Dec. 10, 1957 M. W. SHANNON 2,815,635

SPINDLE DRIVING MEANS IN A COTTON PICKING UNIT

Filed July 5, 1956. 2 Sheets-Sheet 1

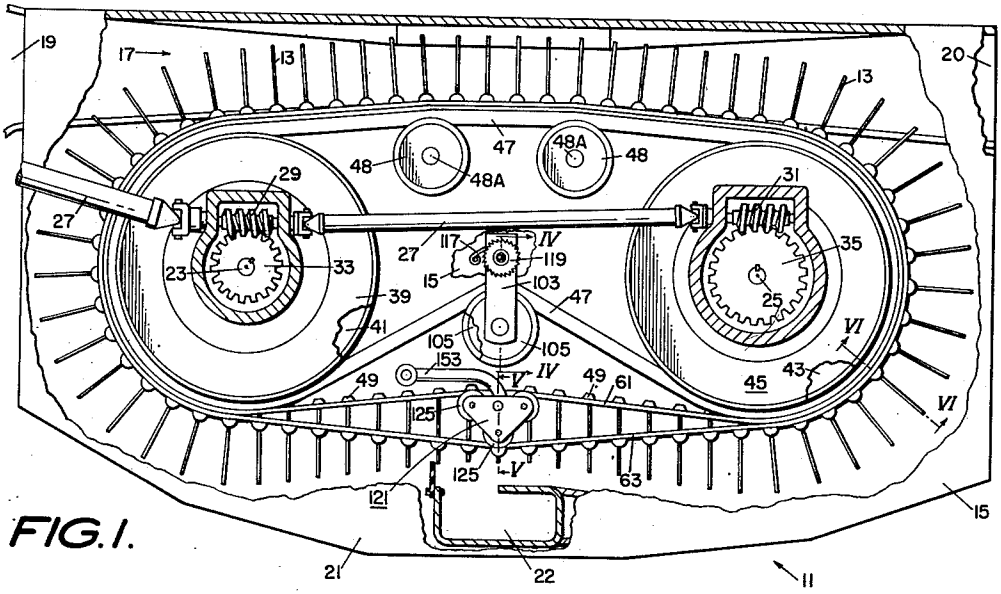
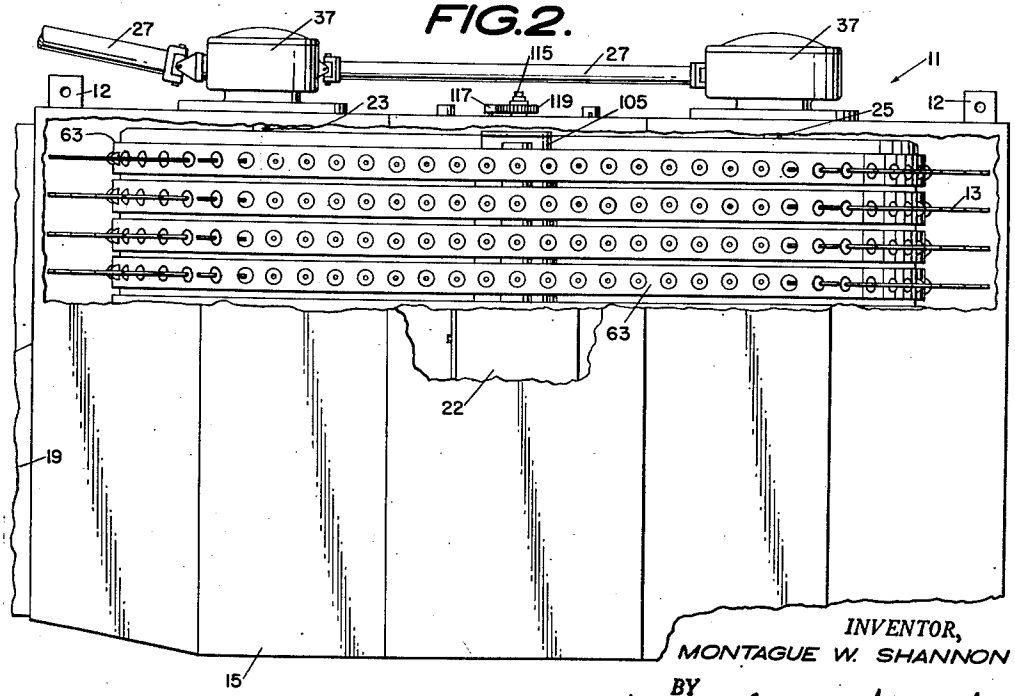


FIG. 1.

FIG. 2.



INVENTOR,
MONTAGUE W. SHANNON
BY
Weatherford & Weatherford
attys

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FIG. 3.

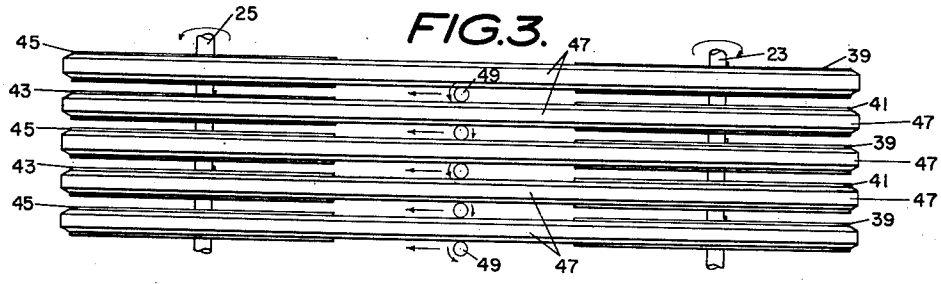


FIG. 4.

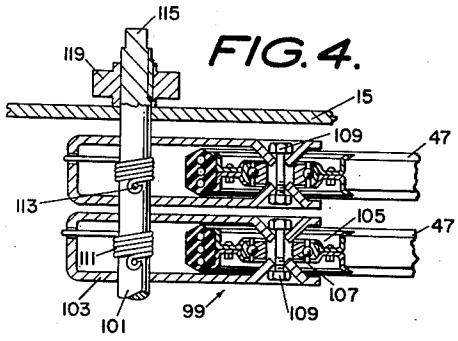


FIG. 7.

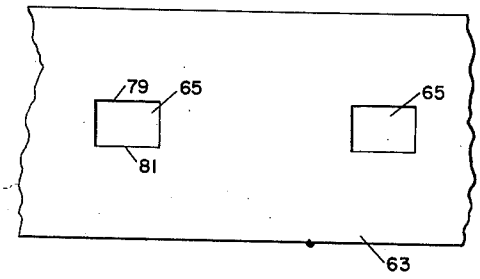


FIG. 5.

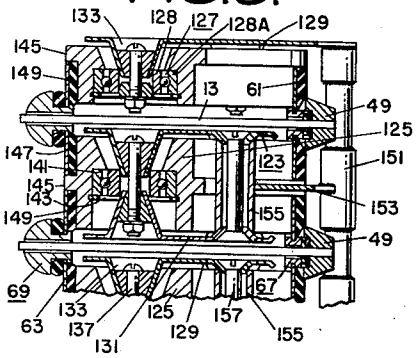
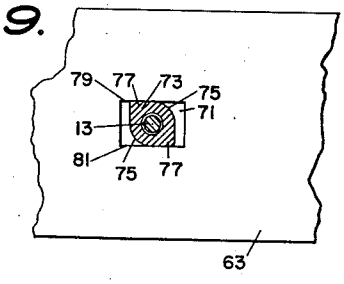


FIG. 9.



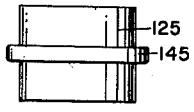


FIG. 10.

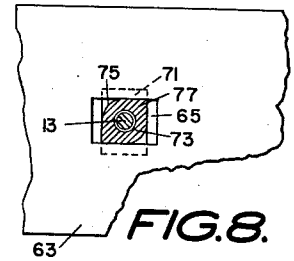


FIG. 8.

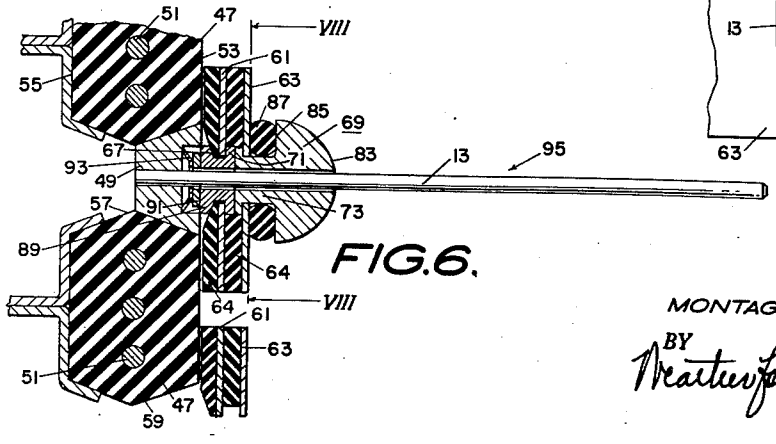


FIG. 6.

INVENTOR,
MONTAGUE W. SHANNON
BY
Weatherford & Weatherford
Attys

United States Patent Office

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SPINDLE DRIVING MEANS IN A COTTON PICKING UNIT

Montague W. Shannon, Greenfield, Tenn.

Application July 5, 1956, Serial No. 595,956

6 Claims. (Cl. 56—42)

This invention relates to a cotton picker, and more particularly to a cotton picking unit having a plurality of rotatable rod-like spindles for engaging and removing the cotton fiber from cotton bolls.

Heretofore in cotton picking units of the above mentioned spindle type the spindles have been rotatably mounted from a plurality of vertical slat-like members, which in turn are hingedly mounted on chains and carried in an endless horizontal path. This type of construction necessarily results in a great number of moving parts, and in an extremely heavy and bulky picking unit.

The cotton picker of the present invention overcomes the above mentioned objections by providing a picker in which an entirely new concept is employed, wherein the spindles are carried by a plurality of horizontally disposed light weight bands which are in overlying relationship and with horizontal rows of spindles being respectively carried in an endless path and rotatably driven by a pair of belts travelling at different speeds and in opposite directions. Thus, a picker is provided of much simpler design which has no vertical slats and consists of fewer moving parts compared to previous pickers. This results in less maintenance and oiling. In addition, the picking unit of the present invention is much lighter than previous pickers, thus making possible the carrying of a greater number of units from a tractor. Heretofore the extreme weight of previous picking units limited to two the number of picking units that should be carried by a tractor, whereas with the units of the present invention as many as four units may be carried by a single tractor to pick four rows at a time.

The principal object of the present invention is to provide an efficient, yet simple and compact, cotton picking unit.

A further object is to provide a cotton picking unit in which friction and wear are kept at a minimum.

A further object is to provide a cotton picking unit having a minimum number of gears, chains, and the like which become clogged with dirt and present lubrication problems.

A further object is to provide a durable unit which requires less adjustment.

A further object is to provide a cotton picking structure of light weight without sacrificing strength of construction.

A further object is to provide a cotton picking unit having a positive stripping means.

A further object is to provide a cotton picking unit comprised of a plurality of spindles carried by horizontally disposed pairs of light weight bands which are in overlying relationship and with each horizontal row of spindles being carried in an endless path and rotatably driven by a pair of belts travelling at different speeds and in opposite directions.

A further object is to provide in such a cotton picker novel means for tightening the drive belts.

A further object is to provide in such a picking unit

novel separating means for separating the spindle carrying bands to strip the cotton from the spindles.

A further object is to provide a quick detachable bearing means for mounting the cotton picking spindles.

A further object is generally to improve the design and construction of cotton pickers.

The means by which the foregoing and other objects of the present invention are accomplished and the manner of their accomplishment will be readily understood from the following specification upon reference to the accompanying drawings, in which:

Fig. 1 is a plan view of the cotton picking unit of the present invention, with parts removed and broken away for purposes of illustration.

Fig. 2 is a side elevational view of the same with parts broken away for purposes of illustration.

Fig. 3 is a diagrammatic view as viewed from the side of the picker opposite from that shown in Fig. 2 of the manner in which the spindles are rotated and carried along in the same direction by means of belts travelling at different speeds and in opposite directions.

Fig. 4 is an enlarged fragmentary sectional view taken as on the line IV—IV of Fig. 1.

Fig. 5 is an enlarged fragmentary sectional view on the scale of Fig. 4 taken as on the line V—V of Fig. 1.

Fig. 6 is a further enlarged fragmentary sectional view taken as on the line VI—VI of Fig. 1.

Fig. 7 is a fragmentary front elevational view on the scale of Fig. 6 of one of the bands showing the apertures therein.

Fig. 8 is a similar view partly in section of one of the bearings taken as on the line VIII—VIII of Fig. 6, illustrating the bearing in locked position in the aperture.

Fig. 9 is a similar view illustrating the bearing in the alined position.

Fig. 10 is an elevational view on the scale of Fig. 5 of one of the spreader rollers.

Referring now to the drawings in which the various parts are indicated by numerals, the cotton picking unit **11** of the present invention is adapted to be suspended as by brackets **12** from a tractor (not shown) or other conveying means, and to pick the cotton from the cotton bolls by means of rotating rod-like cotton picking spindles **13** as the cotton picking unit is conveyed over the rows of cotton. Cotton picking spindles **13** are preferably positioned so as to provide a plurality of vertically spaced and horizontally disposed rows of spindles. Cotton picking unit **11** comprises in general a casing **15** having a cotton plant passageway **17** along one side thereof, the cotton plants entering the passageway at the entrance **19** and leaving the unit by the exit **20**. After the cotton has been picked by spindles **13** during plant passage through passageway **17**, the spindles with the cotton wound therearound are conveyed around to the opposite or stripping side **21** of the picking unit and the cotton is stripped from the spindles by means hereinafter described, the cotton being subsequently removed from the unit by suitable means as a suction duct **22**.

A vertically disposed forward shaft **23** is rotatably mounted in casing **15** adjacent the forward end thereof, and a vertically disposed rearward shaft **25** is rotatably mounted adjacent the rearward end thereof. Forward shaft **23** and rearward shaft **25** are driven in opposite directions and at different speeds as by the following means: A drive shaft **27** is coupled at one end to a suitable drive means (not shown), as for example the motor of the conveying tractor. Drive shaft **27** is provided with oppositely pitched worm-type gears **29**, **31**, which respectively engage drive gears **33**, **35**, which in turn are respectively keyed to the forward shaft **23** and rearward shaft **25**. One of the gears **33**, **35** is larger than the other,

whereby the shafts 25, 27 will be driven at different speeds. In the present drawings drive gear 35 is illustrated as being larger in diameter than drive gear 33, whereby the forward shaft 23 will be driven at a greater speed by drive shaft 27 than rearward shaft 25 and in an opposite direction thereto since the gears 29, 31 are oppositely pitched. Suitable covering is provided for the above described gearing mechanism, as housings 37, in which drive shaft 27 is journalled.

A plurality of fixed pulleys 39 and rotatably mounted pulleys 41 are alternately mounted on forward shaft 23. Fixed pulleys 39 are keyed to shaft 23 for rotation therewith and pulleys 41 are rotatable with respect to shaft 23. Similarly a plurality of fixed pulleys 43 and rotatably mounted pulleys 45 are alternately mounted on rearward shaft 25, with the fixed pulleys 43 being oppositely disposed from rotatably mounted pulleys 41, and rotatably mounted pulleys 45 being disposed oppositely from fixed pulleys 39. A plurality of endless horizontally disposed drive belts 47 are respectively mounted on the above mentioned pairs of oppositely disposed pulleys. A plurality of pairs of idler pulleys 48 is provided for respectively engaging belts 47 at longitudinally spaced points to hold a section of the belts outwardly adjacent the mid-portion of cotton plant passageway 17 whereby to narrow the passageway along this section thereof for more efficient picking of the cotton. Idler pulleys 48 are journalled on shafts 48A which are vertically mounted in casing 15 in longitudinally spaced relation.

A plurality of spindle rollers 49 are respectively keyed onto spindles 13 adjacent one end of the spindles. Since spindles 13 are disposed in a plurality of vertically spaced horizontal rows, the rollers 49 will be arranged in the same pattern. The horizontal rows of rollers 49 are respectively disposed between adjacent horizontal drive belts 47. Thus each of spindle rollers 49 frictionally engages a pair of drive belts 47, that is, the upper surface of the roller engages the drive belt thereabove and the lower surface of the roller engages the drive belt therebelow. The rollers 49 with spindles 13 are rotated and conveyed along by the drive belts, as best illustrated in Fig. 3. Thus for example, the upper one of the spindle rollers 49 illustrated in Fig. 3 with its related spindle is rotated in a counterclockwise direction since the portion of the upper belt which engages the roller moves to the left, as viewed in Fig. 3, and the portion of the next adjacent lower belt which engages the roller moves to the right. The roller 47 next below said upper roller rotates in a clockwise direction since the portion of the drive belt which engages the upper surface of said next roller moves to the right as viewed in Fig. 3, and the portion of the next adjacent lower belt which engages the roller moves to the left as viewed in Fig. 3. Thus it will be seen every other roller 49 in a vertical row will be rotated in opposite directions but conveyed along in an endless horizontal path at the same rate of speed in a clockwise direction as viewed in Fig. 1, said rate of speed being determined by the differences in the speeds of the adjacent belts.

Drive belts 47 are preferably formed of rubber or the like and are preferably reinforced by wires 51 extending therethrough. The outer and inner faces 53, 55 of belts 47 are preferably vertically disposed and the upper and lower edges of the belts are preferably respectively tapered from the center portion thereof towards the outer and inner faces 53, 55 to form tapered upper and lower faces 57, 59, respectively. Spindle rollers 49 are tapered to match the outward portion of tapered upper and lower faces 57, 59, as best illustrated in Fig. 6.

Spindles 13 are rotatably carried by means of a plurality of horizontally disposed and vertically spaced pairs of flexible bands movable in an endless horizontal path. Each of said pairs of bands comprises an inner band 61 and an outer band 63 surrounding or overlying the inner band. Bands 61, 63 are preferably, though not necessarily, respectively provided with resilient backing 64, as

of rubber or the like, bonded thereto and are cut out to provide a plurality of alined rectangular apertures 65 in the inner and outer bands. Spindles 13 respectively extend outwardly through alined apertures 65 with the rollers 49 thereof being disposed behind or inwardly of the bands 61, 63. Each of spindles 13 is supported from bands 61, 63 in the alined apertures by means of an inner bearing 67 and an outer bearing 69. Each of bearings 67, 69 is provided with a central longitudinal bore in which a spindle 13 is rotatably mounted. Additionally, outer bearing 69 is shiftable lengthwise along spindle 13, as best illustrated in Figs. 1 and 5, for the stripping of cotton therefrom. Each of bearings 67 and 69 are provided with locking means which are similar in construction, and for simplicity's sake only one is herein described. Said locking means comprises a locking portion 71 adjacent one end of bearings 67, 69 and comprises an integrally formed intermediate stop portion 73. Locking portion 71 is preferably rectangular in shape and slightly smaller in demensions than apertures 65 for passage therethrough. The length of locking portion 71 is greater than the width of aperture 65 so that when locking portion 71 is turned with its longitudinal axis substantially perpendicular to the longitudinal axis of aperture 65, the locking portion will not pass therethrough. Stop portions 73 are preferably formed from a square shape with the length of the sides thereof being less than the width of apertures 65. Additionally, a pair of opposing corners of stop portions 73 are rounded off, as at 75, so that the stop portions may be turned a quarter of a turn in the apertures. It will be understood that in order to allow the stop portions 73 to be turned in aperture 65, the amount of rounding off of the opposing corners must be such that the radius thereof relative to the center of stop portions 73 is less than one-half the width of the rectangular aperture 65. Bearings 67, 69 are turnable from and to a locked position, best illustrated in Figs. 6 and 8, and turnable to and from an alined position, for removal and insertion of the bearings. In the alined position, as best illustrated in Fig. 9, it will be seen the bearing has been turned clockwise a quarter of a turn from the position in Fig. 8 so that the opposite square corner portions 77 limit further clockwise motion by engagement with the upper and lower edges 79, 81 respectively of aperture 65, and so that locking portion 71 is in alinement with the aperture for passage therethrough. In the locked position, as will be seen in Figs. 6 and 8, the bearing is limited in further counter-clockwise movement by engagement of square corner portions 77 with edges 79, 81, respectively, and locking portions 71 engage the bands adjacent apertures 65 to prevent removal of the bearings from the apertures. It will be understood that the proper corners are rounded off of stop portions 73 so that the rotation of spindles 13 will urge bearings 67, 69 towards said locked position. Thus, the bearings in Figs. 8 and 9 are adapted to be placed on a spindle which rotates in a counter-clockwise direction. For a spindle rotating in a clockwise direction it will be necessary to round off the other pair of corners instead of the pairs rounded off in Figs. 8 and 9. Bearings 67, 69 are disposed in apertures 65 so that the locking portions 71 of bearings 67, 69 are in abutment as best illustrated in Fig. 6.

The exterior portion of outer bearing 69 remote from its locking portion 71 is preferably hemispherical, as at 83, and is provided with an annular shoulder 85 adjacent the inward side thereof. A ring-like rubber grommet 87 is removably mounted between shoulder 85 and the outward side of band 63 to hold the locking portion 71 against the back of the outer band 63 and yet permit limited canting movement of spindle 13.

The end of inner bearings 67 remote from locking portion 71 is preferably flat, as at 89, and a washer 91 carried on spindle 13 is held thereagainst by means of a spring 93. From the foregoing description it will be apparent that the spindle assembly, generally designated as

95, compared to previous spindle type cotton pickers comprises a relatively small number of parts, namely, spindle 13, roller 49, inner and outer bearings 67, 69, washer 91, and spring 93, thus resulting in less maintenance and oiling.

Separating means is provided on the cotton stripping side 21 of the cotton picking unit 11 for pulling drive belts 47 away from spindle rollers 49 whereby to stop the rotation of the rollers and the spindles 13 during stripping of the cotton therefrom and to allow spread of the bands 61, 63 in a manner as hereinafter described. Additionally, said separating means clears belts 47 from the end of rollers 49 so that if it is desired to replace a spindle 13, the spindle to be replaced may be quickly and easily removed from bearings 67, 69 by pulling spindle rollers 49 inwardly or away from band 61, and the new spindle may then be inserted lengthwise into the bearings from the inward side thereof. Thus, the spindles of the present invention may be replaced much easier and quicker than the replacement of spindles in previous cotton pickers. Said separating means preferably comprises a plurality of separating assemblies 99 vertically spaced and respectively rotatably mounted on a vertical rod 101 which is turnably mounted in the picking unit casing 15. Each of separating assemblies 99 preferably comprises a casing 103 journalled on rod 101, and a pulley 105 rotatably mounted in casing 103, as by means of roller bearing assemblies 107 which are clampingly held in place between the upper and lower portions of casing 103 by means of bolt means 109, as best illustrated in Fig. 4. A spring 111 is provided in each of separating assemblies 99, the spring being preferably coiled about rod 101 with one end of the spring fixedly secured to the rod as by a pin 113 projecting from the rod, and with the other end of the spring engaging the casing to urge the casing in a clockwise direction as viewed in Fig. 1.

The upper end of rod 101 is preferably squared as at 115 whereby to receive a wrench or the like for turn of rod 101. Turn of rod 101 in a clockwise direction as viewed in Fig. 1 is effective to wind spring 111 whereby to increase the pressure of the spring on casing 103 and to cause the pulley 105 to exert a greater pressure against drive belts 47. Thus it will be seen, adjustable means is provided for tightening drive belts 17. Additionally, means is provided for maintaining rod 101 at the desired angular position, said means preferably comprising a pawl 117 mounted on casing 15 and engaging a ratchet wheel 119 which is fixedly mounted on rod 101.

Spreading means is interposed between overlapping pairs of inner and outer bands 61, 63 at a place in the endless path of movement of the bands adjacent the cotton stripping side that is, the side of unit 11 opposite from stripping side 21, whereby the outer band is shifted outwardly relatively to the spindles 13, as best illustrated in Figs. 1 and 5, forcing bearing 69 along the spindles to strip the cotton therefrom. Said spreading means is provided with oppositely facing band engaging surfaces which are spaced apart a distance substantially equal to the exposed length of spindle 13 when bearing 69 is in a retracted position as illustrated in Fig. 6. Thus the exposed length of spindle 13 is the length of the spindle from a point on the spindle adjacent the outer end of bearing 69 to the end of the spindle as viewed in Fig. 6. The distance between the oppositely facing band engaging surfaces is important since in order to strip the cotton from spindle 13 the bearing 69 must be moved substantially to the outward end of the spindle, and this is accomplished when said distance is substantially equal to said exposed length. Said spreading means preferably comprises a plurality of spreaders 121, each of which comprises in general a carriage 123, and preferably though not necessarily, three rollers 125 rotatably mounted from carriage 123 by means of roller bearing rings 127, including inner ring 128 and outer ring 128A. In the embodiment illustrated the rollers 125 are in a triangular dis-

position and said oppositely facing band engaging surfaces comprise the outer face of one of the rollers and the oppositely facing faces of the other two rollers. Each of carriages 123 are preferably formed from two separate sections, an upper section 129 and a lower section 131, respectively having integrally formed cone-shaped portions 133 extending from each of the sections towards the other. Inner ring 128 is clamped between cone-shaped portions 133 by means of a bolt 137 extending therethrough. Outer ring 128A is removably and fixedly anchored against a shoulder 141, provided in the interior of rollers 125, by means of a snap ring 143 removably engaged in a groove provided in the interior of the roller.

Each of rollers 125 is provided with a circumferential embossment 145 dividing the roller into an upper roller surface 147 and a lower roller surface 149. One of rollers 125 in each of carriages 123 engages a pair of adjacent outer bands 63 with embossment 145 extending therebetween and with the upper one of said pair of adjacent bands engaging upper roller surface 147 and the lower one of said adjacent bands engaging lower roller surface 149. The remaining two rollers in each of carriages 123 engage an adjacent pair of inner bands 61 with embossment 145 extending therebetween and with the upper one of said pair of adjacent inner bands engaging upper roller surface 147 and the lower one of said adjacent bands engaging lower roller surface 149. Spreaders 121 are respectively supported from a vertical post 151, mounted in casing 15, by means of a plurality of vertically spaced and horizontally extending arms 153 mounted adjacent one end thereof to post 151 and respectively extending through the vertical spaces between adjacent pairs of bands. The other end of arms 153 are respectively attached to spreaders 121 to provide support therefor. The attachment means of arms 153 to spreaders 121 comprise hollow tubes 155 fixedly attached to the end of the arms and clampingly held between the upper and lower sections 129, 131 by a bolt means 157. It will be understood that the uppermost and lowermost spreaders consist of only one-half of a spreader 121 since it is necessary for these uppermost and lowermost spreaders only to contact one pair of inner and outer bands. Thus, as best illustrated in Fig. 5, the uppermost spreader comprises an upper section 129 and one-half of a roller 125 with the circumferential embossment being disposed adjacent the upper edge thereof. Arm 153 may be omitted and the upper section 129 extend to be fixedly attached to the upper end of vertical post 151. Lowermost spreader 121 is of similar construction to uppermost spreader 121 just described.

From the foregoing it will be understood that the present invention provides a novel cotton picker having few moving parts and characterized by a simplicity of construction which is light weight, yet sturdy and rugged. Additionally, a novel and efficient means is provided for rotating the spindles and at the same time conveying them in an endless path. In addition, many other unique features are provided in the cotton picker of the present invention not heretofore known.

I claim:

1. In a cotton picker, a housing, a plurality of horizontally disposed and vertically spaced pairs of bands movable in an endless horizontal path, a plurality of cotton picking spindle means rotatably mounted and carried on said pairs of bands to provide a plurality of horizontal rows of cotton picking spindle means, each of said pairs of bands comprising an inner band and an outer band surrounding said inner band, a plurality of horizontally disposed drive belts movable in an endless path, the spindle means in each of said horizontal rows being respectively frictionally engaged on opposite sides thereof by an adjacent pair of said drive belts, means driving said belts, adjacent drive belts being driven in opposite directions and at different speeds to rotate said spindle means

and to move said spindle means with said bands in an endless path, a plurality of means for separating said drive belts from engagement with said spindle means, a vertical rod turnably mounted from said housing, said separating means being vertically spaced and respectively rotatably mounted on said rod; each of said separating means comprising a casing, a pulley rotatably mounted in said casing, said pulley engaging one of said drive belts, a spring engaging said casing and said rod to urge said pulley against said drive belt, the turning of said vertical rod being effective to change the pressure of said spring on said casing to vary the force said pulley exerts against said drive belt whereby to vary the tightness of said drive belt, pawl and ratchet means coupled to said rod to maintain said rod at the desired position for the desired tightness of said drive belt.

2. In a cotton picker, a housing, a plurality of horizontally disposed and vertically spaced pairs of bands movable in an endless horizontal path, a plurality of cotton picking spindle means rotatably mounted and carried on said pairs of bands to provide a plurality of horizontal rows of cotton picking spindle means, each of said pairs of bands comprising an inner band an outer band surrounding said inner band, a plurality of horizontally disposed drive belts movable in an endless path, the spindle means in each of said horizontal rows being respectively frictionally engaged on opposite sides thereof by an adjacent pair of said drive belts, means driving said belts, adjacent drive belts being driven in opposite directions and at different speeds to rotate said spindle means and to move said spindle means with said bands in an endless path, a plurality of means for separating said drive belts from engagement with said spindle means, a vertical rod turnably mounted from said housing, said separating means being vertically spaced and respectively rotatably mounted on said rod; each of said separating means comprising a casing rotatably mounted on said rod, a pulley rotatably mounted in said casing, said pulley engaging one of said drive belts, a spring engaging said casing and said rod to urge said pulley against said drive belt.

3. In a cotton picker, a plurality of horizontally disposed and vertically spaced pairs of bands movable in an endless horizontal path, a plurality of cotton picking spindle means rotatably mounted and carried on said pairs of bands to provide a plurality of horizontal rows of cotton picking spindle means, each of said pairs of bands comprising an inner band and an outer band surrounding said inner band, a plurality of horizontally disposed drive belts movable in an endless path, the spindle means in each of said horizontal rows being respectively frictionally engaged on opposite sides thereof by an adjacent pair of said drive belts, means driving said belts, adjacent drive belts being driven in opposite directions and at different speeds to rotate said spindle means and to move said spindle means with said bands in an endless path, a plurality of means engaging said drive belts and urging said drive belts away from said spindle means along a portion of said endless path thereby stopping the rotation of said spindle means for the cotton stripping operation.

4. In a cotton picker, a plurality of horizontally disposed and vertically spaced pairs of bands movable in an endless horizontal path, a plurality of cotton picking spindle means rotatably mounted and carried on said pairs of bands to provide a plurality of horizontal rows of said cotton picking spindle means, each of said pairs of bands comprising an inner band and an outer band surrounding said inner band, a plurality of horizontally disposed drive belts movable in an endless path, the spindle means in each of said horizontal rows being respectively frictionally engaged on opposite sides thereof by an adjacent pair of drive belts, means driving said belts, adjacent drive belts being driven in opposite directions and at different speeds to rotate said spindle means and to move said spindle means with said bands in an endless path.

5. In a cotton picker, a plurality of horizontally disposed bands movable in an endless horizontal path, said bands being formed to provide a plurality of apertures therein, a plurality of bearing means respectively carried by said bands in said apertures, a plurality of spindle means rotatably carried in said bearing means, each of said spindle means including an inward end and an outward end, said spindle means being inwardly and longitudinally slidable from said bearings, a plurality of drive belts engaging the inward end of said spindle means to drive said spindles and prevent removal thereof from said bearings, separating means engaging said drive belts adjacent at least one place in said endless path to separate said drive belts from said spindle means adjacent said one place whereby access is provided to said spindle means for removal thereof.

6. In a cotton picker, a plurality of horizontally disposed and vertically spaced pairs of bands movable in an endless horizontal path, a plurality of cotton-picking spindle means rotatably mounted and carried on said pairs of bands to provide a plurality of horizontal rows of cotton-picking spindle means, each of said pairs of bands comprising an inner band and an outer band surrounding said inner band, a plurality of horizontally disposed drive belts movable in an endless path, the spindle means in each of said horizontal rows being respectively frictionally engaged on opposite sides thereof by an adjacent pair of said drive belts, means driving said belts, adjacent drive belts being driven in opposite directions and at different speeds to rotate said spindle means and to move said spindle means with said bands in an endless path.

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