R. W. McLEAN.

SAW CYLINDER.

APPLICATION FILED DEC. 29, 1917.

1,345,207. **Patented June 29, 1920.**

Fig. 1.

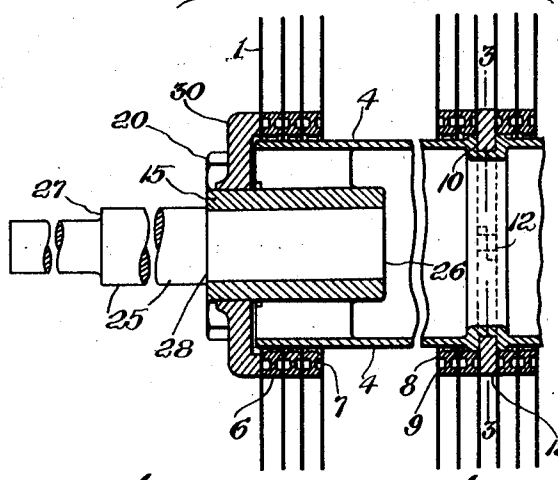


Fig. 2.

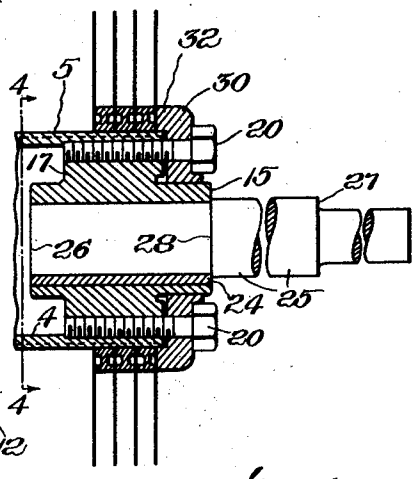


Fig. 5.

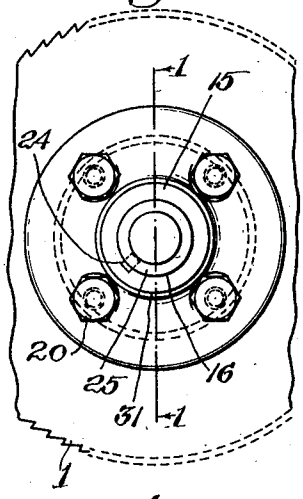


Fig. 3.

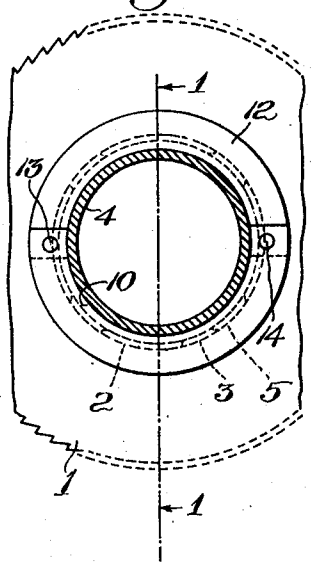


Fig. 4.

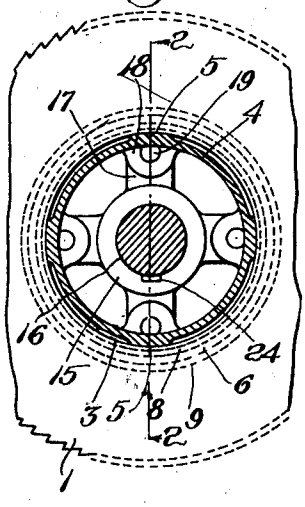
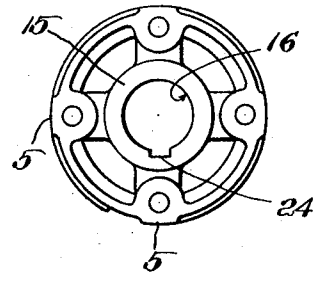


Fig. 6.



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UNITED STATES PATENT OFFICE.

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SAW-CYLINDER.

1,345,207. Specification of Letters Patent. Patented June 29, 1920.

Application filed December 29, 1917. Serial No. 209,416.

To all whom it may concern:

Be it known that I, ROBERT W. McLEAN, a citizen of the United States, and resident of Bridgewater, in the county of Plymouth and State of Massachusetts, have invented new and useful Improvements in Saw-Cylinders, of which the following is a specification.

This invention relates to saw cylinders for delinting cotton gins and the like, and is particularly concerned with maintaining the spacing, angular position, central position and flatness of a series of gin saws in that type of device in which the mounting and driving means for the said elements is of metallic construction.

As well known in the art, in gins, burring machines, Garnett machines and the like, whether for ginning, disintegrating, delinting, or hulling, or for other fibers than cotton, the driven element is a toothed disk operating in a slot between grate-bars so called. In modern practice the cylinder of saws has been increased in length and the saws have been placed closer together, since the efficiency of the instrument as a whole, especially for ginning or the recovery of short fibers, depends upon the number of active saw-peripheries capable of working at once upon the material. The saw is a flat, thin, hardened annulus of steel of good quality having teeth on its periphery. Sufficiently rigid and accurate spacing and mounting means for a cylinder made up of such saws has not heretofore been provided. Objects of my invention are therefore to provide means for driving and spacing a series of such saws so that each passes centrally in the slots between an adjacent series of accurately spaced grate-bars, to provide against flexure of the mounting, and readily to enable a replacement of a broken or dulled saw, and especially to provide for accomplishing said objects while increasing the durability and strength and decreasing the cost of the elements improved.

In the accompanying drawings,

Figure 1 is a central longitudinal section, parts broken away, of the complete cylinder on line 1—1 of Figs. 3 and 5;

Fig. 2 is a similar section of the right-hand end of the cylinder on line 2—2 of Fig. 4;

Fig. 3 is a section on line 3—3 of Fig. 1;

Fig. 4 is a section on line 4—4 of Fig. 2;

Fig. 5 is a left-hand end elevation of the cylinder showing one of the compression heads; and

Fig. 6 is an elevation of the right-hand end of the drum.

As shown in Fig. 1 a series of saws 1 is adapted to be mounted upon the surface of a drum 4 by means spacing the saws apart, holding them against rotation relatively to the drum and holding them accurately in planes perpendicular to the axis of rotation. The saws 1 are provided with an inner opening 2, Fig. 3, into which a key or tooth 3, Figs. 3 and 4, projects.

The drum 4, which may be a hollow cast-iron member having integral or attached ends, is provided with seats 5 which preferably are longitudinally extending ribs cast upon the surface and machined to diameter. These seats 5, which may cover as much of the drum surface as desired, but preferably are relatively narrow as shown, for economy of machining, engage the inner surfaces of the openings in the saws, to establish a concentric position for the saw peripheries, but the saws can slide on the seats 5. The saws are prevented from rotation on their seats as by engagement of the keys 3 with the side face of one of the seats 5, or other convenient keying means.

The saws are separated from each other and held in perpendicular relation, as usual, by spacing rings 6 which preferably are of the I-shaped cross section shown in Fig. 1 having an inner surface in the plane of the dividing web 7 and having machined faces 8 and 9 in planes perpendicular to the axis of their figures. In many cases it is not desired that the grate-bars shall extend very deeply toward the center of the saw cylinder, and for such use the spacing rings 6 may be increased in radial depth, either by extension of the inward web or by outward displacement of the annular part carrying the surface 9. It will be understood that the spacing rings may if desired be solid, filling the space between their flat faces, or that they may be provided with strengthening lugs or filling-webs distributed about the peripheries and entirely or partly filling out the cross section of the ring at places to form solid spots at these places.

The inner dimension of the spacing rings

is such as to give them a sliding fit on the seats 5.

However accurately the spacing rings 6 may be machined to dimension, the hardened sheet metal saws generally show individual variations either in gage of the metal from which they are cut, or in effective thickness due to being bent out of the flat. With saws of a certain gage and rings 6 of a certain thickness it is therefore by no means certain that an assembled series of saws and spacer rings will hold the saws spaced at the calculated distances apart, or that the whole cylinder so built up will be of the calculated length. When the series is powerfully compressed its members approach their calculated position, but in this case, local or cumulative differences in gage of either saw or spacer may still result in a cylinder improperly spaced or of the wrong length. Where such cylinders are provided for replacement in existing gins it is necessary that the saws within certain limits should be properly spaced, as will be apparent. In order to enable the cylinder as a whole to be effective with a grate of standard spacing, provision is made for causing the device of this invention to vary as little as possible from the calculated spacing, by providing both for powerful compression and for distributing the variation from position symmetrically with respect to the longitudinal middle of the cylinder. Referring now to Figs. 1 and 3, the drum 4 is provided at its middle with an annular groove 10 to receive and position an abutment 12 preferably made as a split ring of the same thickness as the spacing rings 6. As shown in Figs. 1 and 4 the ring 6 may be provided with a hinge-pivot and joint at 13 and with a locking pin at 14 in suitable bores through reduced ends of the sections of the ring 12, which is assembled in the groove 10 and locked in place by inserting the pin 14.

The series of saws 1 and spacers 6 strung upon the drum 4 from either end are compressed in opposite directions against the abutment 12 by suitable means.

Improved means for this purpose are illustrated in Figs. 1, 2, 4, 5 and 6. As best shown in Fig. 4 the preferably integral and like heads of the drum 4 are each provided with a central boss 15 bored for the driving shaft at 16. For convenience in casting, the connection between the boss 15 and the drum 4 may be any form of separated arm 17, the arm 17 preferably including bosses 18 bored and tapped at 19 to receive strong screws 20.

For economy and for advantages presently to be mentioned the drive shaft 25 preferably is not continued through the length of the drum 4, but is made as two separate alined stubs each firmly seated in a boss 15 and ending at 26 at or near the inner face of said boss. The bore 16 may be turned to a tight driving fit and the shaft may be shouldered at 28 to position the boss, 15, as well as being provided with the usual shoulders 27 for positioning by the bearing in the gin to fix the lateral position of the saw cylinder with respect to the grate. Preferably each boss 15 is keyed at 24 to the stub shafts 25. A defect of saw cylinders has been liable to flexure under the heavy loads sometimes taken by such cylinders. It will be observed that the present device provides a relatively rigid drum 4 of comparatively large diameter, which is wrapped and reinforced by the saws themselves and the spacing rings 6. To provide for extreme rigidity the present invention also provides means for placing the drum 4 under heavy longitudinal tension against the resistance afforded by the reacting longitudinal compression of the saws 1 and the rings 6, thus forming of longitudinal sections of the cylinder virtual trusses of which the saws and spacers provide the compression member and the drum 4 provides the tension member.

This may be accomplished in any desired way, but a preferred form is that illustrated in which heavy compression heads 30, Figs. 1, 2 and 5, having loose bearings at 31 on the bosses 15 are adapted to be forced against the series of saws 1 and spacers 6 with respect to each face of the abutment 12. The heads 30 have an overlying annular flange 32 adapted to take against the end saw 1, the said heads 30 being bored to receive the heavy screws 20 as shown.

Pairs of the screws 20 on opposite ends of the cylinders are in line with each other. Upon setting up the screws 20 firmly the parts of the saws between the rings 6 are not only compressed thereby to position and space the saws properly but the reaction of the pile of compressed saws and spacer rings in the absence of a continuous central shaft connected at both ends to the drum strains the drum 4 on the longitudinal line of each pair of screws at opposite ends of the drum. Screws at opposite ends of each sector of the drum are tightened until there is absence of observable flexure along the peripheries of the saws.

Whatever variation in spacing due to variation in the gage of the saw blanks or curvature on the saws there may be is made harmless by distributing the error caused thereby on each side of the abutment 12, which fixes the position of the middle of the series of saws, and with respect to which the ends of the series move under compression.

It will be plain that the construction of the drum 4, abutment 12 and compression and tension means 20, 30, 32 may be varied

without departure from the invention. For instance the abutment 12 might as well be an integral part of the drum 4, or the drum 4 might be made of sheet metal, or the screws 20 might be some other form of powerful compression device.

When a saw is damaged, the division of the series by the abutment 12 enables the damaged saw to be taken out by releasing half of the series without disturbing the positions of the saws in the other half of the series. In an ordinary cylinder the whole series must be disturbed to make repairs.

What I claim is:

1. A saw cylinder comprising a hollow drum and an abutment projecting radially from the outer surface of the drum substantially at its middle point, a series of saws carried by the drum, a series of spacer rings for the saws, and means for holding the saws and the spacer rings under compression against each other and against said abutment, said means comprising an element reacting to place the drum under longitudinal tension.

2. A saw cylinder comprising a drum adapted to receive separate thin saws, an abutment seated against endwise movement in a groove on the surface of the drum, a series of spacing rings adapted to slide on the surface of the drum and means adapted simultaneously to place the drum under longitudinal tension and to compress the series of saws and spacing rings against each other and against opposite faces of said abutment.

3. A saw cylinder for use in gins and the like comprising a hollow drum having heads and peripheral longitudinal seats for annular saws, stub shafts seated in said heads, a series of saws carried by the drum, a series of spacer rings for the saws each having radially spaced annular bearing faces, and means for holding the saws and the spacer rings in contact at said bearing faces under compression, comprising end caps and longitudinally alined screws reacting between said end caps and drum to place different longitudinal sectors of the spacers and saws and of the drum respectively under separately adjustable longitudinal compression and longitudinal tension.

4. A saw cylinder having a drum, a groove in the middle of the drum, and a segmental abutment ring removably seated in said groove, in combination with a series of saws and spacer rings therefor on said drum and means at each end of said drum for forcing said saws and spacers toward said abutment ring.

5. In a device of the class described, in combination a tubular saw support having a circumferential groove therein, an annular abutment seated within said groove, a saw blade mounted upon said support and means for forcing said saw blade into engagement with said abutment.

6. In a device of the class described, a cylindrical support provided with a circumferential groove, and an abutment member seated within said groove, said abutment member comprising a plurality of arcuate members hingedly connected together.

7. In a saw mounting for cotton gins, in combination a hollow cylindrical saw support and a longitudinally immovable abutment member carried thereby at a point intermediate its length, said abutment comprising a divisible ring member.

8. In a gin saw, in combination, a saw cylinder, a series of longitudinally arranged ribs upon its outer surface, said cylinder being provided with a circumferentially arranged abutment member, a series of circular saw blades mounted to slide along said ribs at either side of the abutment, and independent spacer rings slidably mounted upon said ribs and engaging contiguous surfaces of adjacent saws.

9. In a gin saw in combination, a hollow cylindrical saw support, a series of circular saw blades mounted thereon, spacer rings interposed between adjacent saw blades and constructed and arranged to engage radial surfaces only of said blades, end caps for said cylinder and means for adjusting said caps relatively to the cylinder to compress the series of blades and rings thereon, said means reacting indirectly upon the cylindrical walls of the support.

10. In a device of the class described, in combination, a tubular saw support, a pair of stub shafts concentric with said support and arranged within its respective ends, hubs mounted upon the respective shafts and serving to space the support therefrom, end caps for said support slidably engaging said hubs, a series of saw blades mounted upon said support, and means reacting between said caps and hubs for moving said caps toward one another.

11. A gin saw comprising in combination a tubular saw support provided with hub members at its opposite ends, independent series of circular saws mounted upon said support, compression members for positioning the respective series of saws, and bolts engaging threaded openings in said hubs and constructed and arranged to adjust said compression members.

Signed by me at Boston, Mass., this twenty-first day of December, 1917.

ROBERT W. McLEAN.