This invention relates to cotton harvesting machines of the type in which rotary picking spindles are moved through a picking tunnel, and the invention is concerned more particularly with an improved mechanism for establishing and maintaining efficient driving contact between the picking spindles and a drive track which is engaged by the picking spindles while they are moved through the tunnel.

To achieve efficient operation in a cotton picking machine of the hereinafore outlined character, it is necessary that proper frictional contact be established between spindle drive rollers and the drive track by application of an accurately predetermined spring pressure to the drive track. If too small a spring pressure is applied, the spindles will not develop sufficient torque; and if too large a spring pressure is applied, overheating and rapid disintegration of the spindle drive track will take place. It is therefore necessary that the springs which bias the friction drive tracks into contact with the spindle drive rollers be manufactured with a high degree of precision, that the springs are uniformly spaced along the friction drive tracks, and that the spacing of the springs is maintained during operation of such machine; all to the end of producing exactly the required amount and uniformity of spring pressure upon the drive tracks. Furthermore, the means for retaining the springs and spacing same should be easy to manufacture and assemble.

In the prior art, flat springs have been used, and it has been found difficult to control small manufacturing variations in the thickness of the sheet metal from which these springs are constructed and which result in an unsatisfactory spring pressure for the work involved.

It is therefore an object of this invention to provide an improved spring assembly which will produce a uniform biasing pressure upon a pair of spindle drive tracks of a cotton picking machine.

A further object of this invention is to provide an improved spring retaining and spacing structure which is easily manufactured and which can be readily combined with track biasing springs of special construction to meet the hereinafore outlined requirements.

A further object of this invention is to provide an improved spindle drive assembly for cotton pickers which is more economical to manufacture and assemble than heretofore known cotton picker spindle drive assemblies.

Accordingly, the present invention may be considered as comprising the various features of construction and combinations of elements as more fully set forth in the following detailed description and appended claims, reference being had to the accompanying drawings, wherein:

Fig. 1 is a plan view of a cotton picking unit embodying the invention, with some parts removed and other parts broken away for the sake of clarity;

Fig. 2 is a plan view of the inner frame structure of the cotton picking unit shown in Fig. 1 omitting the slat and spindle structures in the interest of clarity and illustrating the positioning of a spindle drive track assembly therein;

Fig. 3 is an enlarged end view of the inner frame structure of the cotton picking unit shown in Fig. 2 illustrating the positioning of a spindle drive track assembly and spring group therein, with the lines representing the curvature of the drive tracks being omitted in the interest of clarity;

Fig. 4 is an enlarged fragmentary sectional view taken on line IV—IV of Fig. 1 with some parts broken away for clarity of illustration;

Fig. 5 is an enlarged view of one of the track biasing springs and associated parts shown in Fig. 4;

Fig. 6 is an enlarged fragmentary plan view of a spindle drive track assembly as shown in Fig. 2;

Fig. 7 is an enlarged partial side elevation of the spindle drive track assembly shown in Fig. 6;

Fig. 8 is a fragmentary bottom plan view of a track biasing spring assembly;

Fig. 9 is a sectional view taken on line IX—IX of Fig. 8;

Fig. 10 is an end view of a track biasing spring;

Fig. 11 is a plan view of the spring shown in Fig. 10; and

Fig. 12 is an enlarged fragment of Fig. 8 with parts of the spring retainer and spring spacer removed for the sake of clarity of illustration.

Referring to the drawings and particularly Fig. 1, the invention, for purposes of illustration, is embodied in a cotton picking unit which is adapted to be supported from and operated by a tractor or similar wheeled device (not shown). This picking unit is adapted to be supported from a pair of brackets 2 and 3, bracket 2 being attached to transverse picker frame member 4 and to upper longitudinal frame members 6 and 7, while bracket 3 is attached to transverse frame member 8.

The picking unit includes a pair of vertically spaced driving sprockets 9, only one of which is shown, attached to a vertically extending shaft 11, rotatably supported at the rear end of the picker unit. A pair of vertically spaced idler wheels 12, only one of which is shown, are attached to vertically extending shaft 13 which is rotatably supported at the forward end of the picking unit. Upper and lower drive chains 14 (see Fig. 4) are drivingly engaged with sprockets 9 and pass around idler wheels 12. Upper frame members 6 and 7 and lower frame members 6' and 7' serve as guides for chains 14 to guide same about the generally oval path with guides 7 and 7' providing a bowed out portion as is shown in Fig. 1. A series of vertically extending picking spindle carrying slats 16 are pivotally attached at the ends thereof to upper and lower driving chains 14. Each slot rotatably mounts a series of vertically spaced horizontally extending picking spindles 17. These spindles are journaled at one end thereof in the slats, as shown in Fig. 4, and the opposite or distal ends of the spindles are available for picking cotton. The journaled end of each spindle is enlarged, forming a cylindrical drive portion 73 and said cylindrical drive portions are arranged in spaced vertically opposite pairs with the pairs of cylindrical drive portions of each slat 16 aligned longitudinally with the corresponding pairs of cylindrical drive portions of other slats to form a series of vertically spaced friction drive assembly receiving gaps. At the upper end of drive shaft 11 an additional pair of sprockets 18 and 19 are attached for rotation therewith. Sprocket 18 is drivingly chain connected to a sprocket of gear box 21 which has a splined power input shaft 22 connectable with a power source (not shown). The uppermost sprocket 19 on shaft 11 is drivingly chain connected with a gear attached to conveyor drive shaft 23 which is journaled at its lower end on a plate carried by transverse frame member 26 which is supported on longitudinal frame members 6 and 7. Frame member 26 also supports
2,968,904

A spindle moistening mechanism 28 is provided at the forward end of the picking unit, and this mechanism is operative to apply a film of moisture to each spindle prior to its entrance into the picking tunnel 29 of the unit. The chains 14 move in the generally horizontal oval path shown in Fig. 1 and in the direction indicated by the arrows. A stalk guiding assembly 31 carried by the forward portion of the plant is drivingly connected to the picking tunnel 29 as the unit is moved through a cotton field. While passing through tunnel 29, slats 16 and picking spindles 17 thereon are caused to follow the bowed out horizonal paths as determined by the curvature of the frame members 7 and 7' which function to guide chains 14 as they move adjacent the picking tunnel. Also while moving through tunnel 29, the vertical rows of spindles 17 are caused to rotate by frictional engagement of their cylindrical drive portions, respectively, with stationary, vertically spaced spindle drive track assemblies 32 (see Figs. 4, 5, 6 and 7) which will be described more fully hereinbelow and which are positioned adjacent frame members 7 and 7'. By such rotation of the spindles, cotton is wound about the spindles and is thus picked from the plants.

A pair of horizontally disposed slots 52 on the rear end of the unit is a slot hold back disk 33 carried by longitudinal frame member 34 (see Fig. 1) and which disk functions to impede and thereby slow down slats 16 as they leave sprockets 9. Just forwardly of hold back disk 33 is a slot hold back guide 36 also carried by frame member 34 and which guide positions the slats and spindles in proper relation for stripping the picked cotton from the spindles. Stripping devices 37 are mounted in a substantially vertical series on channel member 38 which is suitably attached at its upper end to transverse frame member 39 carried by longitudinal frame members 6 and 54 and at its lower end to floor member 41, so that adjoining stripping devices have only sufficient clearance vertically therebetween to permit passage of a horizontally moving spindle. The spindles with rolls of cotton wrapped around them pass between the opposed edges of adjacent stripsers, the cotton being thus stripped off as the spindles are drawn between the stripping devices. The stripped cotton falling from the stripping devices and spindles is picked up by flights 42 of conveyor 27 and is moved to a point of collection (not shown).

A series of vertically spaced, horizontal channel members 43, shown in Figs. 3 and 4, extend longitudinally of the picking unit at the side of the latter, each channel member being bowed horizontally outward, as shown in Figs. 1 and 2, and secured at its rearward end to pipe member 44 which rotateably supports shaft 11 therein. As shown in Fig. 2, channel members 43 are additionally supported by vertically extending angle members 46 which also serve as a support for upper frame members 6 and 7 shown in Fig. 4. Arranged within each channel member 43 is a hollow strip-like spring retaining member 47 having a generally triangularly shaped cross section and including a longitudinally extending base portion 48 adapted to fit against the web portion of channel member 43, and converging upper and lower sides 49 and 51 which extend from the upper and lower edges, respectively, of the base portion 48 toward the open side of the associated channel member 43. Retaining member 47 is each bowed to conform with the bowed shape of the channel members 43. Sides 49 and 51 are spaced apart at their apex edges remote from base portion 48 to provide a generally longitudinally extending slot 52. Spring retainer 47 is positioned within channel member 43 with the slot 52 facing outwardly.

A series of wire wound springs 53 (see Figs. 9, 10 and 11) are each composed of a pair of spaced coil or apex portions 54 forming about a common axis and two pairs of diverging inverted U-shaped leg portions 56 and 57. The leg portions 56 extend outward from the inner ends of the coils 54 and present an integral biasing force to the members 53, whereas the leg portions 57 extend outward from the outer ends of the coils 54 and present a bight portion 59 formed by a clip element unit overlapping leg elements. It will be noted by reference to Figs. 10 and 11 that the inverted U-shaped leg portions 56 and 57 extend outward in diverging relation to each other from opposite sides of the pair of oppositely spaced coil portions 54. The coils or apex portions 54 of the springs are dimensioned for insertion longitudinally within the retainer 47 with the leg portions 56 and 57 extending outward through the slot 52. The side and base portions 49, 51 and 48 have interior wall surfaces disposed in contiguosly confining relation to the coil or apex portions 54 thereby preventing the latter from moving outward through the slot 52. A flat horizontally bowed spring spacing member 61 is provided with a series of longitudinally spaced elongated apertures 62 each receiving a pair of diverging leg portions 63 and 64 extending by base portion 53, the arrangement effectively spacing the springs longitudinally along the length of spring retainer 47. It should be noted that apertures 62 are of a length substantially equal to the distance between the outer sides of spring leg portions 57. This close fit tends to prevent upward movement of the retaining member 47. Cocking is also eliminated by the coil or apex portions of the springs having a close fit in spring retainer 47 with the coil portion in contact with base portion 48 and sides 49 and 51 as is shown in Fig. 5.

A friction drive assembly is mounted between each pair of horizontally moving spaced opposed rows of cylindrical drive portions. The elements forming this assembly include the spring mounting subassembly (spring retainer 47, springs 53, and a spring spacing member 61) and the drive truck mounting subassembly comprising a longitudinally bowed track rub strip 63 of T-shape in cross section, a coupling element 64 attached at one end of said rub strip, a pair of flat longitudinally bowed upper and lower spindle drive backing members 66 and 67 and attached to said coupling element and coextending with said rub strip, and a pair of upper and lower drive tracks 68 and 69 coextending with and attached to said backing members.

The spring mounting subassembly is formed by inserting the leg portions 56 and 57 of a spring 53 through each of the apertures 62 in spring spacing member 61. When this has been done, each retaining member 47 is forced against the coil portions of the springs until all the coil portions are within the channel of triangular cross sectional configuration presented by retainer 47 to form the spring assembly shown in Figs. 8 and 9.

The spring mounting subassembly is now combined with the drive truck mounting subassembly in the following manner. All of the projecting leg portions 56 are now inserted between rub strip 63 and backing member 66 and leg portions 57 are inserted between said rub strip and the backing member 67 as shown in Figs. 4 and 5. Coupling member 64 which serves as a guide for the entire friction drive assembly is now inserted into the rear end of a channel member 43 and between the associated spaced opposed rows of spindle drive portions 73, and the friction drive assembly is then pulled forwardly until aperture 71 (see Fig. 6) in coupling member 64 is in line with aperture 72 (see Figs. 1 and 2) in channel member 43. After each channel member 43 is provided with a friction drive assembly in the same manner as described, a rod (not shown) is inserted vertically through all the holes 71 and 72.

As assembled the spindle drive tracks 68 and 69 contact the cylindrical drive portions 73 of the spindles 17 and the leg portions 56 and 57 bias the backing members 66 and 67, respectively, away from wear strip 63 thereby biasing the attached drive tracks 68 and 69 into frictional driving contact with the spindle drive rollers as is shown.
in Figs. 4 and 5. The various components of the herein disclosed spring mounting or retaining assembly are susceptible of description in terminology other than that which has been used hereinbefore to describe the embodiment of the invention which is illustrated by the drawings.

For example, channel member 43 may be considered as a support; whereas the use of coil springs makes it easy to construct springs of uniform properties. It has been found that each drive track should exert a pressure of approximately fifteen pounds. If the springs exert more than this pressure excessive wear takes place in the driving track, and if less pressure is exerted, the drive rolls sufficiently to rotate the spindles which merely slide along the tracks and wear out same through excessive heating without performing any picking function.

The one piece spring retainer and spacers of the prior art were objectionable because they were difficult to manufacture and it was difficult to insert and convert opposite sides. As has been previously pointed out, spring retainer 47 is of relatively simple construction as is spring spacer 61 and both can be readily manufactured but a combining of a spring retainer and a spring leg in a single element resulted in an element difficult to manufacture and one that is difficult to assemble spindles therein.

It is to be understood that it is not desired to limit the invention to the particular features and details described hereinabove for purposes of illustration and that the invention is to be considered as including such other forms and modifications as are fairly embraced within the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. For use in a cotton harvester of the type including means mounting a series of spindles presenting picking portions and pairs of spaced opposed cylindrical drive portions, a pair of opposed spindle drive tracks mounted between said spaced opposed drive portions, a drive track biasing assembly comprising an elongated open ended hollow spring retainer coextensive with said drive tracks and having a triangular cross sectional configuration formed by a base portion and converging opposite sides terminating in apex edges spaced apart to provide therebetween a continuous slot disposed opposite base portion, a series of springs each having a pair of diverging drive track engaging leg portions extending outward from a common apex portion, said apex portion being dimensioned for and inserted longitudinally within said retainer with said leg portions extending outward through said slot, said side and base portions of said retainer having interior wall surfaces disposed in contiguous confining relation to said apex portions thereby preventing the latter from moving outward through said slot.

2. For use in a cotton harvester of the type including means mounting a series of spindles presenting picking portions and pairs of spaced opposed cylindrical drive portions, a pair of opposed spindle drive tracks mounted between said spaced opposed drive portions, a drive track biasing assembly comprising an elongated open ended hollow spring retainer coextensive with said drive tracks and having a triangular cross sectional configuration formed by a base portion and converging opposite sides terminating in apex edges spaced apart to provide therebetween a continuous slot disposed opposite base portion, a series of springs each having a pair of diverging drive track engaging leg portions extending outward from a common apex portion, said apex portion being dimensioned for and inserted longitudinally within said retainer with said leg portions extending outward through said slot, said side and base portions of said retainer having interior wall surfaces disposed in contiguous confining relation to said apex portions thereby preventing the latter from moving outward through said slot.
the latter passing through said apertures thereby holding said spacer strip on said retainer externally of the latter
and in closing relation to said slot.

6. For use in a cotton harvesting machine of the type including a series of traveling slats each including a series of spindles presenting a picking portion and pairs of spaced opposed cylindrical drive portions with the pairs of drive portions on one slat aligned with the corresponding pairs of drive portions on other slats, a pair of opposed spindle drive tracks mounted between aligned pairs of said spaced opposed drive portions, a U-shaped channel member flexibly mounted with its open side disposed in opposite intermediate relation to said drive tracks, a drive track biasing assembly comprising an elongated hollow open ended spring retainer disposed within said channel member, said retainer having a triangular cross sectional configuration formed by a base portion and converging sides terminating in apex edges spaced apart to provide therebetween a continuous slot disposed opposite said base portion, said base portion slidably engaging the web portion of said U-shaped channel member with the base edges of said retainer disposed in close proximity to the side flanges of said channel member, a series of springs each having a pair of diverging drive track engaging leg portions extending outward from a common apex portion, said apex portion being dimensioned for and inserted longitudinally within said retainer with said leg portions extending outward through said slot, said side and base portions of said retainer having interior wall surfaces disposed in contiguous confining relation to said apex portions thereby preventing the latter from moving outward through said slot, and a flat elongated spring spacer strip having a longitudinal series of elongated spaced apertures therethrough, each dimensioned for and receiving a pair of said spring leg portions, the latter passing through said apertures thereby holding said spacer strip on said retainer externally of the latter and in closing relation to said slot.

7. For use in a cotton harvesting machine of the type including a series of traveling slats each including a series of spindles presenting a picking portion and pairs of spaced opposed cylindrical drive portions with the pairs of drive portions on one slat aligned with the corresponding pairs of drive portions on other slats, a pair of opposed spindle drive tracks mounted between aligned pairs of said spaced opposed drive portions, a U-shaped channel member flexibly mounted with its open side disposed in opposite intermediate relation to said drive tracks, a drive track biasing assembly comprising an elongated hollow open ended spring retainer disposed within said channel member, said retainer having a triangular cross sectional configuration formed by a base portion and converging sides terminating in apex edges spaced apart to provide therebetween a continuous slot disposed opposite said base portion, said base portion slidably engaging the web portion of said U-shaped channel member with the base edges of said retainer disposed in close proximity to the side flanges of said channel member, a series of springs each having a pair of diverging drive track engaging leg portions extending outward from a common apex portion, said apex portion being dimensioned for and inserted longitudinally within said retainer with said leg portions extending outward through said slot, said side and base portions of said retainer having interior wall surfaces disposed in contiguous confining relation to said apex portions thereby preventing the latter from moving outward through said slot, and a flat elongated spring spacer strip having a longitudinal series of elongated spaced apertures therethrough, each dimensioned for and receiving a pair of said spring leg portions, the latter passing through said apertures thereby holding said spacer strip on said retainer externally of the latter and in closing relation to said slot.

References Cited in the file of this patent

UNITED STATES PATENTS

2,607,178 Rust Aug. 19, 1952
2,665,536 Rust Jan. 12, 1954