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(54) **GINNING RIB FOR USE IN A SAW TYPE COTTON GIN STAND**

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(57) **ABSTRACT**

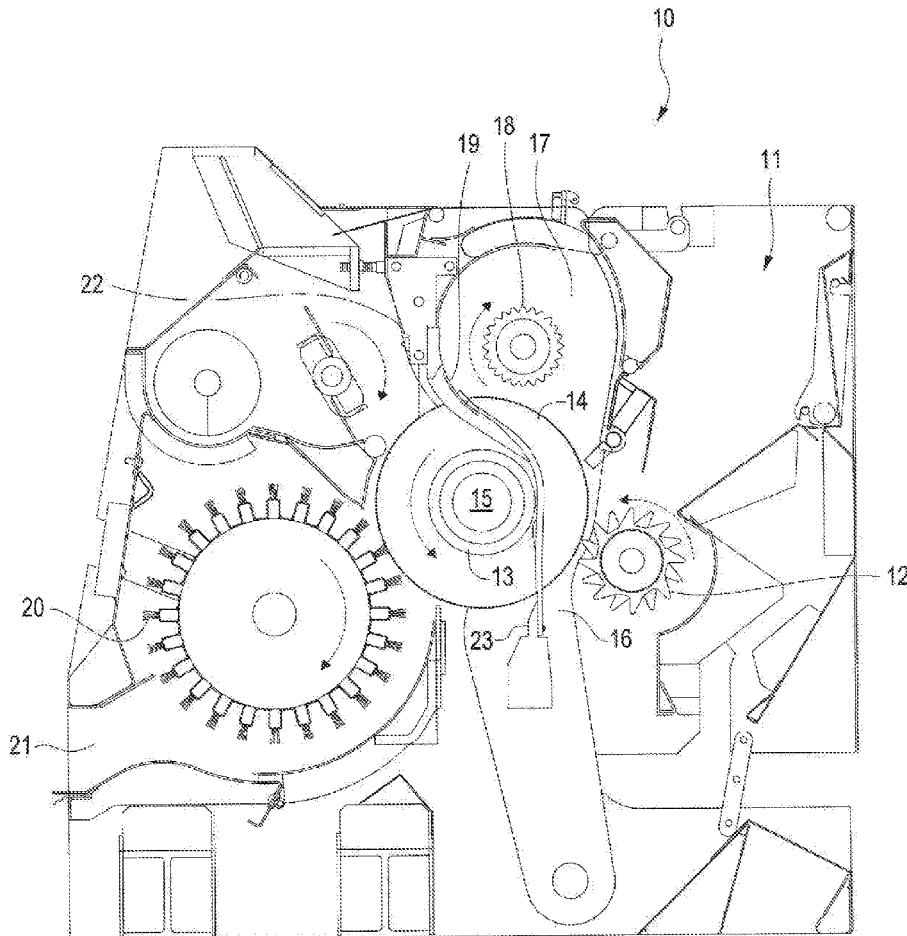
A ginning rib for use in a saw type cotton gin stand constructed from a plate or sheet of raw material, with the material thickness defining the width of the rib, and the shape or profile of the rib defined by the path of the cutting means of the plate or sheet. Furthermore, the shape of the rib being such that it can be economically produced with current cutting technology while concurrently of a unique design to reduce raw material waste, and to include features improving functional reliability and serviceability.

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Related U.S. Application Data

(60) Provisional application No. 62/257,005, filed on Nov. 18, 2015.



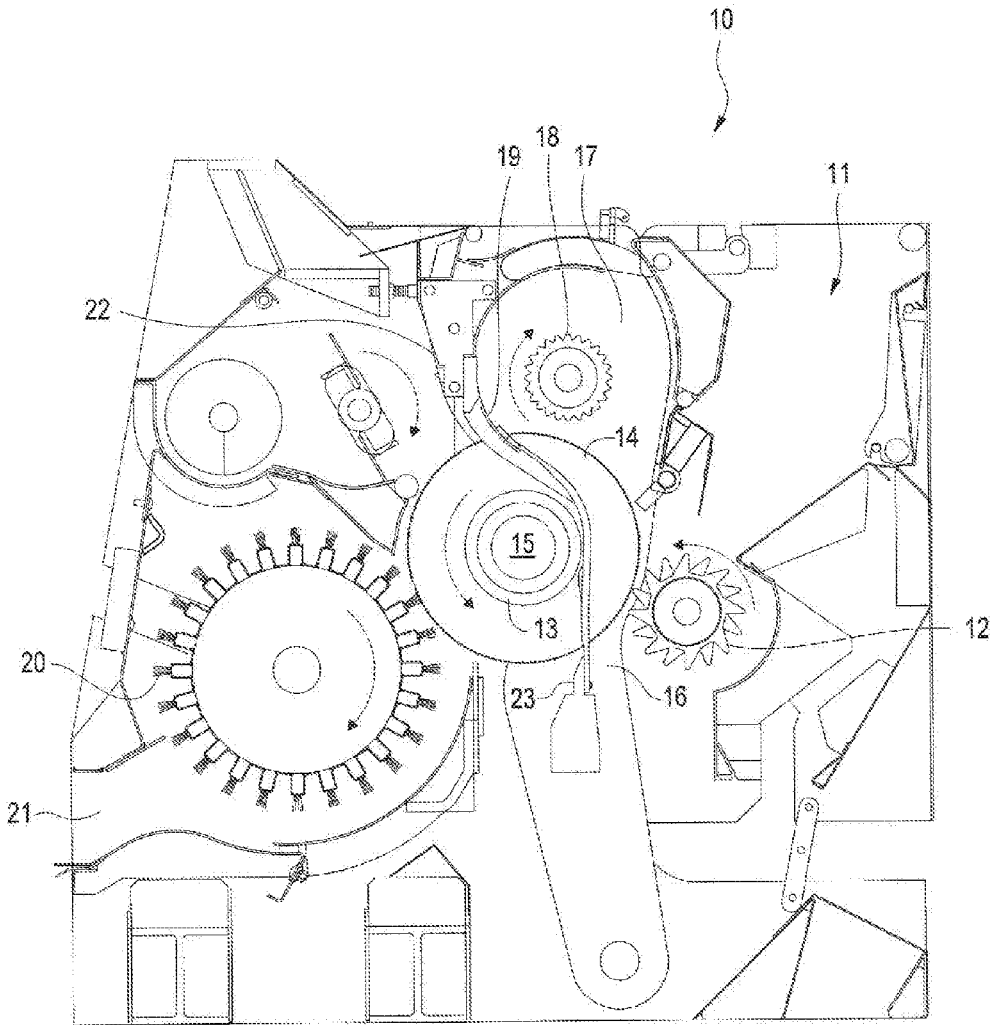


FIG. 1

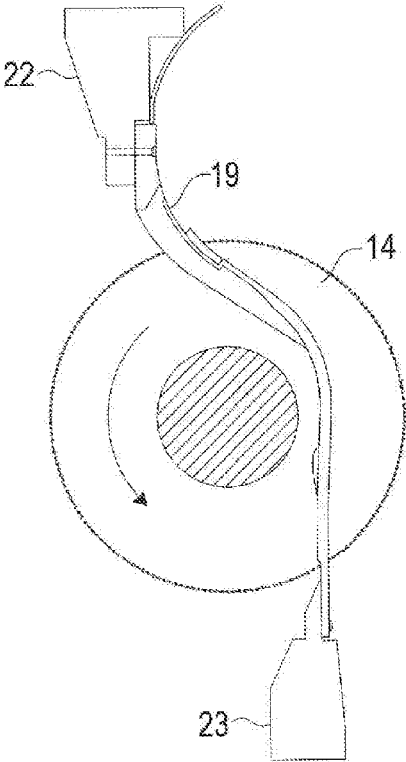


FIG. 2

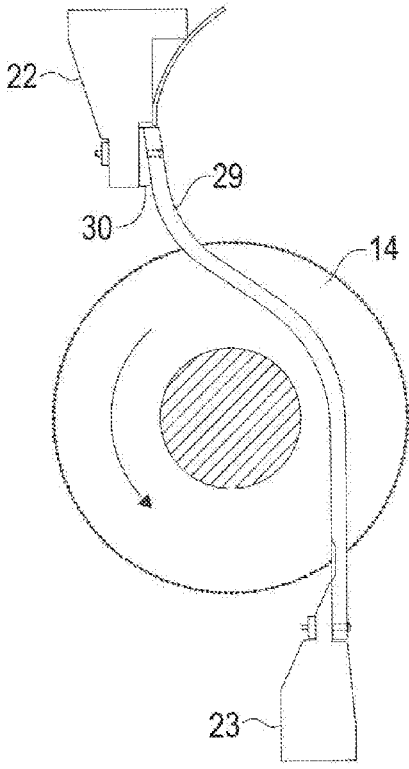
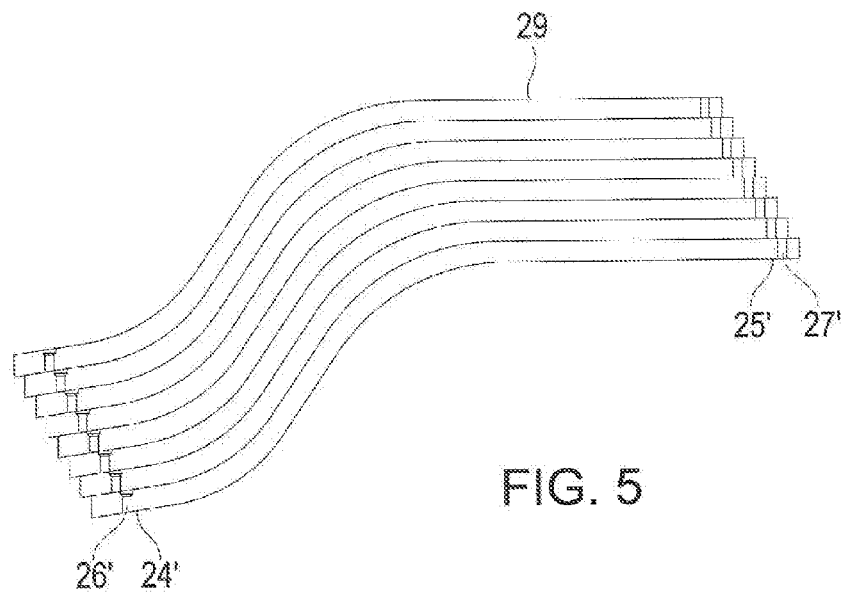
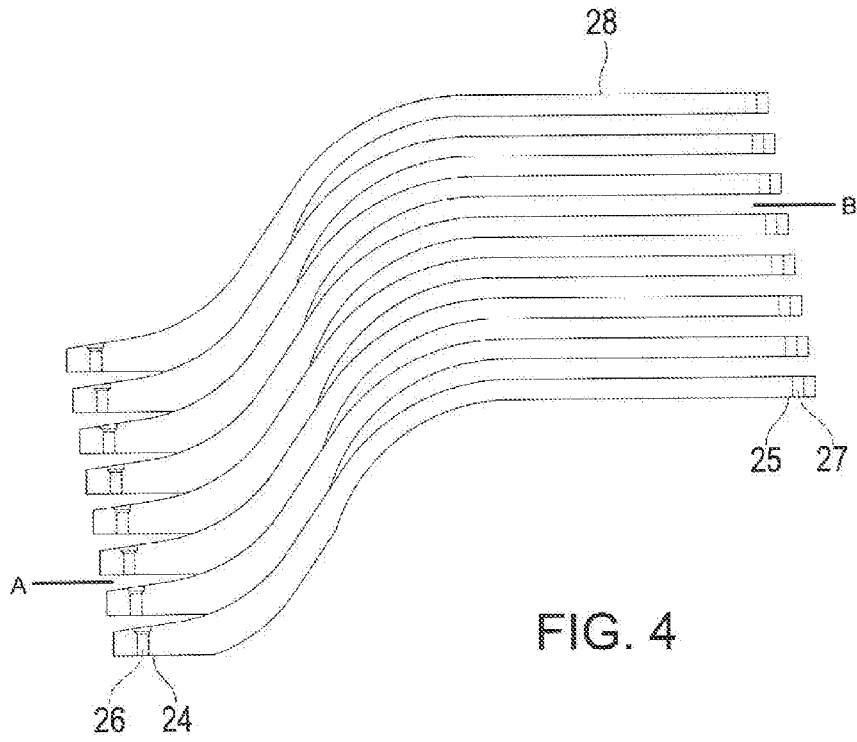


FIG. 3



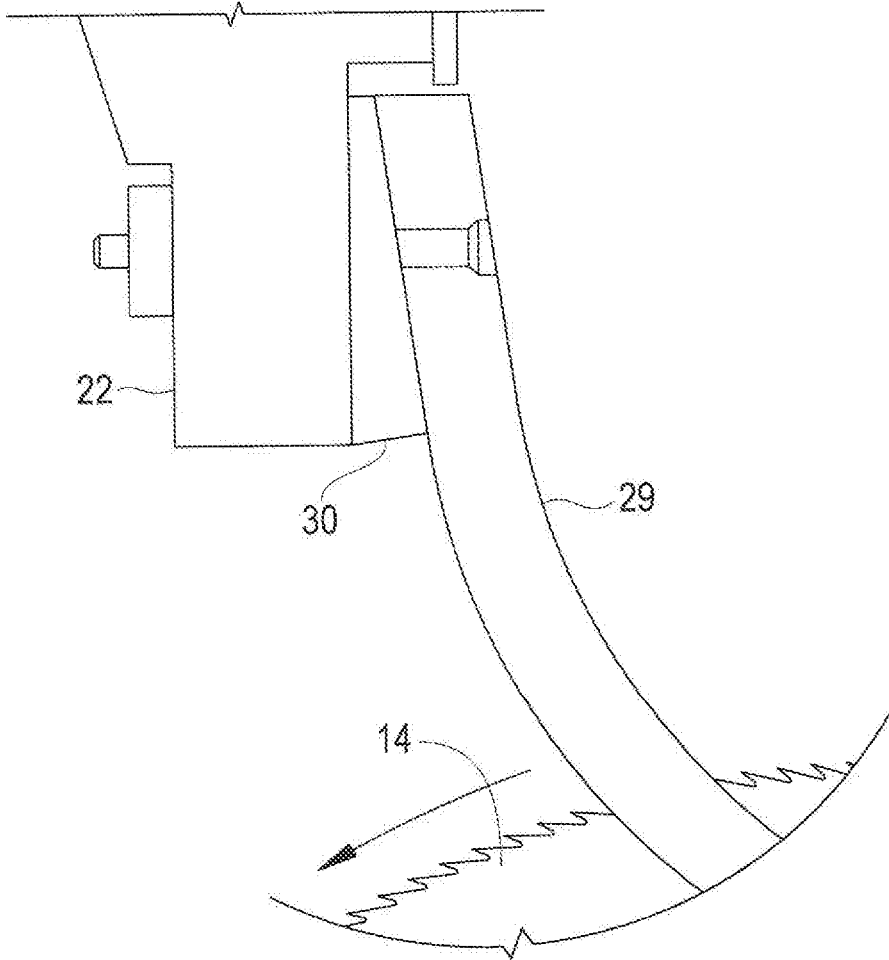


FIG. 6

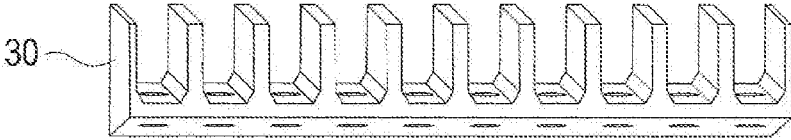


FIG. 7

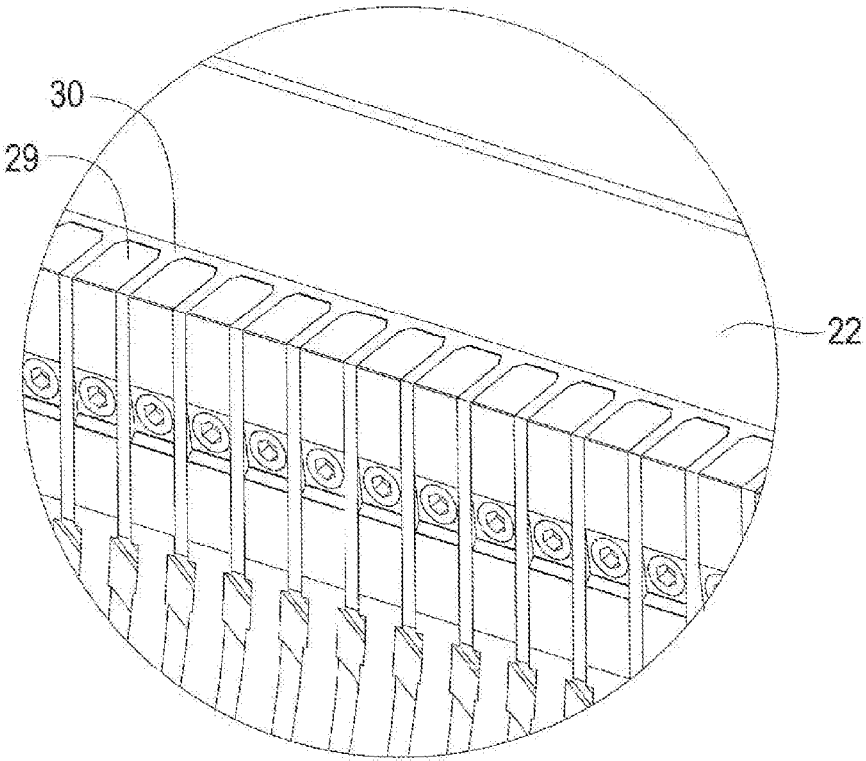
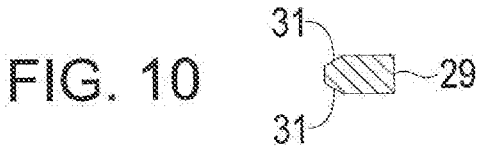
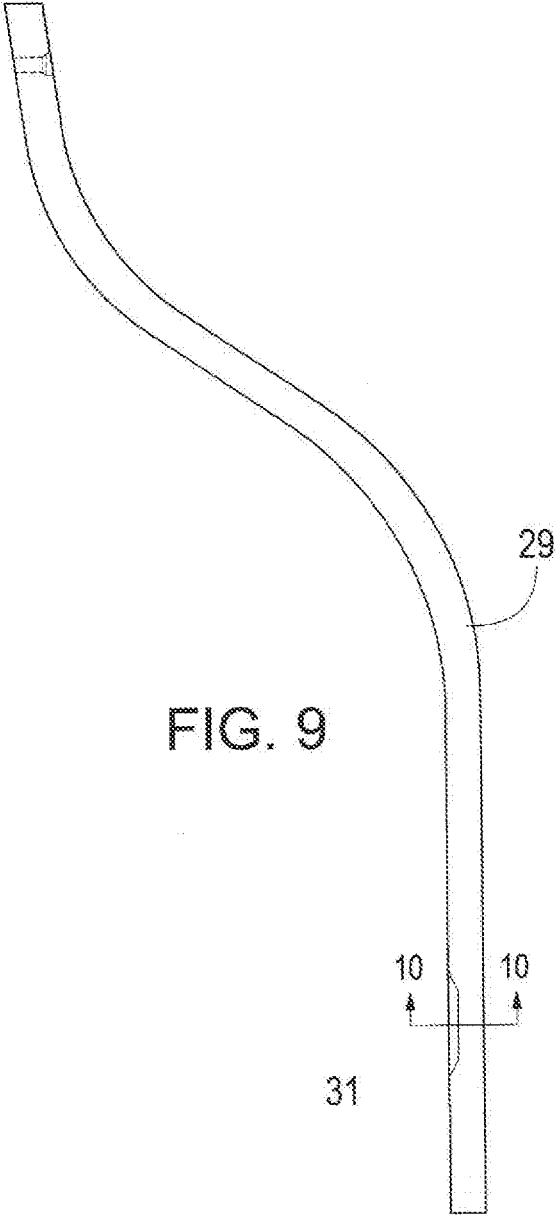


FIG. 8



GINNING RIB FOR USE IN A SAW TYPE COTTON GIN STAND

[0001] This application claims priority from provisional patent application Ser. No. 62/257,005 filed Nov. 18, 2015.

FIELD OF INVENTION

[0002] This invention relates to a novel cotton ginning rib for ginning seed cotton. In particular, this invention relates to the construction and features relating to how the novel rib is mounted in the gin stand, and incorporation of a rib spacer at the point where the rib meets at least one of the rib rails. Additionally, the rib design includes a feature allowing relief at the bottom of the rib to reduce the chances of accumulation of cotton fiber, thus reducing the chances for a fire created by the friction between the rotating gin saw and stationary cotton fiber inadvertently being held in place on the back surface of the lower section of the rib.

BACKGROUND

[0003] The process of picking cotton and removing seeds, trash and other foreign materials from the seed cotton is well known and understood by those familiar with the art. After seed cotton is harvested, it is then transported from the field to a cotton ginning facility. This facility has apparatus for receiving the seed cotton, drying and cleaning the seed cotton, removing the seeds from the cotton fiber or lint, cleaning the lint, and pressing the lint into bales for transport to warehousing, and later sold for commonly processing into yarn, thread, and fabric.

[0004] Central to the processes found in the type of cotton ginning facility relating to the present embodiment is the machine which separates the seed from the cotton fiber. This machine is referred to as a saw type ginning stand, or simply, a gin stand.

[0005] A typical prior art gin stand currently in use is shown in cross section in FIG. 1. Referring to FIG. 1, a gin stand 10 typically comprises an inlet chute 11 wherein seed cotton enters the machine in a single locked or separated state, and at a controlled rate. The seed cotton is urged by a picker roller 12 onto a gin saw cylinder 13, comprised of a large number of spaced apart circular saw blades 14 having teeth along their periphery and rotating about a common axis 15. The seed cotton is carried upward on the periphery of the saw blade through a seed discharge outlet 16 into the lower portion of the roll box 17 directly below an oscillator cylinder 18. The multitude of saw blades 14 rotate between closely spaced stationary ginning ribs 19 which serve to strip a portion of the cotton fibers from each seed as the saw teeth and attached fibers pass between the closely spaced ribs.

[0006] The partially ginned seeds are larger than the gap between the ribs 19, and become part of a seed roll rotating around the axis of the oscillator cylinder 18. The fibers remaining on the partially ginned seed tends to keep the seed loosely attached to the seed roll, which is a large mass made up of seeds with varying amounts of fiber remaining. Each seed will rotate around the roll box 17 a multitude of times until it no longer has enough long fiber to keep it adhered to the seed roll, at which time it will fall out through the seed discharge outlet 16 and out of the bottom of the machine.

[0007] The cotton fiber passing between the ribs 19 will remain attached on the periphery of the saws until doffed off of the saw teeth by a counter-rotating brush cylinder 20. The surface speed of the brush cylinder 20 is greater than the tip

speed of the saw cylinder 13, which allows the cotton to be lifted off the teeth of each saw blade 14 and passed out of the machine through the lint outlet 21.

[0008] In cotton saw gin stands employing ribs 19 that are mounted at both the upper and lower extremities, the mounting surfaces typically lie in what are essentially parallel planes. The surface inside the gin stand where the upper end of the ribs 19 mount are commonly referred to as the upper rib rail 22. Correspondingly, the surface where the lower end of the ribs 19 mount is known as the lower rib rail 23.

[0009] Typically, ginning ribs are manufactured from a metal casting, usually iron or steel. The shape or profile of the rib 19 as viewed from one axial end of the rotating gin saw cylinder 13 shaft towards the other, and the distance between the parallel rib mounting planes 22, 23 can vary from one model of gin stand to the next depending on a number of factors. Saws and ribs are high wear items and are therefore common replacement parts in existing saw gin stands.

SUMMARY OF THE INVENTION

[0010] An object of the present invention is to offer a novel saw ginning rib which can be manufactured by cutting the rib profile from a sheet of metal plate in a cost effective manner. Cutting ribs from plate in the axial profile direction has been considered cost prohibitive in the past.

[0011] It is another object of this invention to change the profile of the rib near at least one of the mounting surfaces so the rib mounting surfaces are no longer in essentially parallel planes, such that the ribs can be nested closely together when cutting from a sheet of raw plate material to reduce the amount of unused raw material, thus reducing the cost to manufacture significant quantities of the saw ginning ribs.

[0012] Since these saw ginning ribs are intended for use not only in new gin stands, but also in gin stands of existing design where the rib mounting surfaces lie in what are essentially parallel planes, it is necessary to also introduce a wedge-shaped spacer between the mating mounting surfaces of the gin rib and the gin stand rib rail. This wedge-shaped spacer can be manufactured to support a single or a multiple number of ribs. It is understood this spacer could also take forms other than a smooth wedge with one contiguous surface being in contact with the mounting surface of the ginning rib, and/or with one contiguous surface being in contact with the rib rail and still achieve the intended result.

[0013] A further object of this invention is to combine the function of a wedge-shaped spacer as described immediately above in conjunction with a plurality of grooves, each groove defined by two fins, with each groove having a tapered bottom to accept the mounting surface of one distal end of the ginning rib. The wedge-shaped spacer extends from one end of a rib rail to the other; however as a practical matter the spacer can be broken up into multiple pieces instead of one continuous piece, with each piece configured to hold one or more ribs. The rib correspondingly has a complimentary tapered bottom such that it sockets into the groove with the tapers serving to center each rib along the rail precisely spaced apart from one another as determined by the geometry of the spacer.

[0014] Another object of this invention is to reduce the tendency of undoffed cotton fiber from accumulating on the back side of a ginning rib. It is well understood by those familiar with the art of cotton ginning that cotton fiber can

occasionally accumulate on the back side of a gin rib and create potential for a rib fire wherein the friction between the rotating saw blade and a stationary mass of cotton fiber generates enough heat to begin the combustion process. This object is accomplished by removing material from the back of the rib in the region where the periphery of the freshly doffed, rotating saw passes between the rib immediately prior to being exposed to fresh seed cotton urged onto the periphery of this rotating saw by the picker rollers such that corresponding tapers on either side of the rib allow any undoffed cotton fiber remaining on the saw teeth to easily pass between the ribs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Referring to the drawings which are appended hereto and which form a portion of this disclosure, it may be seen that:

[0016] FIG. 1 is a side cross section view of a modern gin stand containing conventional ginning ribs made of cast iron or cast steel.

[0017] FIG. 2 is a side cross section view similar to FIG. 1, but with most features removed for the purposes of demonstration.

[0018] FIG. 3 is a side cross section similar to FIG. 2, but fitted with ginning ribs of the present embodiment.

[0019] FIG. 4 is a view showing a set of ribs utilizing the traditional mounting arrangement nested together on a sheet of plate raw material.

[0020] FIG. 5 is a view showing a set of ribs of the present embodiment nested together on a sheet of plate raw material.

[0021] FIG. 6 is a side cross section showing the upper end of the rib and the wedge-shaped spacer of the present embodiment mounted to the upper rib rail.

[0022] FIG. 7 is an orthographic view of the wedge-shaped spacer.

[0023] FIG. 8 is an orthographic view showing the upper end of the rib and the wedge-shaped spacer of the present embodiment mounted to the upper rib rail.

[0024] FIG. 9 is a singular rib of the present embodiment with a

[0025] FIG. 10 is a sectional detail along section 10-10 of FIG. 9 showing the tapered relief of the tuft region on the back of the rib near the lower end of the rib.

DETAILED DESCRIPTION

[0026] One or more of the above objects can be achieved, at least in part, by providing ginning ribs which utilize less material in creation. As shown in FIG. 2, a traditional cast iron or cast steel rib 19 is mounted to the upper rib rail 22 and lower rib rail 23, in close proximity to the circular gin saw 14. It should be noted that the mounting surfaces of the rib 19 and rib rails 22, 23 are essentially in parallel planes.

[0027] As best seen in FIG. 3, the rib 29 of the current embodiment is mounted to the upper rib rail 22 and lower rib rail 23, in close proximity to the circular gin saw 14. It should be noted that the upper and lower mounting surfaces of the rib 29 are not essentially in parallel planes.

[0028] As illustrated in FIG. 4, hypothetically a nest, or grouping of ribs having the same configuration as prior art cast ribs with mounting surfaces in essentially parallel planes could be arranged on a sheet of raw plate material in a manner to best utilize the raw material in cutting the ribs from the material rather than making them from cast iron. In

this hypothetical, the ribs are oriented such that the width of the rib is defined as the raw material thickness, albeit prior to subsequent machining processes; the outline or profile of the rib as seen in this view will be cut in a plane parallel to the axis of rotation of the saw cylinder in the finished gin stand. The mounting surfaces on the rib 24, 25 can be readily identified by the close proximity to the mounting holes 26, 27 where a fastener is used to attach the rib to the rib rail. It is important to note that rib 28 is of a hypothetical design not currently commercially available and is considered to be cost prohibitive, and is essentially employed herein as a construct to demonstrate by contrast the features of the current embodiment. Specifically note the spacing A and B between the ends of adjacent ribs wherein waste material would be left by this hypothetical design.

[0029] As illustrated in FIG. 5, a nest, or grouping of ribs 29 of the present embodiment with mounting surfaces 24', 25' oriented essentially in-line with the immediately proximate segment of rib can be arranged on a sheet of raw plate material in a manner to best utilize the raw material when cutting ribs therefrom. This requires the mounting surfaces 24', 25' to not be oriented essentially parallel. It will be noted this arrangement allows for more efficient usage of the raw material than the rib shown in FIGS. 2 and 4, by eliminating the waste shown at A and B of FIG. 4, thus allowing the possibility for more ribs to be cut from a similar sized sheet of raw material, and reducing the amount of raw material wasted. Furthermore, the ribs are oriented such that the width of the rib is defined as the raw material thickness, albeit prior to subsequent machining processes; the outline or profile of the rib as seen in this view will be cut in a plane parallel to the axis of rotation of the saw cylinder once assembled in the finished gin stand. The mounting surfaces on the rib 24', 25' can be readily identified by the close proximity to the mounting holes 26', 27' where a fastener is used to attach the rib to the rib rail.

[0030] Since the upper proximal end of rib 29 and its corresponding mounting surface is not in a parallel plane with the corresponding mounting surface of the upper rib rail 22, there is introduced a wedge-shaped spacer or filler bar 30 to allow the mounting of the rib to the rib rail even though they do not share a common plane along the corresponding mounting surfaces.

[0031] FIG. 6 shows the rib 29 of the current embodiment at the upper proximal end where it meets the upper rib rail 22 and the filler bar 30. This illustration is essentially the same as FIG. 3, but is a magnified view of one area of interest, and serves to show greater detail of this connection point.

[0032] As can be seen in FIG. 7, one embodiment of the filler bar 30 has a series of grooves corresponding to the width of the upper end of the rib 29 of the current embodiment. It is to be understood that the filler bar can include any number of grooves and may be unitary across the width of the rib rail or be composed of a number of like units affixed end to end across the width of the rib rail.

[0033] As best demonstrated in FIG. 8, the upper end of the rib 29 has tapered or beveled surfaces 29' that correspond to the beveled grooves 30' in the filler bar 30. It can also be seen that both the width and taper of the mounting surface of the upper end of the rib 29 are complimentary and can be manufactured in such a way that once installed, the spacing and angular positioning of the ribs 29 can be precisely and uniformly set.

[0034] Referring to FIGS. 9 and 10 note that a novel bevel is created when material is removed from the back of the rib 29 in a tuft region where the periphery of the freshly doffed, rotating saw 14 passes between the ribs immediately prior to being exposed to fresh seed cotton thrown onto the periphery of this rotating saw by the picker roller. When multiple ribs are aligned with corresponding tapers on either side of the ribs allows any undoffed cotton fiber remaining on the saw teeth to easily pass between the ribs. As shown in FIG. 9, the rib 29 of the present embodiment includes a novel bevel 31 in the tuft region facing the oncoming saw and created by the bi-lateral removal of material from the parent raw material.

[0035] While in the foregoing specification this invention has been described in relation to certain embodiments thereof, and many details have been put forth for the purpose of illustration, it will be apparent to those skilled in the art that the invention is susceptible to additional embodiments and that certain of the details described herein can be varied considerably without departing from the basic principles of the invention.

What we claim is:

1. A gin rib for use in a gin stand wherein multiple gin ribs are mounted to at least one upper rib rail and at least one lower rib rail in parallel spaced relation with a plurality of circular saw blades mounted for concomitant rotation about a common axis such that the periphery of said circular saw blades pass between said multiple gin ribs, said gin rib comprising a rib body having a predetermined thickness and a first end for mounting in said at least one upper rib rail at an upper mounting surface formed on said first end and a second end for mounting in said at least one lower rib rail at a lower mounting surface formed on said second end, wherein said upper and lower mounting surfaces are not in parallel alignment with each other.

2. A gin rib as defined in claim 1 wherein said rib body includes a front surface, a rear surface, and opposing side surfaces and wherein a tuft region is formed at the intersection of said opposing side surfaces and said rear surface proximate the point at which said periphery of said saw blades pass said rear surface, wherein said tuft region is defined by an area of reduced thickness compared to said predetermined thickness.

3. A gin rib as defined in claim 2 wherein said tuft region is defined by converging beveled surfaces formed at said intersection of said opposing side surfaces and said rear surface.

4. A gin rib as defined in claim 1 wherein said upper mounting surface is narrower than said predetermined thickness.

5. A gin rib as defined in claim 4 wherein said first end is beveled on each edge of said upper mounting surface to reduce the predetermined thickness adjacent said upper mount surface.

6. A gin rib as defined in claim 4 wherein said rib body includes a front surface, a rear surface, and opposing side surfaces and wherein a tuft region is formed at the intersection of said opposing side surfaces and said rear surface proximate the point at which said periphery of said saw blades pass said rear surface, wherein said tuft region is defined by an area of reduced thickness compared to said predetermined thickness.

7. A gin rib as defined in claim 1 wherein a plurality of gin ribs are formed from a plate of material by nesting a number

of profiles of said gin ribs on a surface of said plate such that minimal material is wasted when said profiles are cut through said plate; cutting said plate along said profiles to yield a plurality of gin ribs each having a thickness determined by the thickness of said plate.

8. A gin rib as defined in claim 7 further defined by forming apertures in said first and second ends at said upper and lower mounting surfaces for passing fasteners there-through.

9. A gin rib as defined in claim 7 wherein said forming of said gin rib comprises machining said gin rib to form a beveled tuft region.

10. A gin rib as defined in claim 7 wherein each of said profiles define a front boundary of said rib, a rear boundary of said rib, and a top and bottom boundary of said rib such that cutting through said profile creates a front surface, a top surface, a rear surface, and a bottom surface and the opposing surface of said plate define the side surfaces of said rib and said forming further comprises machining the intersection of said side and rear surfaces adjacent said upper mounting surface to reduce the thickness of said rib at said upper mounting surface.

11. A gin rib as defined in claim 10 wherein said forming of said gin rib further comprises machining said gin rib to form a beveled tuft region.

12. A gin rib as defined in claim 1 wherein each of said profiles define a front boundary of said rib, a rear boundary of said rib, and a top and bottom boundary of said rib such that cutting through said profile creates a front surface, a top surface, a rear surface, and a bottom surface whereby the opposing surfaces of said plate define the side surfaces of said rib and wherein the intersections of said side and rear surfaces adjacent said upper mounting surface are beveled reduce the thickness of said rib at said upper mounting surface.

13. A gin stand comprising a plurality of circular saw blades mounted for concomitant rotation about a common axis such that the periphery of each of plurality of said circular saw blades pass between a pair of gin ribs, each gin rib of said pair of gin ribs comprising a rib body having a predetermined thickness and a first end for mounting to said at least one upper rib rail at an upper mounting surface formed on said first end and a second end for mounting in said at least one lower rib rail at a lower mounting surface formed on said second end, wherein said upper and lower mounting surfaces are not in parallel alignment with each other.

14. A gin stand as defined in claim 13 further comprising at least one filler bar affixed to said upper rib rail wherein said at least one filler bar is configured with a plurality of grooves separated by a plurality of fins such that said upper mounting surface of each of said pair of gin ribs is seated within one of said plurality of grooves in abutting relationship with said at least one filler bar.

15. A gin stand as defined in claim 13 wherein said rib body includes a front surface, a rear surface, and opposing side surfaces and wherein a tuft region is formed at the intersection of said opposing side surfaces and said rear surface proximate the point at which said periphery of said saw blades pass said rear surface moving toward said front surface, wherein said tuft region is defined by an area of reduced thickness compared to said predetermined thickness.

16. A gin stand as defined in claim **14** wherein said upper mounting surface is narrower than said predetermined thickness.

17. A gin stand as defined in claim **14** wherein said first end is beveled on each edge of said upper mounting surface to reduce the predetermined thickness adjacent said upper mount surface and each groove of said plurality of grooves tapers commensurately with said upper mounting surface for cooperative mating therewith.

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