J. C. GARNER.

FIBER SEPARATING DEVICE.

APPLICATION FILED FEB. 3, 1920.

1,414,508. Patented May 2, 1922.

Fig. 1.

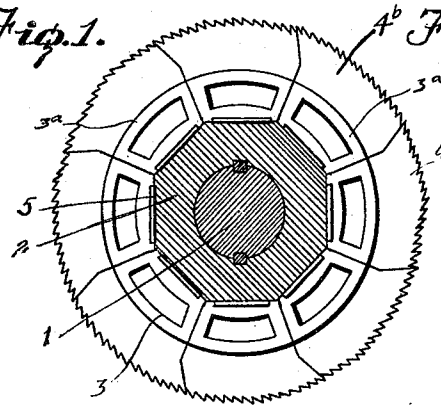


Fig. 2.

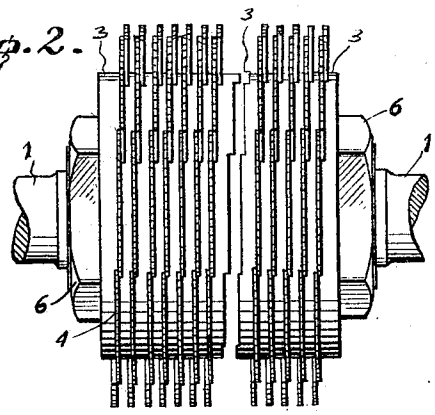


Fig. 3.

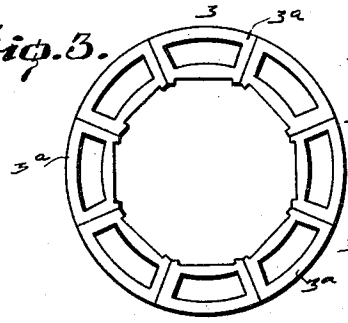


Fig. 4.

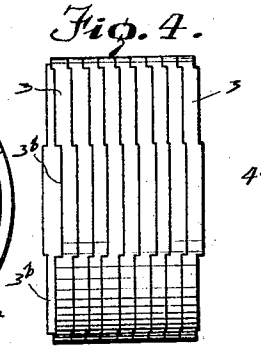


Fig. 5.

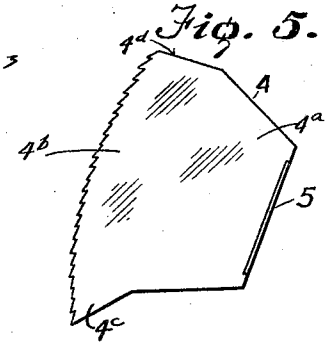


Fig. 7.

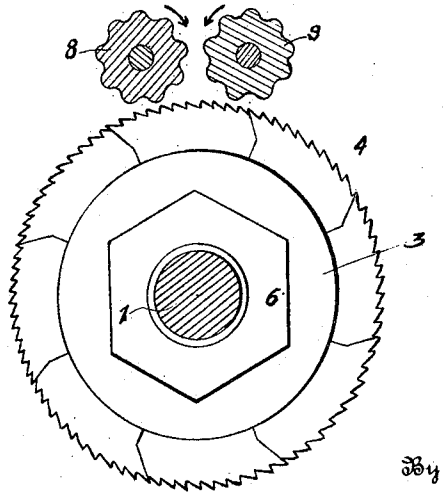
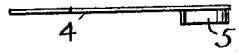


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES C. GARNER, OF HOUSTON, TEXAS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE GARNER GIN COMPANY, INC., OF HOUSTON, TEXAS, A CORPORATION OF TEXAS.

FIBER-SEPARATING DEVICE.

1,414,508. Specification of Letters Patent. **Patented May 2, 1922.**

Application filed February 3, 1920. Serial No. 355,929.

To all whom it may concern:

Be it known that I, JAMES C. GARNER, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in Fiber-Separating Devices, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in the mechanism used for disintegrating masses of cotton fiber, and separating, to as great an extent as possible, each fiber from its neighbors to permit the escape of foreign particles and for thoroughly intermingling the fibers of varying colors to improve the grade of the material. Mechanisms of this class are used in treating the masses of cotton which come, sometimes as unbound masses from compress plants, from sampling houses, and the like, and sometimes as bound bales from the farms.

Large bodies of such cotton material comprise sub-masses of a relatively high grade, these having white and lustrous fibers in clean condition, and other sub-masses, commingled with those aforesaid, which are of a low grade either in respect to the color of the fibers or in respect to cleanliness, they often having many intermingled foreign bodies such as particles of earth, sand and grit, and small particles of dry vegetable matter, such as broken stalks, stems, leaves and the like.

My purpose is to provide a mechanism that will separate those fibers which (regardless of color) are of market value, from all particles of sand, earthy matter, pieces of stalks, etc., and then thoroughly commingle the fibers. To accomplish this, separating cylinders or drums have been proposed, each of which has its periphery composed of a large number of relatively small saw-like teeth turned forward tangentially and so distributed as to have as many teeth as possible pass, per second, through a line parallel to the axis and lying in the surface of the cylinder which is generated by the tooth points, such toothed drums in this respect differing from those used in ordinary gins. And numerous forms of toothed devices such as last referred to have been proposed for this. In one case thin flexible toothed disks or annuli have been arranged in a series along a shaft and clamped rigidly thereto, each disk being crimped around radial lines, and some of the teeth of each disk being held in transverse planes away from the normal plane so as to rotate in circles between said normal plane and those of its neighbors. The crimps in the disks have sometimes been so formed as to be permanent. In other cases the flexibility of the disks has been utilized and spacing blocks or washers, together with devices for forcing them toward each other, have been used for forming the crimps, the blocks or washers having corrugated faces. The convex parts of one set of corrugations register axially with the concave parts of the next set of corrugations, and axial compression results in crimping the disks in correspondence with these corrugations. In other mechanisms the toothed cylinder has been reciprocated axially over paths long enough to insure that a line, such as aforesaid, will be intersected at each of all of its points with high frequency by the teeth.

Serious difficulties have been found incident to each of these devices and modes of use.

In the present mechanism the object is to avoid the bending of the fibers of the disks and to provide a toothed cylinder which can be easily constructed, which will be stronger and more durable than those referred to and which can be readily repaired in case of any bending or breakage of its component elements.

Figure 1 is a transverse section of the saw cylinder.

Fig. 2 is a side view of the two end parts of the saw cylinder with their elements assembled.

Fig. 3 is a face view of one of the segments or hub elements of the saw cylinder.

Fig. 4 is a side view of a series of the saw carrying hub sections when looked at on a line approximating 90 degrees from the line of sight for Fig. 2.

Fig. 5 shows one of the saw blades or sections detached.

Fig. 6 is an edge view of the same.

Fig. 7 shows the relative positions of the cotton feeder rolls and the saw cylinder.

The component elements of the saw cylinders are mounted on the shaft 1, to which is keyed an elongated hub 2 which is polygonal, preferably octagonal, in section. On this hub are fitted ring-like segments 3.

Each of these segments 3, is composed of a plurality, here eight, of integral sections 3^a, each section being offset axially, in relation to the sections next adjacent to it. And the radial faces (right and left) of each section lie in radial planes other than the planes of the faces of the adjacent sections. The large central aperture of each of these ring-like plate segments 3 is polygonal in correspondence with the solid central hub 2.

4, 4 indicate the sectional saw blades. Each is formed with a main tapering plate part 4^a, 4^b. The part 4^a fits in one of the radial recesses 3^b in one of the ring sections 3. The part 4^b extends outward beyond the periphery of the ring or washer section 3^a. Each saw section has a peripheral projection at 4^c and at the opposite edge is cut away somewhat as at 4^d.

At the inner edge each section 4 has a lip flange 5 extending at right angles to the plane of the saw. These lip flanges 5 are of such thickness that a circular series of eight of the saw sections can be positioned around the axis and have the flanges 5 rest upon the flat faces of the hub 2. Each washer ring or clamp 3 is adapted to be fitted upon and surround the series of flanges 5 and press them tightly against the hub 2, and thus firmly and securely hold in position all of the saw sections of each circular series and prevent them from flying or moving outward or radially away from the axis.

All of the component parts are firmly bound together by nuts 6 engaging with threads on the shaft 1.

Because of this radially stepped, or offset, relationship in position of the saw sections in each circular series, provision is made for having a complete cylinder generated by the saw teeth. That is to say any straight line parallel to the axis and at a distance equal to the radius of the saw teeth will have each of its points intersected by a long series of teeth at each rotation of the saw cylinder.

In Fig. 7 is shown the method of using my improved saw mechanism. 8 and 9 are feed rolls adapted to be rotated in the direction of the arrows as shown in the figure. The material from a hopper (not shown) is fed between these feed rolls and is thus formed into a compact bat. As this bat moves downward from the feed rolls it is presented, along a line parallel to the axis of the saw cylinder to the teeth carried by said cylinder. The latter is rotated at high speed relatively to the speed of rotation of the feed rolls 8 and 9, and a large number of teeth, per second, intersect each and every point of the edge of the material presented to them.

Although there is a staggered relationship of the teeth when the drum is made as herein described, there are in each set of the teeth a large number which all travel in the same transverse plane during each revolution, and these are all presented similarly to the fiber. This gives an assurance that all fibers, even the shortest, advancing in that plane from the rolls shall be caught; the arrangement of the teeth in this respect differing materially from those which are carried by crimped disks, not only in respect to having a large number of teeth rotating, seriatim, in the same plane but also in that the teeth are all presented with their side faces at right angles to the transverse line of the bat. Many of these advantages are attainable when a reciprocating drum with peripherally continuous disks (each in a transverse plane) is used; and also in mechanisms where the bats are bodily reciprocated relatively to the teeth.

But I obviate the necessity of multiplying mechanical parts in the mechanism and consuming power to reciprocate one element or another, by having peripherally short sections each with a plurality of teeth extending only part way around the axis, and all rotating in a common transverse plane, which is immediately adjacent to the planes of the next sections.

By expanding radially the hub or holder element I provide for utilizing saw sections which are not only peripherally short but also radially narrow. And as I furnish firm, strong holders for these small sections, namely the clamping and spacing ring-like collars, it opens the way to form the active, toothed parts from sheet steel blanks which are small and inexpensive, this being in marked contract with the integral disks in earlier mechanisms, whether crimped or not, each formed with a peripherally continuous toothed element.

When a break, even small, or even a slight bend is made in one of the older integral disks it must be removed from the drum and an entire new disk substituted; all of which difficulties and losses are now obviated.

Another important advantage incident to the relationship of the parts constituting the present drum is that the tips of the teeth (when the several parts are accurately made and assembled and when the teeth are in normal position) will all lie in the surface of the cylinder which can be regarded as generated by the rotation of the drum. If the radius of any tooth point should be slightly shorter (to an extent measurable in hundredths of an inch) than the radius of the generated cylinder, such tooth will miss cotton filaments at the edge of the bat, and if throughout the surface of the cylinder there are numerous such variations in radii, the separation of fiber from fiber effected by the drum, as an entirety, will be markedly inferior. And such disadvantages were incident to the earlier,

axially stationary, drums comprising thin disks which, as already described, were crimped or flexed at their peripheries; that is to say, a short peripheral section of an integral disk was forced to the right of the normal transverse plane and the immediately adjacent sections were forced to the left from that plane. Necessarily, the teeth at the crest of each deflection or curve are at the ends of radii from the axis shorter than the radii of the teeth carried by those parts of the disk which lie in the central normal plane. And this variation in the distances of the tooth points from the surface of any given cylinder gives a surface for the drum which can be regarded as one composed of numerous low areas and numerous intermediate high areas. With such a drum surface there must necessarily be a corresponding variation in action as concerns the work of the tips of the teeth in relation to the lines at the edge of the bat which are parallel to the axis of the drum.

What I claim is:

1. A toothed drum of the class described having an axially arranged series of sets of saw sections, each set extending continuously around the axis, and comprising a section rotatable in a central transverse plane a plurality of supplemental sections rotatable respectively in planes at one side of said central plane, and a plurality of supplemental sections rotatable respectively in transverse planes at the other side of the said central plane all of said parts being held in fixed relation to each other.

2. A toothed drum of the class described having an axially arranged series of sets of saw sections, each set comprising sections of which each has a series of peripheral teeth extending only part way around the drum in a transverse plane intermediate of the transverse planes of the toothed peripheries of those sections of its set which are adjacent to it, whereby said sections can be made of relatively thin sheet metal, and the number of the points will be reduced which when the drum is rotated pass through each point of the generated cylinder all of said sections being held in fixed relation to the drum when rotating.

3. A toothed drum of the class described, having an axial series of spacer rings, and a series of sets of saw sections each set extending continuously around the axis and having its sections secured to the face of a spacer ring and positioned in axially stepped relation to each other to have the sections of each set adapted to rotate in a plurality of transverse planes around the axis.

4. A toothed drum of the class described, having a rotatable relatively elongated axially positioned supporting element and a series of sets of saw sections, each normally lying in a transverse plane other than the planes of the adjacent sections of the same set, devices for positively spacing each section axially from the sections of the adjacent sets, and devices for rigidly holding all of the sections in fixed relative positions.

5. A toothed drum of the class described having an elongated and relatively expanded rotatable holder and a series of approximately circular sets of saw sections fixed relatively to the said holder and to each other, each section being separable from the others of its series and lying in a transverse plane other than the planes of the adjacent sections, and over-lapping, axially, each of the adjacent sections of its set, and means for positively spacing each section axially from the sections of the adjacent sets.

6. A toothed drum of the class described, having a rotatable holder, and axially arranged series of circular sets of saw sections all fixed peripherally relatively to each other, each set comprising a plurality of peripherally short independently movable sections, each section having at its periphery a set of teeth all rotatable in the same transverse plane, and means for positively spacing axially each section of each set from the sections of the adjacent sets, all the sections being arranged relatively to the holder to have a line parallel to the axis, and lying in the cylinder generated by the drum when rotated, intersected at each of its points by the teeth of one of said sections.

7. A toothed drum of the class described, having a rotatable holder, an axially arranged series of circular sets of peripherally short saw sections, each section having a plurality of teeth rotatable in a common transverse plane other than the planes of rotation of the teeth or the next adjacent sections of the same set, means for positively spacing axially each section of a set from the sections of adjacent sets, and fastening devices carried by the holder for removably securing the sections thereto, in peripherally fixed positions.

8. An axially stationary rotatable drum of the class described provided with a plurality of sets of teeth, the teeth of each set being integral and positioned in an arc in a transverse plane, devices for positively spacing each set of teeth axially from the next adjacent sets and all of the teeth of the drum being relatively arranged as described to intersect at all points a line parallel to the axis and lying in the cylinder generated by the drum.

9. In a toothed drum of the class described, a radially expanded rotatable central carrier, a series of spacer rings, each

having a series of seats in its radial face which are in axially stepped relation with each other and each ring slidably engaging with the central carrier, and a series of peripherally short saw sections each adapted to fit in one of said seats and engaging positively and radially with a spacer ring to prevent radial displacement.

10. In a toothed drum of the class described, the combination with the rotatable holder, of the series of axially movable ring-like spacing devices, each formed with a circular series of radially positioned flat-faced steps, each step face being in a radial plane other than that of the adjacent steps, and a series of rigidly fastened saw sections, each positioned against one of said step faces and rigidly fastened relatively to the holder.

11. In a toothed drum of the class described, the combination with the rotatable holder, of the series of axially movable ring-like spacing devices, each formed with a circular series of radially positioned flat-faced steps, each step face being in a radial plane other than that of the adjacent steps, and a series of rigidly fastened saw sections, each section having a relatively elongated peripheral portion and a shorter inner portion fitted to one of said step faces.

12. A rotatable toothed drum of the class described, having a central holder with an operative surface which is polygonal in cross section having flat sides parallel to the axis, a plurality of saw sections each formed with a peripheral toothed edge concentric with the axis and a rectilineal inner edge adapted to fit one of the flat sides of the said central holder, and retaining rings surrounding the holder and each having a central polygonal opening, each ring positively engaging with the sections of a series around the axis to hold them against radial displacement and spacing each section from the section axially adjacent thereto.

13. A rotatable toothed drum of the class described, having a central holder with an operative surface which is polygonal in cross section having flat sides parallel to the axis, a plurality of saw sections each formed with a peripheral toothed edge concentric with the axis, a straight inner edge adapted to fit one of the flat sides of the said central holder and an axially extending flange formed integral with the said inner edge, and retaining rings surrounding the holder and each having a central polygonal opening each ring positively engaging with the axial flanges of each of the sections of a series around the axis to hold them against radial displacement and adapted to space each section from the section axially adjacent thereto.

14. A rotatable toothed drum of the class described having the points of all its teeth arranged to travel in the same cylinder of rotation and to have all the points of said cylinder intersected by teeth during each rotation, said teeth being in a plurality of sets, all the teeth of each set traveling in the same circular path of rotation, the path of one set differing from the paths of rotation of adjacent sets, and the teeth of each set being held peripherally fixed in relation to those of the other sets.

In testimony whereof, I affix my signature.

JAMES C. GARNER.