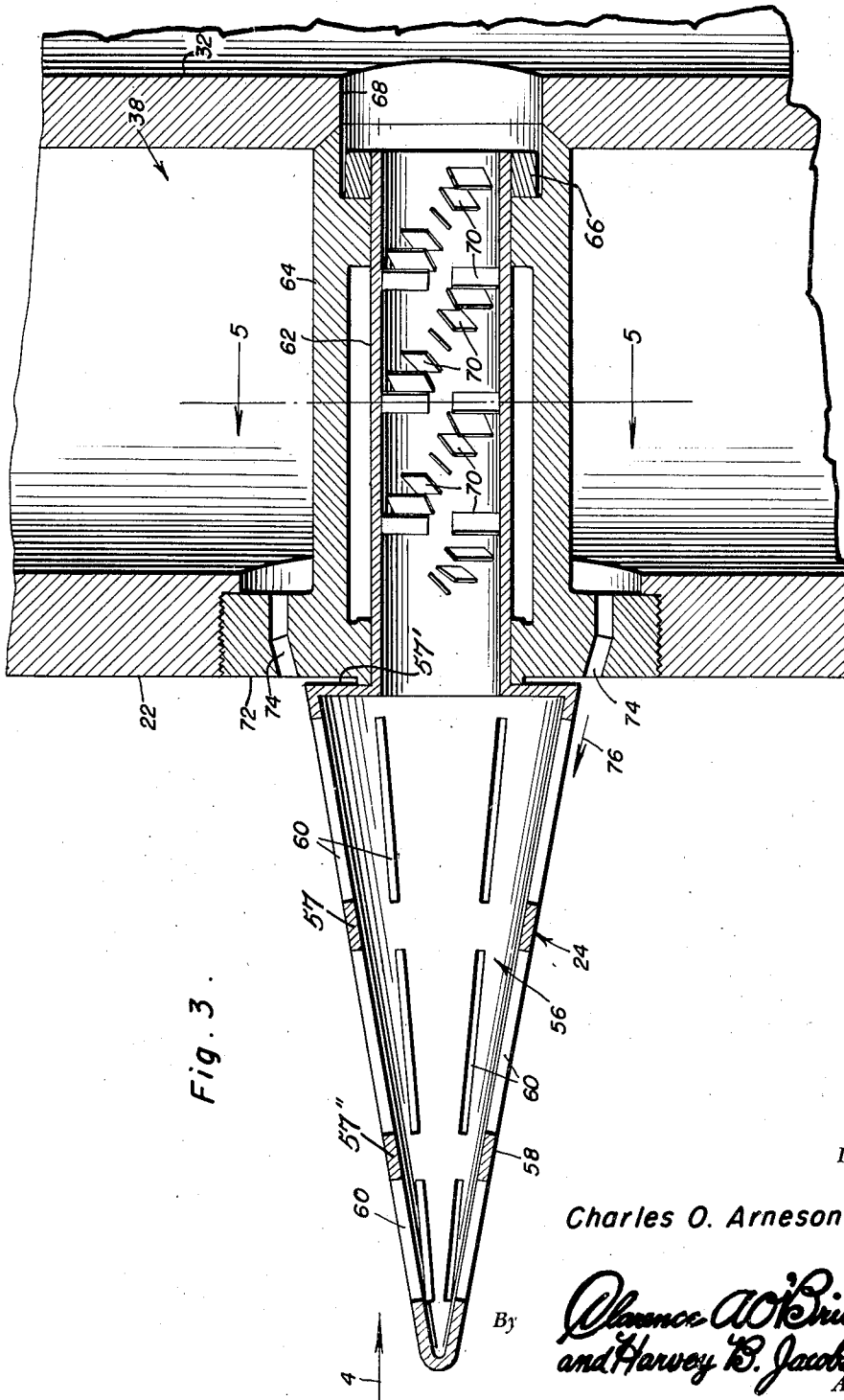
C. O. ARNESON

2,493,564

PNEUMATIC COTTON-PICKING SPINDLE

Filed May 20, 1948

3 Sheets-Sheet 3



Inventor

Charles O. Arneson

By

Clarence A. O'Brien
and Harvey B. Jacobson
Attorneys

UNITED STATES PATENT OFFICE

2,493,564

PNEUMATIC COTTON-PICKING SPINDLE

Charles O. Arneson, Delhi, La.

Application May 20, 1948, Serial No. 28,091

2 Claims. (Cl. 56—50)

1

This invention relates to new and useful improvements and structural refinements in cotton picking machines, and the principal object of the invention is to facilitate fast and efficient gathering of mature cotton from the plants, and equally fast and efficient disposal of the cotton after it is gathered.

Conventional machines or pickers employed for this purpose usually embody in their construction a pair of spaced, vertical and revolving drums which straddle a row of cotton plants, each drum being equipped with cam-actuated picker rods on which are mounted rotating tapered spindles. These spindles have numerous small barbs which catch the lints from the open cotton bolls. As the cotton fibers are drawn by the barbs they are propelled by air pressure through a collecting duct into a temporary storage receptacle mounted on the picker machine.

It is to be noted that this conventional apparatus for picking cotton employs what may be referred to as a positive mechanical action for separating the cotton fibers from the plants, that is, by direct physical engagement of the barbs with the cotton bolls. As a result, a machine of this type is quite capable of performing considerable injury to the plants, particularly to the immature bolls thereof, which usually become mutilated and rendered incapable of further growth or development to maturity.

Another object of the invention is, therefore, to eliminate the disadvantages incident to the use of conventional cotton pickers, that is to say, to facilitate the gathering of the cotton fibers with the minimum of disturbance or mutilation to the plants themselves.

These objects of the invention are achieved by eliminating the aforementioned positive mechanical gathering or picking action and employing vacuum or reduced air pressure, whereby the cotton is gathered, so to speak, in a gentle yet efficient manner by the pressure of the atmosphere.

Another important feature of the invention resides in the provision of means for intermittently applying pressure greater than that of the atmosphere to the cotton picking members after a certain amount of cotton has been deposited or accumulated thereon, so that the accumulated cotton may be discharged or released from the cotton picking members and deposited in a storage receptacle.

A further feature of the invention resides in the provision of a cotton picking device which is simple in construction, which may be easily and

2

conveniently manipulated, which will not easily become damaged, and which will readily lend itself to economical manufacture.

With the above more important objects and features in view, and such other objects and features as may become apparent as this specification proceeds, the invention consists essentially of the arrangement and construction of parts as illustrated in the accompanying drawings, in which:

Figure 1 is a top plan view of a tractor showing the invention in situ thereon, parts of the invention being broken away so as to reveal its construction;

Figure 2 is a front elevational view of the subject shown in Figure 1, parts of the invention also being broken away;

Figure 3 is a cross sectional detail showing a portion of a drum and one of the rotatable picking spindles used in the invention;

Figure 4 is an elevational view, taken substantially in the direction of the arrow 4 in Figure 3;

Figure 5 is a cross sectional view, taken substantially in the plane of the line 5—5 in Figure 3;

Figure 6 is a cross sectional view, taken substantially in the plane of the line 6—6 in Figure 2;

Figure 7 is a cross sectional view, taken substantially in the plane of the line 7—7 in Figure 2; and,

Figure 8 is a cross sectional view, taken substantially in the plane of the line 8—8 in Figure 6.

Like characters of reference are employed to designate like parts in the specification and throughout the several views.

Referring now to the accompanying drawings in detail, the general reference character 10 designates a conventional tractor, the lower portion of which is surrounded by an elongated shell 12 which encloses the front wheel assembly 14 of the tractor, but the rear wheels 16 of the tractor are disposed exteriorly with respect to the enclosure 12, as is best shown in Figure 1.

A pair of carriers 18 project laterally to the sides of the enclosure 12 (see Figure 2), these carriers being disposed forwardly of the rear wheels 16 and supporting downwardly extending housings 20. A rotatable drum 22 is provided in each of the housings 20 and carries on its lateral surface a plurality of rotatably mounted pickers or picking spindles 24. It is to be noted that the housings 20 are spaced from the side plates of the shell 12 so as to provide what may be referred

3

to as passageways 26, and the housings 20 are formed in the inner surfaces thereof with suitable openings through which the pickers 24 may project into the passageways 26, substantially as shown.

The construction and mounting of the two drums 22 is similar, so that a description of one will suffice for both.

The drum 22 is of hollow construction, having a closed lower end 28 equipped with a stub shaft 30 rotatable in the bottom of the housing 20, and a tubular insert 32 is secured in the drum 22 in spaced relation therewith, the insert 32 extending longitudinally in the drum and defining what may be referred to as a central, cylindrical compartment 34. Moreover, a plurality of radially disposed, longitudinally extending partitions 36 extend between the insert 32 and the wall of the drum 22 proper, the partitions 36 defining a set of air passages 38 which are disposed in annular formation around the central compartment 34, as is best shown in Figure 7.

The upper end portion of the drum 22 is freely rotatable in a distributor head 40 provided in each of the aforementioned carriers 18, the head 40 being separated by a diametrically extending partition 42 into a substantially semi-circular vacuum chamber 44 and a substantially semi-circular compressed air chamber 46, as is illustrated in Figures 6 and 8. The bottom wall of the head 40 carries a downwardly extending partition 48 which, in effect, is a continuation of the aforementioned partition 42 and which, although being stationary, extends into the center compartment 34 of the rotatable drum 22 and thereby separates that compartment into a pair of substantially semi-cylindrical portions. It is also to be noted that the bottom wall of the head 40 is formed with an opening 50 connecting the vacuum chamber 44 with a portion of the compartment 34 at one side of the partition 48, while a similar opening 52 connects the compressed air chamber 46 with the second portion of the compartment 34 at the relatively opposite side of the partition 48, substantially as shown in Figure 8. Moreover, the bottom wall of the head 40 is formed with a plurality of openings 54 which connect the compressed air chamber 46 with one-half of the aforementioned air passages 38, namely, those of the passages which are disposed in a semi-circle immediately adjacent that portion of the center compartment 34 which is in communication with the compressed air chamber 46.

The distributor head 40 as well as the partition 48 remain stationary at all times, while the drum 22 including the insert 32 are rotatable. Means hereinafter described are employed for creating vacuum in the chamber 44 and for maintaining a pressure of air in the chamber 46, and as a result, rotation of the drum 22 will simultaneously subject different portions of the inner surface of the insert 32 to the effects of reduced and increased air pressure, and at the same time, air under pressure will intermittently be delivered, in a circumferential progression, so to speak, to the air passages 38.

The arrangement and construction of the several picking spindles 24 is identical, so that a description of one will again suffice for all.

Each of the spindles 24 consists of a hollow, substantially conical body 57 forming a chamber 56 therein, this body including an end wall 57' and a tapered lateral wall 57'' which affords a crop-engaging surface 58 and is formed with a plurality of longitudinally extending air slots 60

4

communicating with the chamber 56. An open ended tubular duct 62 projects longitudinally from the end wall 57' and is rotatably journaled in the bore of a tubular bushing 64 secured in the drum 22, between the outer wall of the latter and the insert 32, as is best disclosed in Figures 3, 6 and 8. Needless to say, an individual bushing 64 is provided for the duct 62 of each of the several spindles 24, and the latter are rotatably retained in position on the drum by means of suitable retaining rings 66 provided on the ducts 62. It is to be noted that the insert 32 is formed with suitable apertures 68, whereby the compartment 34 communicates through the medium of the ducts 62 with the chambers 56 of the spindles 24, and it should be explained that as the drum 22 rotates, the aforementioned partition 48, disposed in the compartment 34, will coact with the vacuum chamber 44 and the compressed air chamber 46 of the distributor head 40 in such manner that in the spindles on the inner side of the partition 48 (see Figure 1) reduced air pressure will exist in the chambers 56 and atmospheric air will be drawn through the openings 60 in these chambers, while in the spindles disposed on the outside of the partitions 48, air under pressure will be delivered into the chambers 56 and discharged through the openings 60 into the atmosphere, or more specifically, into the housings 20.

Moreover, it is to be noted that a plurality of substantially rectangular propelling blades 70 are mounted in mutually spaced spiral formation in each of the ducts 62, so that when air passes through the ducts in either direction, the ducts together with the spindles 24 will be caused to rotate in one direction or the other, as will be clearly apparent.

The aforementioned bushings 64 are equipped with outturned mounting flanges 72 which are disposed adjacent the end walls 57' and extend outwardly beyond the marginal edges of the latter. The flanges 72 in turn, are provided with angulated air passages 74 disposed in a circular formation around each of the spindles 24 and communicating with the aforementioned air passages 38. Outer portions of the passages 74 have axes parallel to and spaced outwardly from the crop engaging surface 58, as is best shown in Figure 3. Accordingly, when air under pressure is delivered to the passages 38 from the compressed air chamber 46, compressed air will be discharged through the passages or nozzles 74 along the crop engaging surfaces 58 of the spindles 24, as indicated by the arrow 76 in Figure 3.

The rotation of the drums 22 is effected in the following manner:

The tractor 10 is usually provided with a pair of laterally projecting power take-off shafts, and a pair of bevel gears 78 are secured to these shafts, meshing with similar gears 80 secured to a pair of drive shafts 82 rotatably mounted in the enclosure or shell 12, as indicated in Figure 1. The shafts 82, in turn, are operatively connected by suitable gearing 84 to further shafts 86 carrying worms 88, and the latter operatively engage suitable ring gears 90 provided on the drums 22.

The means for delivering compressed air to the chambers 46 and creating vacuum in the chambers 44 consists of an air compressor 92 and an air pump 94, these being driven by small internal combustion engines 96, 98 respectively, of conventional design, and the several units 92, 94, 96 and 98 being suitably mounted upon a supporting structure 100 carried by the shell 12.

5

The air compressor 92 is connected as at 102 to a compressed air tank 104, while the vacuum pump 98 is similarly connected to a vacuum tank 106. A pair of conduits 108 extend from the compressed air chambers 46 of the two drums 22 to a junction box 110 which, in turn, is connected as at 112 to the compressed air tank 104. Similarly, conduits 114 extend from the vacuum chambers 44 to a junction box 116, the latter being connected to the vacuum tank 106.

It will be apparent that by virtue of this arrangement, a supply of compressed air will be delivered simultaneously to both chambers 46, while vacuum will be created in the chambers 44.

Having thus described the construction of the invention, its method of operation will now be explained.

When the invention is placed in use, the tractor 10 is driven between two rows of the cotton plants indicated at 118 in Figure 1, so that the rows of plants will pass, so to speak, through the passages 26. The side portions of the shell 12 will function as effective guides for urging the plants in engagement with the spindles 24 on the drums 22, and as the drums as well as the spindles are rotated as already explained, air will be drawn through the openings 60 into the chambers 56 of the spindles 24 which are disposed on the "inside," that is, in or adjacent the passageways 26, with respect to the stationary partitions 48.

By virtue of this inward passage of air through the openings 60, fibers of cotton will separate themselves from the plants and will remain deposited on the outer surfaces 58 of the spindles 24 until those spindles, by virtue of the rotation of the drums 22, are disposed on the "outside" with respect to the partitions 48, that is, in the housings 20.

At that time, air under pressure will be delivered through the chambers 56 and through the openings 60, whereby fibers of cotton accumulated on the pickers will be quickly removed or discharged therefrom into the housings 20 as indicated at 118', the latter functioning as temporary storage receptacles for the picked cotton.

It is to be noted that rotation of the spindles 24 while the cotton is being separated from the plants will result in circumferential winding of the cotton fibers on the surfaces 58. That is to say, the spindles 24 are rotated in one direction by the inward passage of air from the chambers 56 through the ducts 62, the inwardly passing air coming in contact with the propelling blades 70 and causing rotation of the spindles, as has been already described. However, while the cotton fibers are being discharged from the spindles into the housings 20, air will pass outwardly through the ducts 62 into the chambers 56 of the spindles, resulting in the rotation of the spindles in a relatively opposite direction as compared to that prevailing during the cotton picking operation. Accordingly, the fibers of cotton will become unwound from the spindles and the outward dis-

6

charge of air through the openings 60 will effectively assist in separating the cotton fibers from the spindles.

Needless to say, the housings 20 may be provided with suitable doors, so that the picked cotton accumulated therein may be periodically removed, such as for example, at the ends of the rows.

It is believed that the advantages and use of the invention will be clearly apparent from the foregoing disclosure and, accordingly, further description thereof at this point is deemed unnecessary.

While in the foregoing there has been shown and described the preferred embodiment of this invention, it is to be understood that minor changes in the details of construction, combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

Having described the invention, what is claimed as new is:

1. A pneumatic cotton picking spindle comprising a hollow conical body affording an air chamber, said body including an end wall and a tapered lateral wall, said lateral wall having a crop engaging surface and being provided with rows of longitudinally extending air slots communicating with said chamber, an open ended tubular air duct extending longitudinally from said end wall and affording means for rotatably mounting said body, and a set of substantially rectangular propelling blades secured in mutually spaced spiral formation to the inner surface of said duct.

2. The device as defined in claim 1, in combination with a tubular supporting bushing having said duct rotatably mounted therein, and an out-turned flange provided at one end of said bushing adjacent the end wall of said body and extending outwardly beyond the marginal edge of said end wall, the marginal portion of said flange being provided with a plurality of compressed air passages having axes parallel to and spaced outwardly from said crop engaging surface whereby compressed air may be blown longitudinally of said crop engaging surface over said slots.

CHARLES O. ARNESON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
768,400	Piper	Aug. 23, 1904
793,210	Morava	June 27, 1905
1,087,872	Dana	Feb. 17, 1914
1,447,328	Rycroft	Mar. 6, 1923
1,845,431	Martin	Feb. 16, 1932
1,953,313	Prouty et al.	Apr. 3, 1934
1,953,639	Waggoner	Apr. 3, 1934