

April 16, 1946.

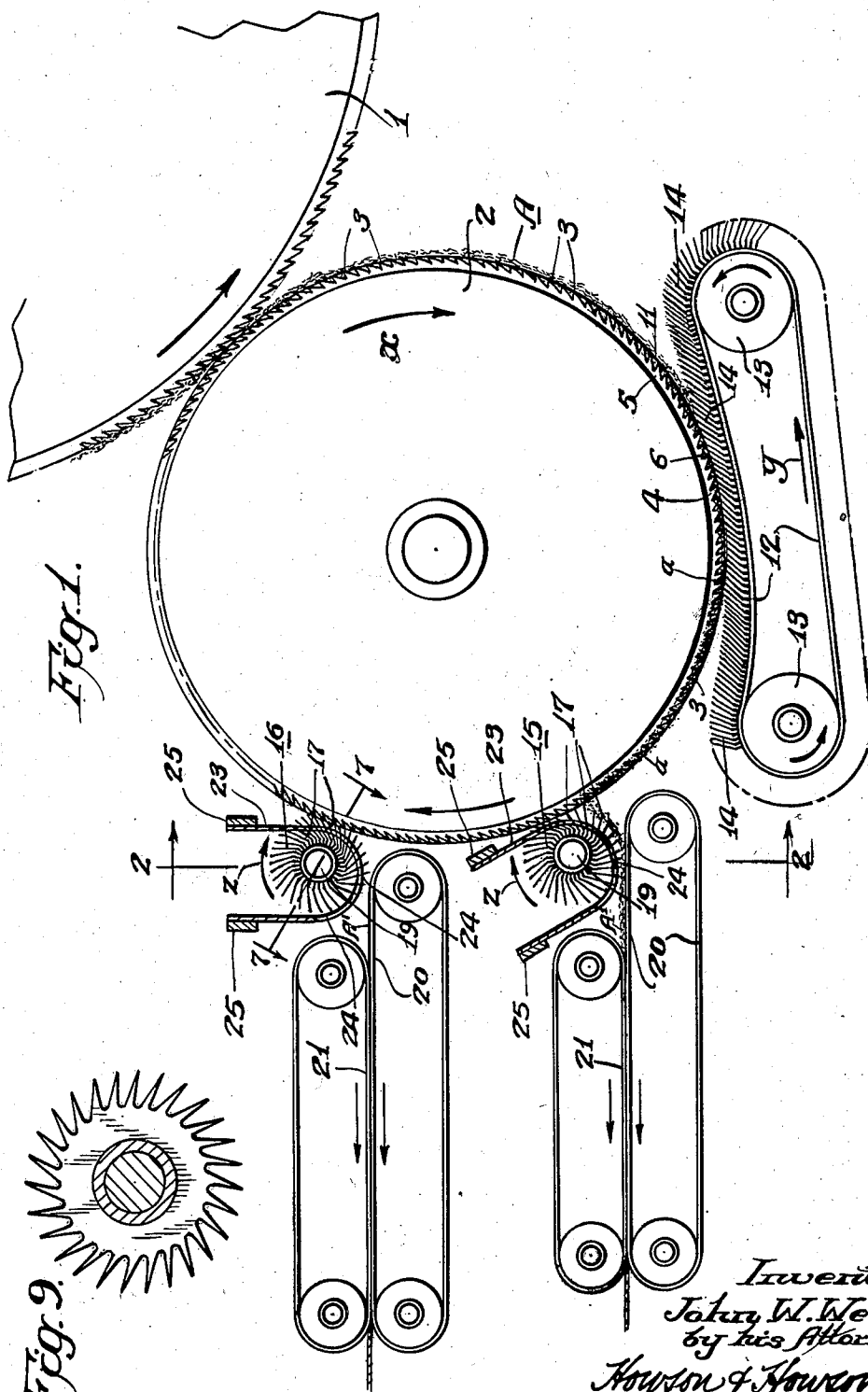
J. W. WEBER

2,398,732

DOFFING MECHANISM

Filed Oct. 6, 1943

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

Fig. 3.

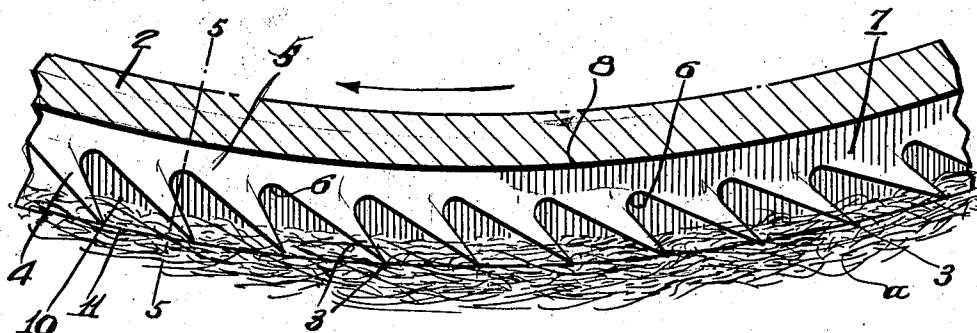


Fig. 4.

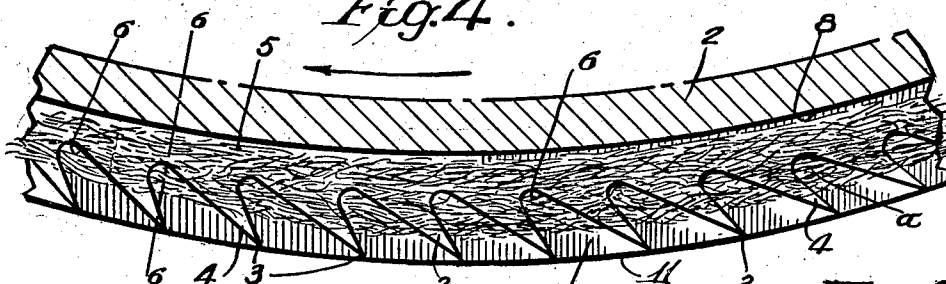


Fig. 5.

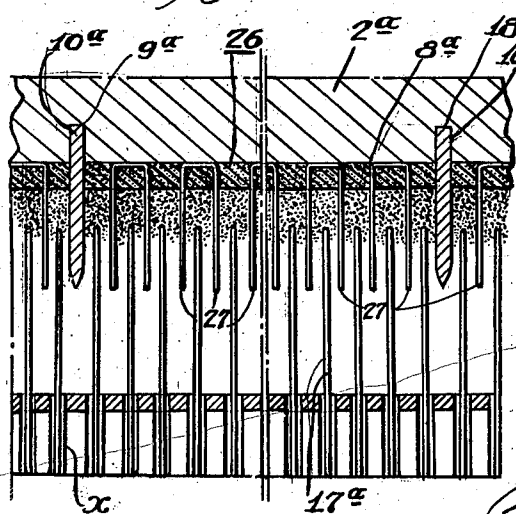
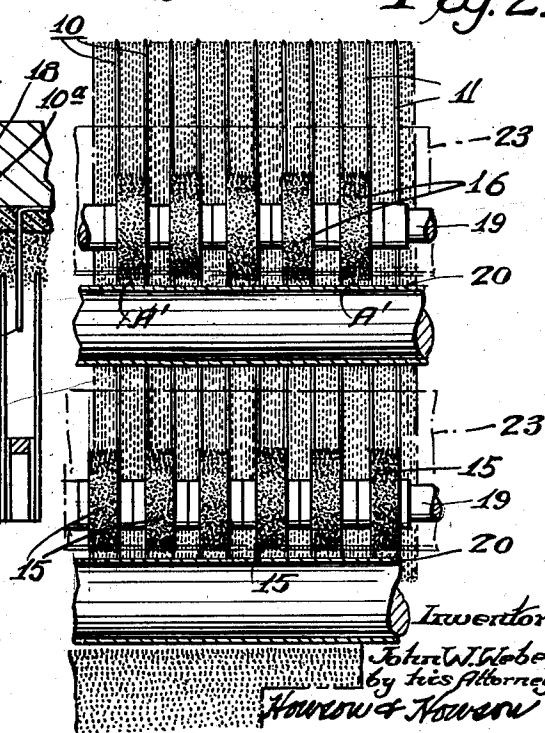


Fig. 6.



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3 Sheets-Sheet 3

Fig. 5.

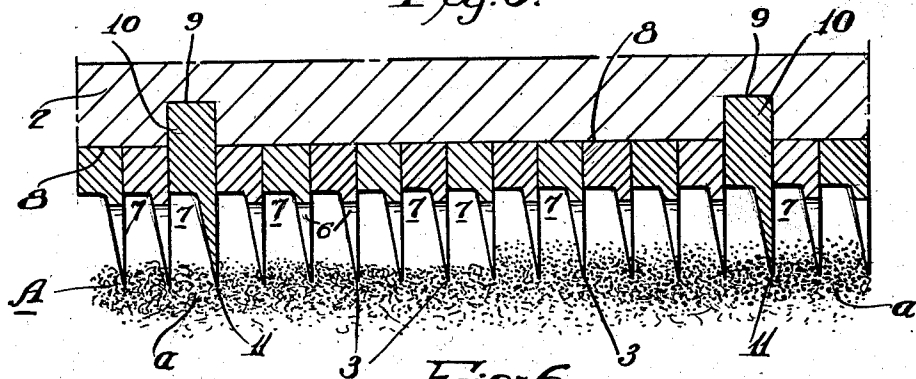
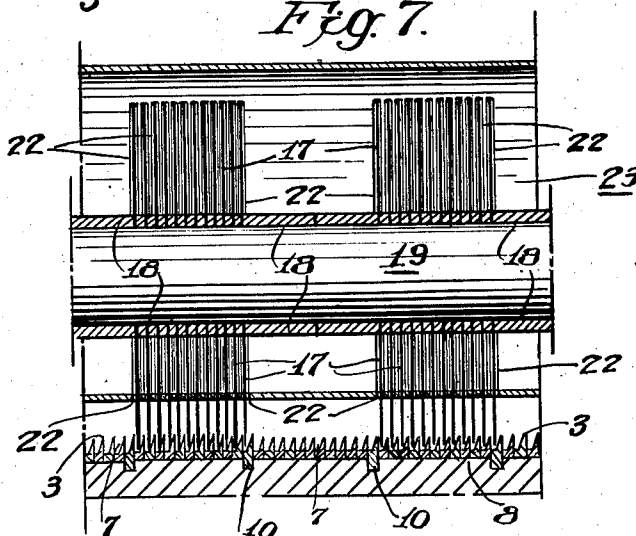


Fig. 6.



Fig. 7.



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UNITED STATES PATENT OFFICE

2,398,732

DOFFING MECHANISM

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3 Claims. (Cl. 19—151)

This invention relates to the doffing mechanisms of carding and garnett machines; and more particularly to doffers of the ring type, by which a fleece or web of carded fibres formed on the main cylinder of the machine is divided and removed therefrom in the form of a plurality of individual ribbons, from which finished yarns are subsequently and respectively produced.

Under the methods currently employed in the manufacture of yarns from ribbons of carded fibres, it is impossible to divide a web of carded fibres accurately into ribbons of uniform widths, consequently the yarns respectively produced from the individual ribbons are not of uniform diameter or texture throughout their length.

Two methods of dividing the webs of carded fibres are commonly employed; one being the ring doffer method, to which the present invention is directed, and the other being the tape condenser method, which employs a different principle than that here involved. Both methods have a common fault, i. e. the fibres along the marginal edges of immediately adjacent ribbons are not cleanly separated at the time the division of the fleece is made, by reason of the fact that some of the longer fibres lying at an angle to and across the proposed line of division are invariably intermingled, at their opposite ends respectively, with other fibres lying at the opposite sides respectively of the proposed line of division. The separation of the web into the immediately adjacent ribbons causes one end of the long line-crossing fibres to adhere to the fibres forming the bulk of one of the adjacent ribbons and follow along as a part of that ribbon, and to cause the fibres adhering to the opposite ends of these long fibres to be drawn from the other of the adjacent ribbons, thus, at the spots where such robbing occurs the one ribbon will have an excess of fibres while the other will be deficient. Such non-uniformity in the cross-sectional volume in the primary ribbons carries through into the yarns ultimately produced from the respective ribbons, thus the yarns are of unequal cross section along their respective lengths.

The object of the present invention is to provide a highly efficient doffing and web-dividing mechanism by which uniformity of ribbon width and cross-sectional volume will be substantially assured.

In the accompanying drawings:

Fig. 1 is a diagrammatic side elevation, partly in section, of part of a carding machine with a doffing and web-dividing mechanism made in ac-

cordance with the present invention applied thereto;

Fig. 2 is a sectional front elevation taken on the line 2—2, Fig. 1;

Fig. 3 is an enlarged sectional view of a segmental portion of the doffing roll shown in Fig. 1, with the carded fibres clinging to the points of the teeth of said roll;

Fig. 4 is a view similar to Fig. 3 with the carded fibres pressed down between the points of the teeth of said roll;

Fig. 5 is a sectional view taken on the line 5—5, Fig. 3;

Fig. 6 is a sectional view taken on the line 6—6, Fig. 4;

Fig. 7 is a sectional view taken on the line 7—7, Fig. 1;

Fig. 8 is a sectional view, similar to Fig. 7, showing a modification of the invention; and

Fig. 9 illustrates a rigid tooth stripper which may be employed in practicing the present invention.

In Fig. 1 of the drawings, the main cylinder of a garnett or carding machine on which the matted fibres are carded into a wide fleece or web A is shown at 1. A doffing roll of substantially the same face width as the carding cylinder 1 is illustrated at 2. In accordance with the present invention the doffing roll 2 removes the web A from the carding cylinder 1 in the usual manner. Normally the carded fibres *a* which constitute the web A remain on the outer surface of the doffer roll, as shown in Figs. 3 and 5, with the fibres *a* being engaged by substantially only the outer ends or points 3 of the teeth 4 of the garnett wire 5, or the ordinary carding cloth, with which the outer surface of the doffing cylinder is clothed, without the fibres getting down, to any substantial extent, into the gullets 6 of the teeth 4 or into the grooves 7 formed by and between the adjacent parallel rows of teeth on the surface of the doffing roll.

According to the present invention, the outer surface 8 of the doffing roll 2 is provided, at spaced intervals, with annular grooves 9, 9, in which are seated complete annulae 10, 10, each of which is provided with a circular beveled outer edge 11. The diameters of the peripheral edges 11 of the rings 10 are substantially the same as the diameter of the cylindrical surface formed collectively by the extreme points 3 of the teeth 4. On some instances the rings may be slightly smaller and in other instances slightly larger depending upon the fibres being worked on the

machine. As shown in Fig. 5, the toothed wire 5 may be laid in convolutions or formed in continuous rings between the annulae 10, 10, on the surface 8 of the roll 2.

The axial spacing of the circular knife edges 11, 11, throughout the length of the roll 2, determines the widths of the ribbons into which the fleece or web A is to be divided, in accordance with the present invention.

In accordance with the present invention, the carded fibres *a*, *a* of the web A are forced down into the gullets 6 of the teeth 4 and into the grooves 7, 7 lying between the parallel rows of teeth 4, to an extent substantially below the outer peripheral edges 11, 11 of the slitting or dividing rings 10, 10, to effect complete separation between the fibres lying along the lines of division between each pair of adjacent ribbons *Al*, *Al*, into which the web A is thus divided.

By pressing the carded fibres down into the grooves 7, forcibly, immediately adjacent the opposite sides of each of the dividing blades 11, any fibres adhering to the ends of others which normally lie across the lines of division are stripped from such ends and such long fibres are carried to either one side or the other of each blade 11, thus a clean separation of the fibres constituting each of the ribbons *Al*, *Al* is effected, along the marginal edges thereof.

Any suitable means may be provided for forcing the carded fibres *a*, *a* down into the gullets 6 of the teeth 4 and into the grooves 7 between the rows of teeth. In the present instance a flexible porcupine belt 12 is provided, which passes around suitable rolls 13, 13, either of which may be driven to move the upper run of the endless belt 12 at a speed at least as great as, and preferably slightly greater than, the speed of the peripheral surface of the doffing roll 2.

The porcupine belt 12 is provided with a multiplicity of flexible wiping elements 14 which collectively produce a surface on the belt 12 which correspond, substantially to the porcupine surface of ordinary wire carding cloth.

As the doffing roll 2 is rotated in the direction of the arrow *x*, Fig. 1, and as the belt 12 is concurrently moved in the direction of the arrow *y*, Fig. 1, the flexible wire elements 14 constituting the porcupine surface of the belt 12, engage the carded fibres *a* lying on the peripheral point surface of the roll 2 and forcibly wipe or press these fibres down into the gullets 6 of the teeth 4 and into the grooves 7 formed by and between the teeth 4 as previously described.

By running the porcupine belt 12 at a slightly greater speed than the point surface of the roll 2 the tips of the flexible wire elements 14 are prevented from dragging the fibres out of the grooves in which they had been pressed, as the belt and the roll separate.

As the roll 2 continues to move, in the direction of the arrow *x* the buried fibres of alternate ribbons *Al*, *Al*, into which the web A has been divided by the rings 10, 10 are removed from the doffer roll 2 by wheel or ring doffers 15, 15, as shown in Fig. 2, leaving the intermediate ribbons *Al*, *Al* buried in the wide channels formed by and between the dividing blades 11, 11. The intermediate ribbons *Al*, *Al* are subsequently removed by a similar series of wheel or ring doffers 16, 16, which lie above the series 15, 15, as clearly shown in Figs. 1 and 2.

Preferably the ring or wheel doffers 15, 15 and 16, 16 are composed of flexible wire elements 17, 17, similar to the wire elements 14 of the belt 12.

The flexible elements 17, 17 are suitably anchored in hubs 18, 18 mounted in end to end abutting relation on shafts 19, 19, which are suitably journaled in the frame of the carding machine and rotated at such a speed with respect to the speed of the roll 2 as to cause the outer surfaces of the wheels 15 and 16 to travel at a slightly greater surface speed than the surface of the roll 2, whereby the ends of the flexible elements 17, 17 will extend down into the grooves 7, 7, as shown in Fig. 7, and wipe the fibres *a* out of the grooves 7 of the doffing roll 2, and at the same time removing the fibres from the gullets 6, 6 of the teeth 4.

Rotation of the wheels 15, 15 and 16, 16 in the direction of the arrows *z*, *z*, Fig. 1, after wiping the fibres *a*, *a* of the ribbons *Al*, *Al* out of the annular channels formed by and between the dividing blades 11, 11, lay these ribbons on the upper runs of flexible belts 20, 20 respectively, which may constitute the lower aprons of a rubbing condenser.

The ribbons *Al*, *Al* lying on the upper runs of the aprons 20, 20 are carried under the lower runs of the upper aprons 21, 21, by which consolidation of the carded fibres into yarn rovings is effected. This consolidation may be accentuated by relative lateral reciprocation between the lower runs of the upper aprons 21 and the upper runs of the lower aprons 20, in the manner common to rubbing condensers, if desired.

In order to assure stripping of the fibres *a*, *a* of the ribbons *Al*, *Al* from the tips of the flexible elements 17 of the wheels 15 and 16 respectively, the flexible elements 17 are installed in these wheels in circular rows, as clearly shown in Fig. 7, and each row is adapted to operate in a slot 22 formed in a U-shaped stripper grid 23.

As shown in Fig. 1, as the wheels 15 and 16 rotate and carry the fibres from the doffer roll 2 to the aprons 20, 20 respectively, the points of the teeth 17 recede through the slots 22 to positions beyond the circular surface 24 of the stripper grids 23, it being noted that the axes of rotation of the wheels 15 and 16 are eccentrically disposed with respect to the centers of the arcs on which the rounded surfaces 24, 24 of the grids 23, 23 are formed. The upper ends of the grids 23, 23 are secured to supporting bars 25, 25 which in turn are rigidly supported in any suitable manner by the side frames of the carding machine.

As shown in Fig. 8 the surface 8*a* of the doffer roll 2*a* is provided with annular grooves 9*a* in which are respectively mounted the ribbon separating rings 10*a*, 10*a*, between which the surface 8*a* of the roll is clothed with bands of ordinary carding cloth 26 having the usual flexible wire teeth 27 arranged in circular axially spaced rows. The flexible elements 17*a* of the stripper rolls 15 and 16 operate between the circular rows of teeth 27 of the carding cloth and lift the ribbons of carded fibres out of the grooves formed between the rows of teeth of the carding cloth, in substantially the same manner as described.

If desired the stripper rolls 15 and 16 may be composed of a series of rigid toothed discs such as shown in Fig. 9, which may be arranged in axially spaced relation to each other to provide the porcupine surface necessary for projecting down into the grooves formed between the rows of teeth of the garnett wire or the carding cloth with which the surface of the doffer roll 2 is clothed.

I claim:

1. A carded fibre doffing mechanism including a doffer roll provided with a cylindrical surface formed of tooth points and interposed axially spaced continuously circular knife edges adapted with said tooth points to support a web of carded fibres, means for forcing said fibres inwardly beyond the peripheries of said knife edges to divide the web into individual ribbons, and wheels rotatably mounted adjacent the face of said roll and provided with teeth adapted to penetrate the tooth-point cylindrical surface of the roll within circumferential channels formed thereon by and between said knife edges for removing the ribbons from said channels respectively.

2. A carded fibre doffing mechanism including a doffer roll provided with a cylindrical surface formed of tooth points and interposed axially spaced continuously circular knife edges adapted with said tooth points to support a web of carded fibres, means for forcing said fibres inwardly beyond the peripheries of said knife edges to divide the web into individual ribbons, wheels having disc-like series of teeth for removing said ribbons individually from circumferential channels

formed on the face of the roll by and between said knife edges, and grids including bar-like elements between said series of teeth and intersecting the paths of travel of the peripheries of said disc-like series of teeth for stripping the fibres of the individual ribbons from said wheels.

3. A carded fibre doffing mechanism including a doffer roll provided with a cylindrical surface formed of tooth points and interposed axially spaced continuously circular knife edges adapted with said tooth points to support a web of carded fibres, means for forcing said fibres inwardly beyond the peripheries of said knife edges to divide the web into individual ribbons, toothed wheels for removing said ribbons individually from circumferential channels formed on the face of the roll by and between said knife edges, grids cooperating with said toothed wheels for stripping the fibres of the individual ribbons from said wheels, and an endless belt conveyer for receiving the ribbons from said wheels and carrying said ribbons away from said wheels and grids.

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