

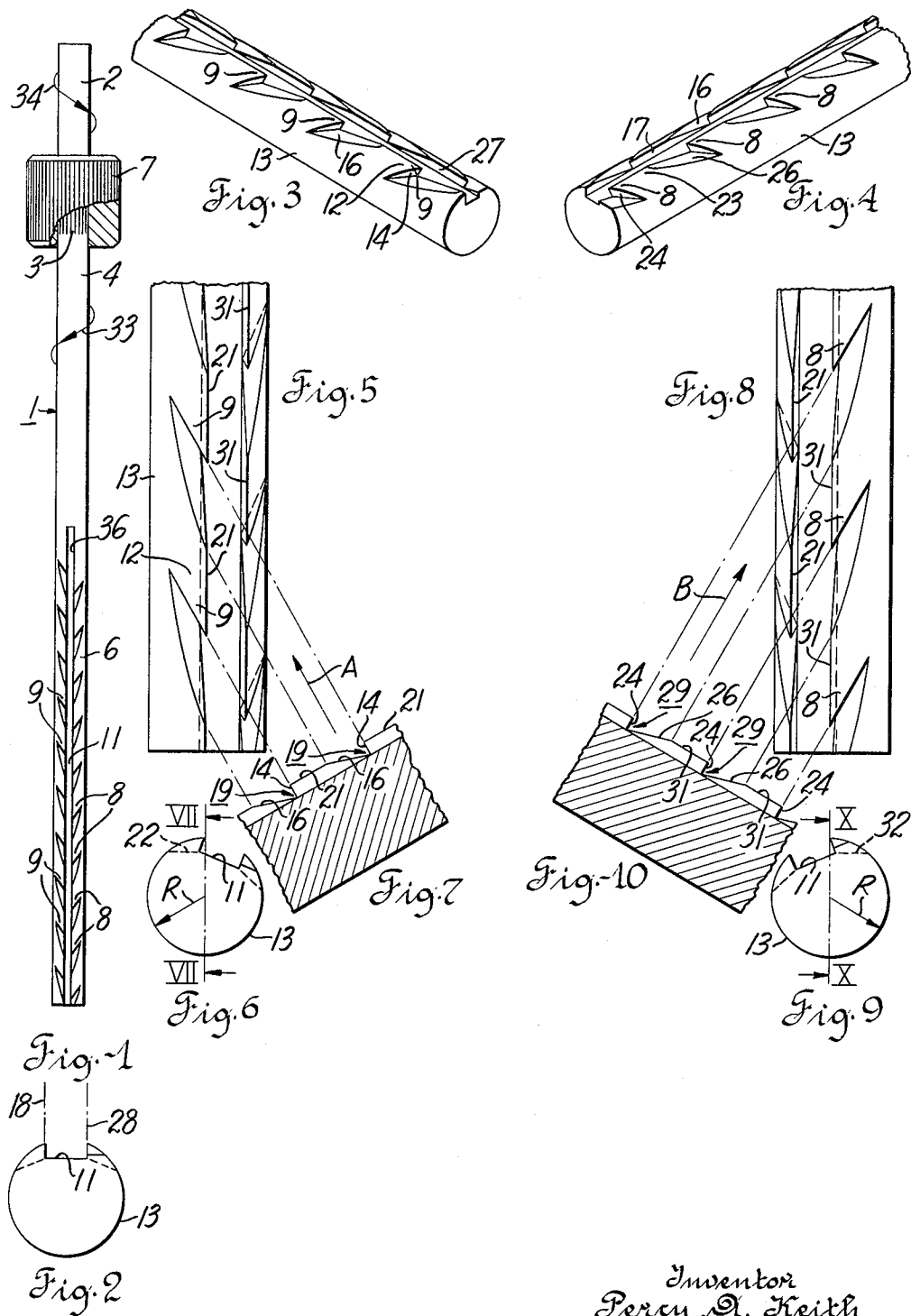
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P. A. KEITH

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TWO-WAY COTTON PICKING SPINDLE

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Inventor
 Percy A. Keith
 by *W. J. Perot*
 Attorney

United States Patent Office

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TWO-WAY COTTON PICKING SPINDLE

Percy A. Keith, Pine Bluff, Ark., assignor to Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

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The invention relates to cotton picking machines, and it is concerned more particularly with a two-way picking spindle, that is, a spindle which is capable of picking cotton upon rotation in either clockwise or anticlockwise direction.

In a well known type of cotton picking machine which is disclosed, for instance, in U.S. Patent 2,671,298 issued on March 9, 1954 to R. C. Ferguson, a stationary drive track is engaged at its upper side by one set of spindle drive rollers and at its lower side by another set of spindle drive rollers. Movement of the upper set of rollers along the track causes these rollers and associated picking spindles to rotate in one direction, and simultaneous movement of the lower set of spindle drive rollers along the track causes the lower rollers and associated picking spindles to rotate in the opposite direction.

For practical reasons it is desirable that the picking spindles in a machine of the mentioned character be of the two-way picking types so that the spindles at the upper side of the track are interchangeable with the spindles at the lower side of the track. Various types of such two-way picking spindles have heretofore been suggested, including the well known fluted spindle which is disclosed, for instance, in the mentioned U.S. Patent 2,671,298 and also in U.S. Patent 2,848,860 issued on August 26, 1958 to R. C. Ferguson.

Generally, it is an object of the present invention to provide an improved two-way picking spindle which lends itself for use in cotton picking machines of the type disclosed in the mentioned U.S. Patent 2,671,298, and wherein alternate sets of vertically spaced picking spindles rotate in opposite directions.

More specifically, it is an object of the invention to provide an improved two-way picking spindle of the mentioned character which is more aggressive than the conventional fluted spindle so that it will pick cleaner but which will nevertheless not gather an undesirable amount of trash such as grass, dry leaves, sticks and burs.

A further object of the invention is to provide an improved two-way picking spindle of the above mentioned character from which cotton may be stripped by a conventional stripping mechanism of the stationary stripper bar type disclosed in the mentioned U.S. Patent 2,671,298; which will retain the picked cotton with a sufficient degree of tightness so that it will not be flung off accidentally by centrifugal force to which the spindles become subjected in the normal operation of the mentioned type of machine; which will permit stripping of the cotton from the spindle without excessive force and without causing the cotton fibers to be torn; and which will impose no undue wear upon the stripping mechanism and, at the same time, will have long lasting wearing qualities of those portions of the spindle which are subject to coercion with the cotton plants as well as with the stripping mechanism.

A further object of the invention is to provide an improved two-way picking spindle of the hereinabove outlined character which lends itself to manufacture expeditiously and at relatively low cost.

These and other objects and advantages are attained by the present invention, various novel features of which will be apparent from the description herein and the accompanying drawing disclosing an embodiment of the invention, and will be more particularly pointed out in the appended claims.

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In the drawing wherein underlined reference characters and arrowed leaders are used to collectively designate elements whose individual portions are designated by nonunderlined reference characters and plain leaders:

FIG. 1 is a side view with parts broken away and shown in section, of a two-way picking spindle and associated drive roller;

FIG. 2 is an enlarged end view of the spindle shown in FIG. 1;

FIG. 3 is an enlarged, perspective front view of the forward end portion of the spindle shown in FIG. 1, the view of FIG. 3 being taken from the left side of FIG. 1;

FIG. 4 is another enlarged, perspective front view of the forward end portion of the spindle shown in FIG. 1, the view of FIG. 4 being taken from the right side of FIG. 1;

FIG. 5 is an enlarged view of the forward end portion of the spindle shown in FIG. 1, the rotary position of the spindle as shown in FIG. 5 being slightly displaced clockwise with reference to FIG. 2;

FIG. 6 is an end view of FIG. 5;

FIG. 7 is a sectional, oblique view of the spindle portion shown in FIG. 5, the view of FIG. 7 being taken in the direction of arrow A in FIG. 5 and along the section line VII—VII in FIG. 6;

FIG. 8 is another enlarged view of the forward end portion of the spindle shown in FIG. 1, the rotary position of the spindle as shown in FIG. 8 being slightly displaced anticlockwise with reference to FIG. 2;

FIG. 9 is an end view of FIG. 8; and

FIG. 10 is a sectional, oblique view of the spindle portion shown in FIG. 8, the view of FIG. 8 being taken in the direction of arrow B in FIG. 8 and along the section line X—X in FIG. 9.

Referring to FIG. 1, the spindle as shown in this figure is of the cylindrical rod type and comprises an elongated generally cylindrical body 1 presenting a cylindrical rear journal portion 2, a knurled portion 3, a cylindrical portion 4 extending forwardly from the knurled portion 3, and a picking portion 6 which extends forwardly from the cylindrical portion 4. A spindle drive roller 7 is press fitted upon the knurled portion 3, and the cylindrical portion 4 affords a forward journal portion in conformity with conventional practice.

The picking portion 6 has a longitudinal series of nine full, one-way, right hand picking teeth 8, a longitudinal series of nine full, one-way, left hand picking teeth 9, and a longitudinally extending recessed face 11 between the series of right and left hand picking teeth 8 and 9.

The first full left hand picking tooth 9, as best shown in FIGS. 3 and 5, has a top surface 12 which is continuous with and forms part of the cylindrically arcuate peripheral surface 13 of the body 1 and whose radius of curvature is equal to the radius R of the spindle body 1 as shown in FIGS. 6 and 9. As further shown in FIGS. 3 and 4, the first full left hand tooth 9 has three flat faces 14, 16 (FIG. 3) and 17 (FIG. 4) which extend inwardly from the top surface 12 and respectively present a tooth front face, a tooth rear face and a tooth side face.

The foregoing explanations with respect to the first full left hand tooth 9 analogously apply to each of the other eight left hand picking teeth 9. That is, each of the left hand picking teeth 9 has a top surface continuous with and forming part of the cylindrically arcuate surface 13 of the elongated spindle body 1, and three flat faces 14, 16 (FIG. 3) and 17 (FIG. 4) extending inwardly from the top surface and respectively presenting a tooth front face, a tooth rear face, and a tooth side face. The respective side faces 17 of the left hand picking teeth 9 lie in a first common plane which is indicated by the dash-dotted line 18 in FIG. 2 and which

extends longitudinally of the spindle and outward from the recessed face 11.

Referring to FIGS. 3 and 7, it will be noted that the front and rear faces 14 and 16, respectively, of each of the left hand picking teeth 9 are inclined relative to each other so as to form dihedral notches 19 between successive left hand picking teeth, and a straight axial edge portion 21 of predetermined length on each of the teeth 9 along the intersection of the plane 18 with the cylindrically arcuate peripheral surface 13 of the spindle body 1. In FIG. 6 the broken line 22 designates the bottom edge of the first dihedral notch 19 between adjacent left hand picking teeth 9, and the notches 19 are formed in such a manner that the bottom edges 22 extend obliquely rearward from their intersection points with the first common plane 18. The notch bottom edges 22 are also inclined relative to the plane of the recessed face 11 for manufacturing reasons as will be explained more fully hereinbelow.

The right hand picking teeth 8 are opposite hand duplicates of the left hand picking teeth 9, and the teeth 8 and 9 are staggered as best shown in FIG. 1. The first full right hand picking tooth 8, as best shown in FIGS. 4 and 8, has a top surface 23 which is continuous with and forms part of the cylindrically arcuate peripheral surface 13 of the body 1 and whose radius of curvature is equal to the radius R of the spindle body as shown in FIGS. 6 and 9. As further shown in FIGS. 3 and 4, the first full right hand picking tooth 8 has three flat faces 24, 26 (FIG. 4) and 27 (FIG. 3) extending inwardly from the top surface and respectively presenting a tooth front face, a tooth rear face, and a tooth side face. The respective side faces 27 of the right hand picking teeth 8 lie in a second common plane which is indicated by the dash-dotted line 28 in FIG. 2 and which extends longitudinally of the spindle and outward from the recessed face 11 opposite to the first common plane 18.

Referring to FIGS. 4 and 10, it will be noted that the front and rear faces 24 and 26, respectively, of each right hand picking tooth 8 are inclined relative to each other so as to form dihedral notches 29 between successive right hand picking teeth, and a straight axial edge portion 31 of predetermined length on each of the teeth 8 along the intersection of plane 28 with the cylindrically arcuate peripheral surface 13 of the spindle body 1. In FIG. 9 the broken line 32 designates the bottom edge of the first dihedral notch 29, and the dihedral notches 29 are formed in such a manner that the bottom edges 32 extend obliquely rearward from their intersection points with the second common plane 28. For manufacturing reasons, the notch bottom edges 32 are inclined relative to the plane of the recessed face 11 at an angle corresponding to the angle of inclination between the plane of the recessed face 11 and the notch bottom edges 22.

In operation, the spindle shown in FIG. 1 is rotated clockwise or anticlockwise depending on the location of the drive roller 7 relative to its associated drive track, not shown. When the spindle is rotated in the direction of arrow 33, that is, in a right hand direction as viewed from the rear end of the spindle, the right hand picking teeth 8 will entrain the fibers of open bolls and a wad of fibers will be wound spirally around the spindle. The left hand picking teeth 9, on the other hand, will brush past the fibers without entraining them during rotation of the spindle in the direction of arrow 33, and the left hand picking teeth 9 will, therefore, be ineffective to pick cotton during right hand rotation of the spindle.

During left hand rotation of the spindle, as indicated by the arrow 34, the left hand picking teeth 9 will entrain the fibers of open bolls and a wad of fibers will be wound spirally around the spindle; but the right hand picking teeth 8 will remain ineffective to pick cotton during left hand rotation of the spindle,

During right hand rotation of the spindle the cotton fibers which are wound around the spindle tend to pack in the notches 29 between the right hand picking teeth 8, but no or very little packing of cotton fibers will occur in the notches 19 between the left hand picking teeth 9. Similarly, during left hand rotation of the spindle the cotton fibers which are wound around the spindle tend to pack in the notches 19 between the left hand picking teeth 9, but no or very little packing of cotton fibers will occur in the notches 29 between the right hand picking teeth 8. This result is due to the staggering of the right and left hand picking teeth as shown in the drawing. Referring to FIG. 5, it will be seen that the longitudinal edges 31 of each of the right hand picking teeth 8 are located directly opposite to the gaps between the longitudinal edges 21 of the left hand picking teeth, and similarly the longitudinal edges 21 of the left hand picking teeth are located directly opposite to the gaps between the longitudinal edges 31 of the right hand picking teeth 8. Instead of proportioning the edges 21 and 31 so that the gaps between successive axial tooth edges in one row are exactly as wide as the opposite axial tooth edges of the other row are long, as they are in the illustrated embodiment of the invention, the desired result of keeping the cotton from packing in the gaps of the non-picking tooth row would, of course, also be obtained if the axial lengths of the gaps between successive teeth in each row were made shorter than the axial lengths of the tooth edges in the opposite row, provided that the gaps in one row are opposite, respectively, to the longitudinal tooth edges in the other row, and vice versa. Stated differently, packing of the cotton on the spindle is limited by staggering the right and left hand picking teeth; and more specifically, by staggering the axial edge portions of the right and left hand picking teeth.

When the spindle with a coiled wad of cotton on it is moved in conventional manner through a gap between stationary stripper bars, axial compression of the coils relaxes the radial pressure of the fibers upon the spindle, and the wad will, therefore, be able to move axially along the spindle and be stripped from it without excessive force. Packing of the fibers is essentially limited to the notches between the teeth of one row only, that is, to the notches of the tooth row which, depending on the direction in which the spindle is rotated, is effective to pick the cotton. Such packing is effective to retain the wad against axial separation from the spindle by centrifugal force to which it becomes subjected when the spindle whips around the ends of its oblong path in the machine, but the packing of the fibers in only one row of notches is sufficiently relaxed by the action of the stripping mechanism, so that the fibers may ride out of the notches without being torn.

The provision of the axially extended edges 21 and 31 on the left and right hand picking teeth 9 and 8, respectively, has the advantage of preserving the aggressiveness of the spindle and reducing wear of the stripper bars due to contact and relative movement of these parts in normal operation of the machine.

As to manufacture of the spindle, milling cutters of conventional type and suitable construction, not shown, may be employed to first mill out an axial groove 36 (FIG. 1) which provides the flat recessed face 11; then to form the dihedral notches of one row of picking teeth, as for instance, the notches 19; and finally to form the dihedral notches of the other row of picking teeth, as for instance, the notches 29. The angularity between the notch bottom edge 22 and the plane of the recessed face 11, as shown in FIG. 6, is preferably such that the milling cutter for forming the notches 19 may be fed clear across the spindle without cutting into the opposite right hand picking teeth 8. Similarly, the angularity between the notch bottom edge 32 and the plane of the recessed face 11, as shown in FIG. 9, is such that the milling cutter for forming the notches 29 may be fed clear across the spindle

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without cutting into the opposite left hand picking teeth 9.

While in the foregoing a preferred embodiment of the invention has been shown and described, it should be understood that it is not intended to limit the invention to the illustrated details of construction but that the invention includes such other forms and modifications as are embraced by the scope of the appended claims.

What is claimed is:

1. A two-way cotton picking spindle of the cylindrical rod type comprising an elongated body having a longitudinal series of right hand picking teeth, a longitudinal series of left hand picking teeth and a longitudinally extending recessed face between said series of right and left hand picking teeth, each of said right hand picking teeth and each of said left hand picking teeth having a top surface continuous with and forming part of a cylindrically arcuate peripheral surface of said body and three flat faces extending inwardly from said top surface and respectively presenting a tooth front face, a tooth rear face, and a tooth side face; the respective side faces of said right hand picking teeth lying in a first common plane extending longitudinally of said spindle and outward from said recessed face, and the respective side faces of said left hand picking teeth lying in a second common plane extending longitudinally of said spindle and outward from said recessed face opposite to said first common plane.

2. A two-way cotton picking spindle as set forth in claim 1 in which said right hand picking teeth and said left hand picking teeth are staggered.

3. A two-way cotton picking spindle as set forth in claim 1 in which the front and rear faces of each of said right hand and left hand teeth are inclined relative to each other so as to form dihedral notches between successive teeth of each of said series, and a straight axial edge portion of predetermined length on each of said right hand teeth along the intersection of said first common plane with said cylindrically arcuate peripheral surface, and a straight axial edge portion of predetermined length on each of said left hand teeth along the intersection of said first common plane with said cylindrically arcuate peripheral surface.

4. A two-way cotton picking spindle as set forth in claim 3 wherein said straight axial edge portions of said right hand teeth and said straight axial edge portions of said left hand teeth are staggered.

5. A two-way cotton picking spindle as set forth in claim 4 wherein said axial edge portions of one of said series of picking teeth are at least as long as the spacings between said edge portions of the other of said series of picking teeth.

6. For use in a cotton picking machine having alternate

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sets of oppositely rotating spindles, a two-way picking spindle adapted for use in either of said sets and having a longitudinal row of one-way right hand picking teeth and a longitudinal row of one-way left hand picking teeth in circumferentially spaced relation to said right hand picking teeth.

7. For use in a cotton picking machine having alternate sets of oppositely rotating spindles, a two-way picking spindle adapted for use in either of said sets and having a longitudinal row of one-way right hand picking teeth and a longitudinal row of one-way left hand picking teeth in circumferentially spaced and axially staggered relation to said right hand picking teeth, whereby packing of cotton between said right hand picking teeth will be impeded by said left hand picking teeth, and packing of cotton between said left hand picking teeth will be impeded by said right hand picking teeth.

8. A cotton picking spindle as recited in claim 6 and wherein said rows of teeth being circumferentially spaced apart by a longitudinally extending recessed face for providing said teeth with radial definition extending from said face outwardly to the surface of said spindle.

9. For use in a cotton picking machine having alternate sets of oppositely rotating spindles, a cylindrically configured two-way picking spindle adapted for use in either of said sets and having a longitudinal row of one-way right hand picking teeth and a longitudinal row of one-way left hand picking teeth in circumferentially spaced relation to said right hand picking teeth and with both rows of teeth lying within the surface defined by said cylindrical configuration.

10. A cotton picking spindle as recited in claim 9 and wherein said rows of teeth being separated by a longitudinally extending recessed face for providing said teeth with generally radial definition extending from said face outwardly to said cylindrical configuration.

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ABRAHAM G. STONE, *Primary Examiner*.

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