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GARNETT MACHINE

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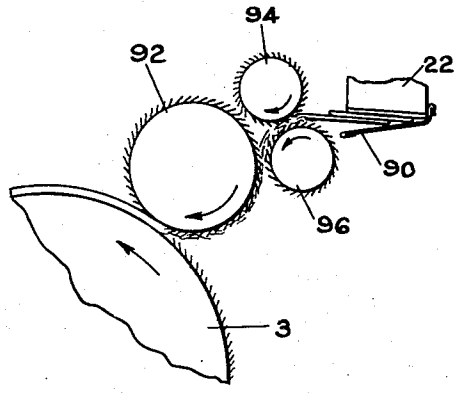


FIG. 3

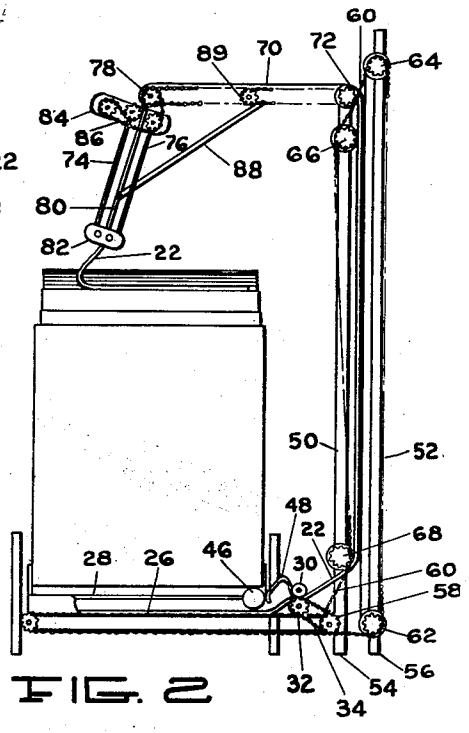


FIG. 2

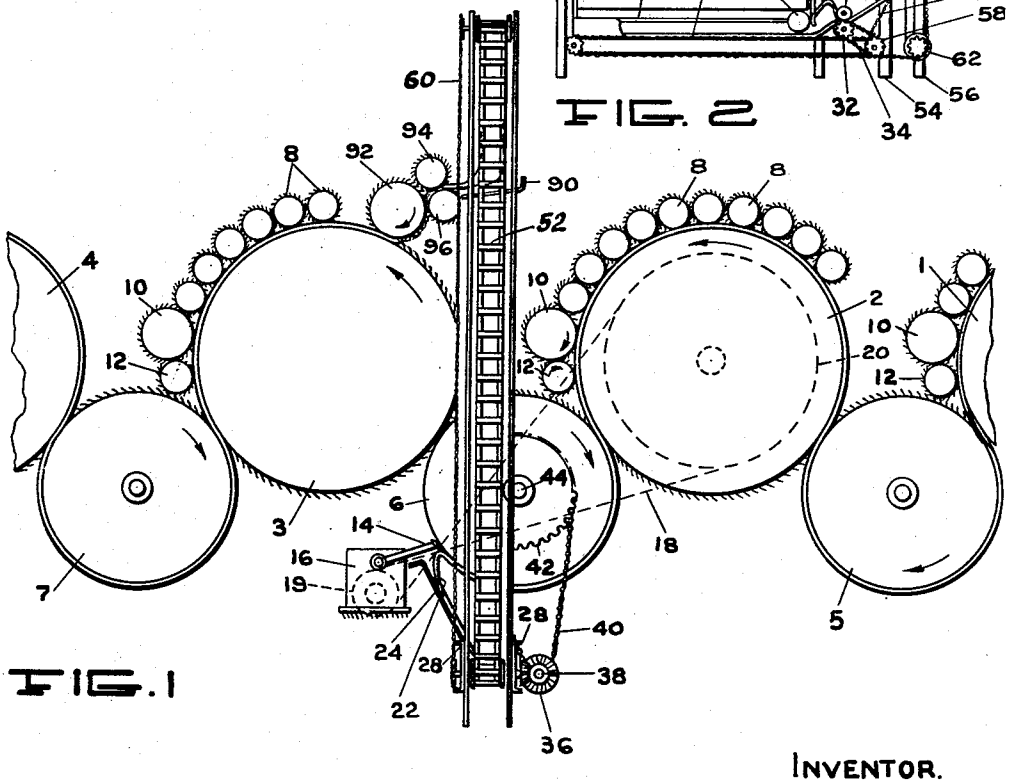


FIG. 1

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GARNETT MACHINE

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This invention relates to the type of fiber preparing machines known as garnetts, which are widely employed for shredding rags and remnants of textile fabrics and waste yarns into their component fibers in preparation for recarding and re-use of such fibers. As is well known, these machines perform a heavy and rough species of carding action by relying on the tearing action of opposed sets of strong, sharp teeth to rend the yarns forming the stock being processed into their component fibers, but since these teeth are mounted on the surfaces of cylinders rotating on parallel axes, the teeth of the several opposing cylinders travel all in parallel planes radial to these axes. Thus yarns which happen to extend in the direction of travel of the teeth in radial planes can and do pass through the machine in end-on relation and thus escape being opened into individual fibers. This occurrence arises largely from the inherent tendency of the yarns to align themselves with the direction of the pull exerted on them by the opposing sets of teeth, which is the principle relied on in all carding operations to dispose the fibers being worked on in generally parallel relation and extending in the direction of feed. However, the result in a garnett is the incomplete and imperfect opening of all the yarns into their component fibers, and has led to the multiplication of the main cylinders to the number of two, three, four, or even more, in a single Garnett machine in the effort to complete the opening action. Even so, some yarns still come through more or less intact, because once they have become oriented in the direction of feed through the machine, there is no force operating on them to change their lie, and they settle between adjacent rows of teeth on the successive cylinders to escape disintegration thereby.

The invention overcomes this fault by interrupting the direct travel of the stock through the machine at an intermediate point in its progress for the purpose of changing the predominating direction of extent or lie of the yarns and fibers of the stock from a parallel to an angular relation to the planes of travel of the Garnett teeth, whereby the yarns will be unable to escape by lying between the rows of teeth of the successive cylinders, but will be caught simultaneously by the teeth of opposing cylinders and duly opened up into fibers.

While there are various methods and means of effecting this change in the lie of the yarns and fibers during their passage through a multi-cylinder Garnett machine, the preferred form em-

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ployed in the present embodiment of the invention comprises an application of the familiar principle employed in the Apperly or Scotch delivery and feed between the units of a set of cards. Not only does this type of crosser-feed apparatus possess the advantage of being familiar and dependable, but it also enables the mechanism needed for the practice of the invention to be applied as an attachment to existing garnetts while requiring a minimum of modification of the existing structure for its installation, and as herein combined has the exceptional virtue of permitting optional use of the garnett in its original manner, when desired to suit the nature of the particular stock being worked, at any time by merely disconnecting the drive for the special attachment.

Other objects of the invention, and the manner of their attainment, are made plain in the following description.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a diagrammatic side elevation of portions of a Garnett machine, showing the invention devices applied thereto.

Fig. 2 is an end elevation of the Garnett machine of Fig. 1, having the invention attachment.

Fig. 3 is a detail view showing the delivery and feeding-in of the lap as it is returned to a main cylinder after being removed to change the lie of the yarns and fibers therein.

In Fig. 1 the main cylinders of a 4-cylinder Garnett machine of conventional type are indicated respectively at 1, 2, 3, and 4, the doffers being shown at 5, 6, and 7, the workers at 8, and the fancy rolls and fancy strippers at 10 and 12 respectively. These cylinders and rolls are all driven in usual or any preferred manner in the directions indicated, by means not shown.

In accordance with the invention, a doffer comb 14 and driving mechanism 16 therefor, of conventional or any preferred type, are applied to one of the intermediate doffers, herein the second doffer 6 of the four present in the machine, and suitably driven as by a belt 18 from drive pulley 20 of the preceding main cylinder 2. This supplemental doffer comb 14 doffs the fleece 22 from doffer 6 onto a guide sheet 24 down which it slides onto the narrow endless receiving apron 26 of a swinging lattice type of lapper feeder, the apron 26 extending across the full width of the doffer and traveling in a trough having low side walls 28 and delivering the fleece collected there-

by into a sliver to a pair of smaller calender rolls 30 the lower of which is driven by sprocket 32 and chain 34 from a sprocket on the shaft carrying the right-hand or delivery end of apron 26, Fig. 2. The other end of this same shaft is driven by bevel gears 36 through a shaft 38 driven by chain 40 and sprocket from a sprocket 42 fixed on shaft 44 of doffer 6. A light drum 46 rolls on the sliver in the trough 28 to smooth and flatten it before it reaches calender rolls 30; a stop 48 supported on the side walls of the trough limits the outward travel of drum 46.

The fleece which has been gathered into a sliver and then flattened to a ribbon 22 on the order of 6 inches wide by calender rolls 30, enters between the ascending adjacent runs of a pair of vertical lattices 50, 52, supported on horizontal shafts in spaced uprights 54, 56, the lattices being driven in unison by a sprocket 58 fixed on the shaft carrying the outward end of receiving apron 26, this sprocket driving a chain 60 which engages sprockets 62, 64, and 68, fixed on the shafts carrying the vertical lattices and sprocket 66, loose on its shaft. As the ribbon of sliver reaches the top ends of lifting lattices 50, 52, it is delivered onto a generally horizontal apron 70, driven by sprocket 72 engaging chain 60, and is thereby delivered between the descending adjacent runs of a pair of lattices 74, 76, swinging about the center of the shaft carrying sprocket 78 and the inward end of apron 70.

These lattices 74, 76, are carried on a swing frame constituted by radius rods 80 and headers 82, 84, carrying the shafts and rolls around which the lattices travel at both ends of their runs, the lattices being driven in unison by a chain 86 passing around sprockets fixed on the top shafts of the lattices, an idler sprocket, and a sprocket fixed on the same shaft as sprocket 78. The entire frame with lattices 74 and 76 is swung back and forth about the center of the shaft carrying sprockets 78 by the usual link 88 oscillated in customary manner by a stud on a chain running around sprocket 89 and another sprocket fixed on the shaft of sprocket 72. The rate of traverse of the delivery ends of lattices 74, 76, is adjusted to the rate of delivery of the band of material 22 therefrom so that the latter will be laid in smooth courses extending back and forth throughout substantially the entire length of the next main cylinder 3 of the garnett.

To receive the stock from the swinging lattice and to return it to the Garnett machine for further working, a sloping table 90 is mounted on the machine directly below the path of swing of the lower ends of lattices 74, 76. Five or six of the workers at the feed end of the series of workers 8 cooperating with main cylinder 3 are removed, to make room for the necessary feeding devices required to get the doffed fleece back onto this cylinder. In place of these workers, a licker-in 92 coacting in usual manner with cylinder 3 is installed, and feed rolls 94, 96, are provided to feed the sliver accumulated on table 90 to the licker-in so that the latter can in turn transfer it to the teeth of cylinder 3. Suitable drives for rolls 92, 94 and 96 are provided analogous with those employed for corresponding parts at the feed end of the Garnett machine. As the stock is gradually withdrawn from table 90 by feed rolls 94, 96, the successive traverses of the swinging lattices lay the successive courses of sliver upon each other in zigzag overlapping relation, and these courses are fed edgewise to the feed rolls, the licker-in licking off the individual fibers and yarns as they

emerge from the feed rolls and transferring them to the surface of cylinder 3.

As is evident, the lapper-feeder or folder has changed the direction of travel of the fleece or sliver that is taken off of doffer 6 from lengthwise of the Garnett machine to crosswise of such machine by the time the ribbon 22 of fleece is deposited on table 90. In so doing, the fibers and yarns forming such fleece have likewise been turned substantially 90° from their original prevailing direction of extent lengthwise of the machine, which was parallel to the planes of rotation of the teeth on the various cylinders and rolls, because the fleece doffed from doffer cylinder 6 is carried laterally by apron 26 at the same rate as that at which it descends from doffer 6, and thus the fibers and yarns remain oriented mainly in the direction of travel of ribbon 22. As a result, the fibers and unopened yarns are presented broadside to the licker-in 92, and are transferred thereby to cylinder 3 in similar relation or at least preponderantly otherwise than in end-on relation, so as to have a substantial component of extent lengthwise of cylinder 3. Thus in their passage around and between the various succeeding toothed cylinders and rolls they are subjected to the full action of the teeth thereon and are disintegrated and are opened up into their component fibers in their passage through the machine far more completely than possible hitherto.

When it is desired for any reason to run the stock straight through the garnett in the original manner of operation of the machine, and without the use of the invention attachment, all that is necessary is to slip belt 18 off from its pulley 19 driving the supplemental comb 14, leaving such comb in its down position, whereupon the stock carried by doffer cylinder 6 will pass comb 14 and be transferred directly to main cylinder 3 in usual manner and proceed through the machine in the customary way. Licker-in 92 and feed rolls 94, 96, are left running, and no other changes or adjustments are necessary.

While I have illustrated and described a certain form in which the invention may be embodied, I am aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the particular form shown, or to the details of construction thereof, but

What I do claim is:

1. A machine for opening textile materials into their component fibers having in combination a pair of cylinders with tooth-covered surfaces working the materials and mounted in direct fiber-transferring proximity to each other with the teeth of the said two cylinders simultaneously engaging the same fibers, and means additional to the cylinders stripping the fibers and materials from one cylinder, forming them into a ribbon in which the predominating direction of their extent is lengthwise thereof, and feeding such ribbon to the other cylinder in a direction at a substantial angle to the ribbon's length.

2. A machine for opening textile materials into their component fibers having in combination cylinders with tooth-covered surfaces working the materials and mounted in direct fiber-transferring relation to each other with the teeth of the cylinders adapted to effect the transfer from one cylinder to the other, and means additional to the cylinders doffing the fibers and materials from one cylinder and returning them to the other cyl-

inder mounted in direct fiber-transferring relation with change of their lie with respect to the direction of travel of the teeth of the cylinder surfaces.

3. The combination according to claim 2 including drive means for the said doffing means optionally disconnectible to permit direct transfer of materials and fibers from one cylinder to the other cylinder.

4. A machine for disintegrating textile yarns into their component fibers having in combination cylinders with tooth-covered surfaces working the yarns and mounted in proximity to each other such that fibers and yarns held by the teeth are passed directly from one cylinder to another, and means removing the yarns and fibers from one cylinder before reaching the point of closest approach of such cylinder to a succeeding cylinder and thereafter feeding them to the latter cylinder and changing their direction of extent with respect to their direction of travel in the interval between such removal from the first-named cylinder and return to the second-named cylinder.

5. A Garnett machine having in combination cylinders with tooth-covered surfaces working the yarns and mounted in fiber-transferring proximity to each other, means intercepting fibers and yarns on one cylinder before direct transfer therefrom to a succeeding cylinder, such means doffing them as a fleece, means condensing the fleece into a ribbon, and means feeding the yarns and fibers of such ribbon to the said succeeding cylinder in a direction mainly crosswise of the ribbon's length.

6. A Garnett machine having in combination cylinders with tooth-covered surfaces working the yarns and mounted in direct fiber-transferring relation to each other with the teeth of the cylinders adapted to effect the transfer from one cylinder to the other, a doffer comb stripping the fleece of yarns and fibers from one cylinder, means drawing off such fleece axially of such cylinder and condensing it into a ribbon, means lapping this ribbon into folds disposed lengthwise of the other cylinder, and means feeding the yarns and fibers of such folds to the latter cylinder in a direction at right angles to the cylinder's axis.

7. The combination of claim 6 in which suspension of the doffer comb's effects direct transfer of the yarns and fibers from one to the other of the two cylinders.

8. A Garnett machine having in combination cylinders with tooth-covered surfaces working the yarns and mounted in direct fiber-transferring proximity to each other with the teeth of the cylinders adapted to effect the transfer from one cylinder to the other, a doffer comb stripping the fleece of yarns and fibers from one cylinder, means condensing the fleece to a sliver and delivering it in oppositely directed successive courses disposed at an angle to the planes of rotation of the teeth of the other cylinder, and means feeding the sliver's yarns and fibers to such teeth in a direction at an angle to such courses.

9. A Garnett machine having in combination cylinders with tooth-covered surfaces working the yarns and mounted in direct fiber-transferring proximity to each other with the teeth of the cylinders adapted to effect the transfer from one cylinder to the other, a doffer comb stripping the fleece of yarns and fibers from one cylinder, a traveling apron conveyor collecting the fleece and folding it into a lap the successive courses of which extend generally parallel to the axis of the other cylinder, and means feeding the material of such lap to the latter cylinder at substantially a right angle to such axis.

10. A Garnett machine having in combination driven cylinders with tooth-covered surfaces working the yarns and mounted in direct fiber-transferring proximity to each other with the teeth of the cylinders adapted to effect the transfer from one cylinder to the other, a doffer comb which when operative intercepts the yarns and fibers on one cylinder to doff them as a fleece, their direct transfer from such cylinder to a succeeding one of such cylinders occurring when the comb is inoperative, drive means for the comb optionally driving and suspending the driving of the comb, and conveyor means feeding yarns and fibers doffed by the comb to the said succeeding cylinder with change of their lie with respect to the direction of travel of the teeth on the cylinder surfaces.

11. A Garnett machine having in combination driven cylinders with tooth-covered surfaces working the yarns and mounted in direct fiber-transferring proximity to each other with the teeth of the cylinders adapted to effect the transfer from one cylinder to the other, a doffer comb which when operative intercepts the yarns and fibers on one cylinder to doff them as a fleece, their direct transfer from such cylinder to a succeeding one of such cylinders occurring when the comb is inoperative, drive means for the comb optionally driving and suspending the driving of the comb, apron conveyor means collecting the fleece, forming it into a sliver, and lapping the sliver into folds extending lengthwise of the succeeding cylinder, feed rolls feeding the folds in a direction crosswise of their length, and a licker-in fed by the feed rolls and transferring the fibers and yarns of the folds to the said succeeding cylinder.

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