

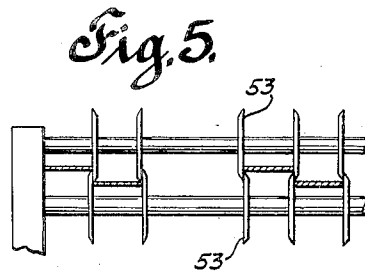
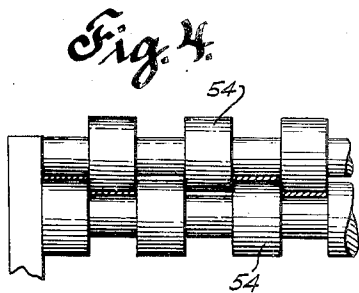
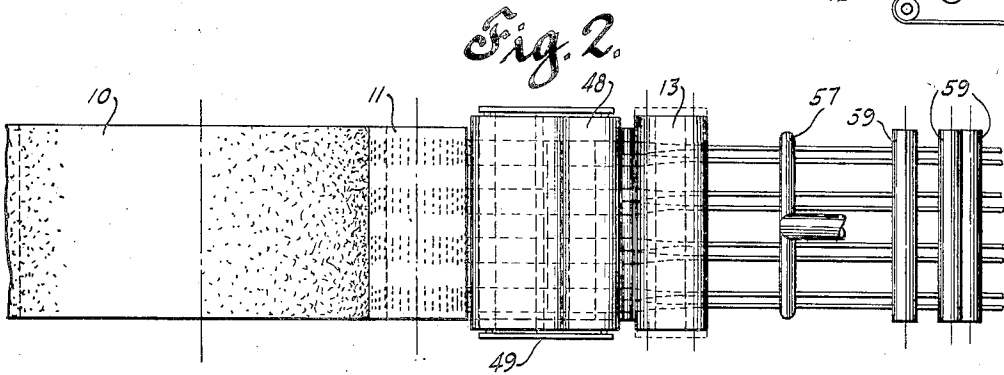
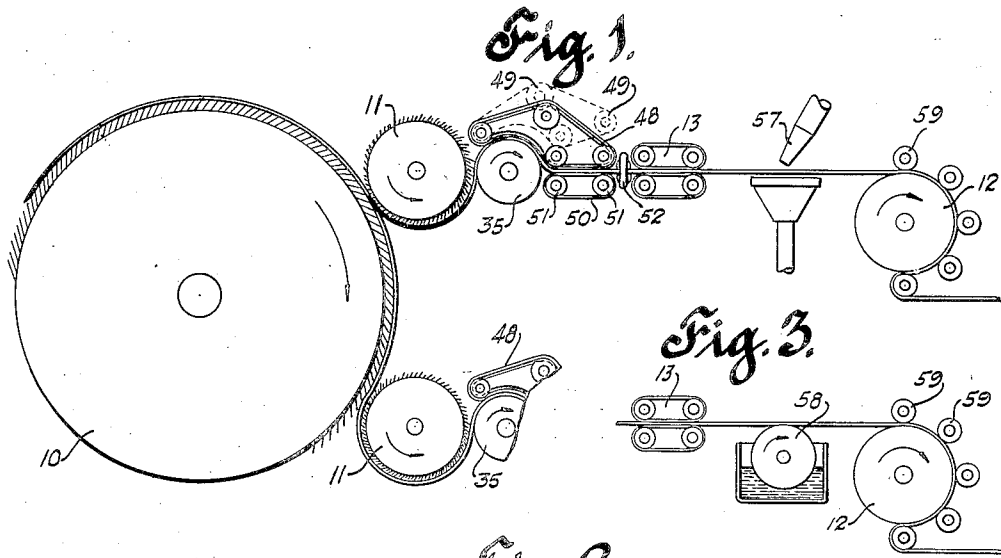
April 13, 1937.

E. L. CADY

2,077,095

CARDING MACHINE

Original Filed Sept. 4, 1930 3 Sheets-Sheet 1



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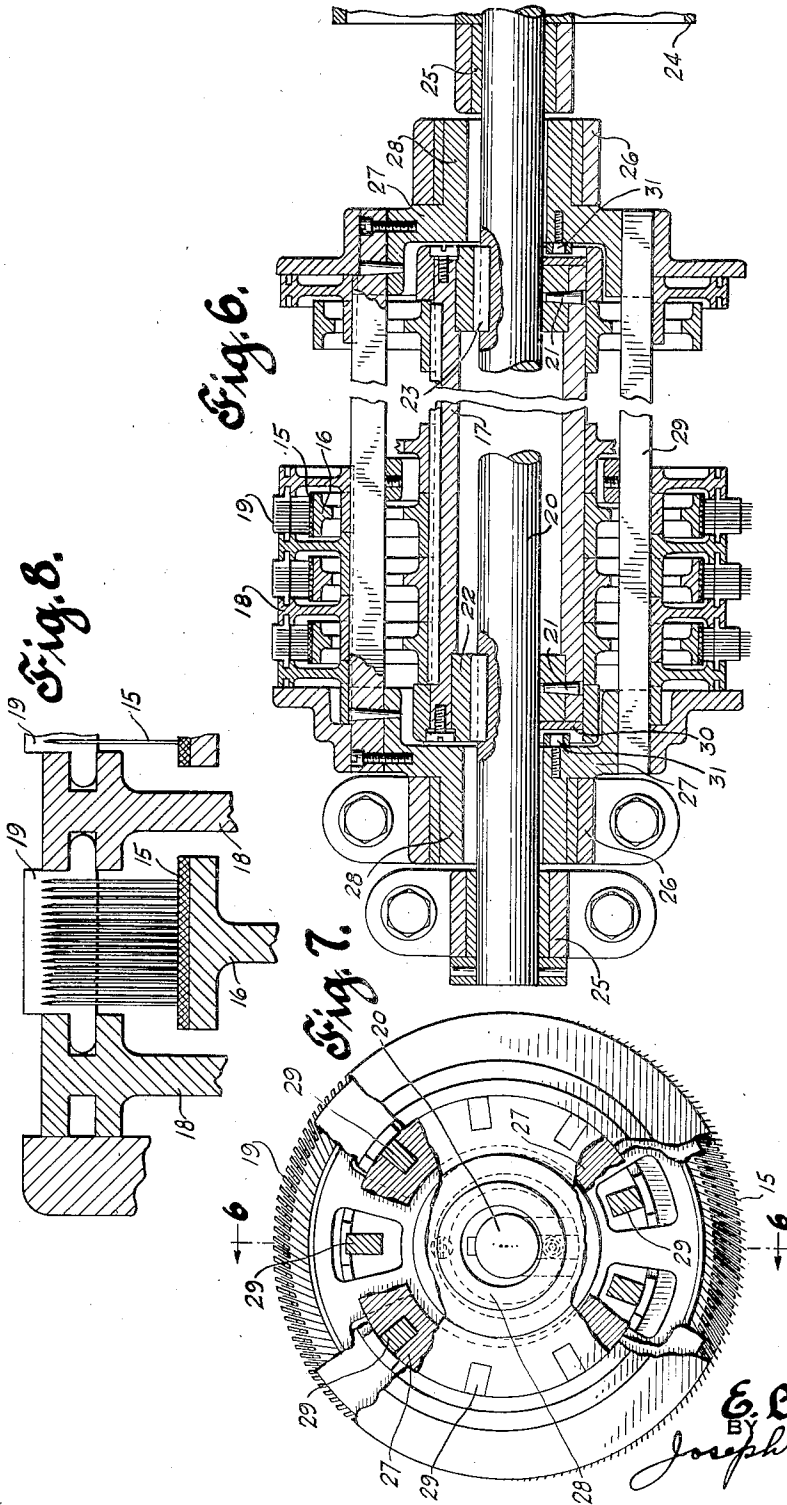
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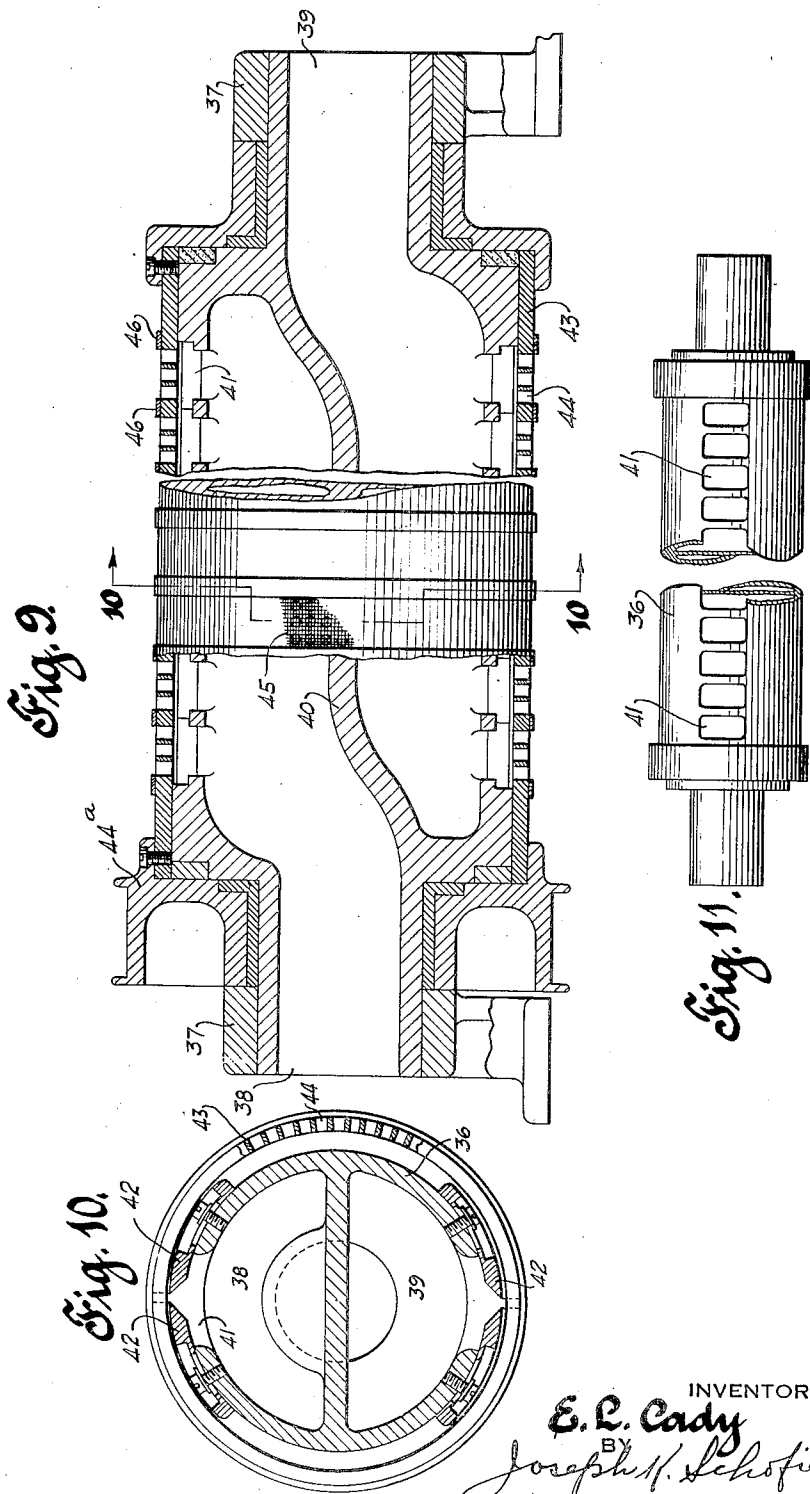
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Original Filed Sept. 4, 1930 3 Sheets-Sheet 3



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# UNITED STATES PATENT OFFICE

2,077,095

## CARDING MACHINE

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14 Claims. (Cl. 19—106)

This invention relates to carding machines adapted generally for textile fibers but particularly designed for carding asbestos fibers in substantially their pure state.

An object of the present invention is to improve doffing devices for textile carding machines enabling fibers to be more readily disengaged from the final carding cylinder and conveyed from a doffing cylinder to condensers wherein they may be compacted to form individual rovings or strands which may subsequently be spun into suitable yarn.

Another object of the invention is to improve the construction of doffing cylinder and method of doffing fibers being carded disclosed and claimed in my prior Patent No. 1,727,393 granted September 10, 1929.

A still further object of the invention is to provide means preferably in the form of a cylinder having air passages therein enabling a current of air to be introduced at one side of the cylinder and exhausted from the opposite side, this cylinder being associated with the doffing cylinder so that the air currents may aid in the removal of fibers from the carding cylinder.

Another object of the invention is to retain the cylinder having air passages fixed in operative position and to provide the cylinder with an enclosed rotatable peripheral member over which the fibers being carded are adapted to be carried.

A still further object of the invention is to improve the construction of doffing cylinder described in the above referred to patent enabling the stripping members associated with the card clothing on the doffing cylinder to be readily assembled and disassembled and to enable the stripping members interposed between the rows of needles of card clothing to be more freely actuated.

With the above and other objects in view, my invention includes the features of construction and operation set forth in the following specification and illustrated in the accompanying drawings.

In the accompanying drawings annexed hereto and forming a part of this specification, I have shown my invention embodied in a particular form of carding machine primarily adapted for operating upon textile material such as asbestos fibers unmixed with cotton or other textile fibers of longer staple, but it will be understood that the invention can be otherwise embodied and that the drawings are not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

In the drawings:

Figure 1 is a diagrammatic view in side elevation of the principal parts of a carding machine to which the present invention is applied.

Fig. 2 is a plan view showing, diagrammatically, the arrangement of parts indicated in Fig. 1.

Fig. 3 is a modification of the finishing device shown in Fig. 1 for moistening the fibers subsequently to their passage through the condensers.

Figs. 4 and 5 are diagrammatic views of cutting or severing mechanism indicated in Fig. 1 which may be used for sub-dividing the webs of fibers after leaving the doffing cylinder.

Fig. 6 is a horizontal view in section of the improved doffing cylinder showing the construction for effecting rotation of the card clothing and interposed stripping members upon axes parallel to each other and slightly spaced apart.

Fig. 7 is an end view of the construction shown in Fig. 6, parts being broken away to more clearly show the construction.

Fig. 8 is a detail enlarged view of the members supporting the strips of card clothing with the interposed stripping members supported therebetween.

Fig. 9 is a longitudinal sectional view of the air supplying cylinder shown apart from the carding machine.

Fig. 10 is a transverse sectional view of the complete cylinder shown in Fig. 9 taken upon line 10—10, and

Fig. 11 is a longitudinal view of the inner or fixed portion of this cylinder.

In the above mentioned drawings I have shown but one embodiment of the invention which is now deemed preferable, but it is to be understood that changes and modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

Briefly and in its preferred aspect, my invention may include the following principal parts: A doffing cylinder adapted to be placed adjacent a final carding cylinder of a textile carding machine. This doffing cylinder may be provided with annular rings of card clothing disposed suitably spaced apart along its length, as is the usual practice. Between adjacent rows of needles of the card clothing are interposed plate-like stripping members. These stripping members are suitably supported by means presently to be described and are rotated simultaneously with the rings of card clothing but in a manner permitting radial movement between the needles. The invention may further include a cylinder disposed adjacent the above described doffing cylinder and preferably disposed on the opposite side thereof from the carding cylinder. This second cylinder has its central or body portion fixed against rotation, openings being provided upon diametrically opposite parts extending into its periphery. These openings are associated with separated passages extending generally longitudinally within the cylinder. Surrounding the cylinder is a perforated rotatable sleeve which

may be covered by strips of fine mesh wire screening. This sleeve is adapted to be rotated upon the fixed cylinder in timed relation to the doffing cylinder so that fibers withdrawn from the doffing cylinder may be carried partially around the periphery of the second cylinder and withdrawn therefrom at the opposite side. The position of the air passages of this cylinder is such that the suction upon one side aids the removal of fibers from the doffing cylinder and the discharge upon the opposite side aids in transferring the fibers from this air supplying cylinder to the condensers or other finishing devices. Compressing bands may be provided adapted to rest upon but advance with a portion of this second cylinder, the compressing member or band preferably comprising a flexible sheet held in place by suitable rollers mounted upon a suitable frame. Beyond the compressing bands there may be provided condensers of the usual type or other forms of finishing means for the fibers enabling them to be converted into uniform strands of roving ready for subsequent spinning operations.

Referring more in detail to the figures of the drawings, I provide the carding machine to which the present invention is adapted to be applied with a final carding cylinder 10, the needles of the card clothing thereof being shown in position in Fig. 1 covered with the fibers being carded. Closely adjacent this carding cylinder 10 so that the ends of the needles of their card clothings substantially contact with each other are doffing cylinders 11. These cylinders 11 are similar so that but one will require description. These cylinders generally are or may be of the form described and claimed in the above mentioned patent, the function of which is to withdraw fibers from the carding cylinder 10 and convey them to the finisher cylinders 12 and condensers 13. Currents of air supplied by means which are presently to be described are employed to aid in removing the fibers from the doffing cylinders 11 and advancing them to the condensers 13.

Referring first to the particular and improved construction of doffing cylinder 11, reference may be had to Figs. 6, 7 and 8. In Fig. 6 a longitudinal sectional view is shown, the particular section being that upon line 6—6 of Fig. 7. The section shown in Fig. 6 in the embodiment of the invention shown diagrammatically in Figs. 1 and 2 is one taken substantially horizontally. The rings or strips of card clothing 15 are firmly held by adhesive or other suitable fastening means to the periphery of narrow rings or discs 16, the hubs of these discs having openings therethrough through which extends a supporting and rotating cylinder 17. It will be noted that these strips of card clothing 15 are spaced uniformly along the length of the doffing cylinder 11, spaces substantially equal to the width of the strips 15 being left between them. Within these spaces extend a second series of discs or rings 18 having annular channels in their opposite faces closely adjacent their peripheries. Within these recesses are retained lugs formed upon and extending laterally from stripping members 19 so that at all times the radial position of the stripping members 19 relative to the needles is controlled by the position of these discs 18. The strips or rings of card clothing 15 and the stripping members 19 are generally similar to those referred to in the above mentioned patent, the stripping members 19 being interposed between the adjacent rows of needles of the card clothing 15

in the same manner. In order to rotate the rings 16 and 18 supporting the card clothing 15 and the stripper members 19 at the same rotative speed but upon different axes, the supporting cylinder 17 for the rings 16 on which the card clothing 15 is mounted is provided with a central shaft 20 extending completely through and beyond this cylinder. Suitable pins 21 connect this cylinder 17 to end bushings 22 within the cylinder 17 and keys 23 connect the bushings 22 to the shaft 20 for positive driving relation. At one end of the shaft 20 a pulley 24 or driving gear is provided whereby this cylinder 17 and the discs 16 may be rotated at any desired speed. Suitable fixed bearings 25 are provided within which the shaft 20 is mounted. Mounted upon independent bearings 26 parallel to but slightly out of alinement with the bearings 25 for the shaft 20 are the end flanges 27 of the supporting means for the discs 18 carrying the stripping members 19. The end flanges 27 have hollow hubs 28 rotatably mounted within the bearings 26, these bearings being disposed out of alinement relative to the axis of the bearings 25 for the shaft 20. Disposed between the flanges 27 are spaced bars 29 preferably set into notches within the flanges 27 so that the bars 29 form an open but rigid support for retaining the discs 18 upon a fixed axis. One of the bars 29, as shown in Fig. 7, may be extended radially outward slightly beyond the others and engage within recesses within the hubs of the discs 18. The bars 29 therefore not only form a support for the discs 18 but also provide a means for rotating them with the rotation of the end flanges 27.

To rotate the end flanges 27 at the same speed as the cylinder 17 supporting the discs 16, inter-engaging means between an end flange 27 and a bushing 22 are provided. As shown in Fig. 6, a member 30 is inserted within an end of the cylinder 17 and one of the bushings 22 having a radial slot. Engaging this slot in member 30 is a projection 31 outstanding from the inner face of the end flange 27. With rotation of the shaft 20 and its cylinder 17, the end flange 27 and supporting structure for the discs 18 mounted thereon are rotated.

In operation the doffing roll 11 is positioned as indicated in Fig. 1, two of these rolls 11 preferably and usually being provided, the rings of card clothing 15 being alternately spaced upon the two rolls so that the entire width of the carding cylinder 10 is covered. The axis of the shaft 20 forming the support for the card clothing 15 is slightly closer to the periphery of the carding cylinder 10 than the axis of the flanges 27 forming the support for the stripping members 19. In that portion of the doffing roll 11 adjacent the carding cylinder 10, therefore, the needles of the clothing 15 will be exposed as the stripping members 19 are retracted. Upon the diametrically opposite portion of the cylinder at all times the needles 15 will be within the stripping members 19 which are extended slightly beyond them. As the operation of the card clothing 15 and the interposed stripping members 19 in this form of the invention is similar to their operation in the patent above referred to, it is not thought that further description is necessary.

Lying parallel to and preferably having its axis in substantially the same plane as the axes of the members of each of the doffing cylinders 11, is what may be termed an air supplying cylinder 35. These cylinders are shown most clear-

ly in Figs. 9, 10 and 11, their positions relative to the doffing cylinders 11 being indicated in Fig. 1. The inner portion of this cylinder, formed preferably by an integral casting 36, is non-rotatably mounted in suitable bearings 37 closely adjacent the doffing cylinder 11.

Referring to Figs. 9, 10 and 11, it will be seen that the central or fixed portion of this cylinder 36 comprises a body member having openings 38 and 39 forming passages at opposite ends extending substantially to the opposite end of the cylinder. A dividing wall 40 formed within this cylinder 36 maintains these two air passages 38 and 39 entirely independent and separated from each other. Along substantially the full length of the cylinder 36 are elongated openings 41, one set communicating with each air passage 38 and 39. Preferably and as shown in Fig. 10, the effective width of these openings 41 may be regulated by suitable auxiliary plates 42 adjustably secured to the cylinder 36. By means of these supplemental plates 42 not only may the width of the opening be controlled but the position angularly or circumferentially about a limited portion of the cylinder may be varied. As shown, the openings 41 for the passages 38 and 39 are substantially diametrically opposite each other.

Surrounding this fixed cylinder 36 so that it may be freely rotated thereon is a sleeve 43 provided with a large number of holes 44 uniformly distributed about its periphery and extending over the elongated openings 41 within the central or fixed cylinder 36. A pulley 44<sup>a</sup> secured to this sleeve 43 at one end provides means for rotating it at any desired speed. In operation this sleeve is rotated so that its periphery has the same surface speed as the doffing cylinder to which it is adjacent. Surrounding and secured to this sleeve 43 is a wire screening 45 of fine mesh, bands 46 being placed about this screening to retain it rigidly in position upon the sleeve 43 and to concentrate the action of the air currents over the spaced portions of the cylinder traversed by the fibers.

The opening for the passage 38 at one end of cylinder is connected to the intake of any suitable form of air pump so that there is a current of air drawn through the screening 45 into the passage 38. The opening at the opposite end of this cylinder to the passage 39 is connected to the discharge opening of a suitable pump so that a current of air is constantly moving from this passage 39 through the screening 45 to the outside of the cylinder. In operation the fixed member 35 supporting the cylinder 36 is so mounted in the carding machine that the opening 38 communicating with the suction openings of a pump is closely adjacent the doffing cylinder 11 and the opposite passage subjected to the current of air from the discharge of the pump is diametrically opposite thereto. It will be seen, therefore, that as the sleeve 43 is slowly rotated a continuous current of air tends to draw the fibers from the doffing cylinder 11 onto the wire mesh screen 45 surrounding the rotating sleeve on this cylinder. After the fibers have traveled substantially half a revolution about this cylinder, the fibers and the wire mesh screen are subjected to the current of air from the discharge side of the pump tending to force them from the wire mesh screen 45 and onto the condensing or finishing rollers 13 and 12.

To aid in compressing the fibers into compact

sheets or strips while they are traveling about the cylinder 36 on the screen 45, an apron 48 may be so disposed that it will lie in contact with and rest upon that part of the sleeve 43 and screen 45 traversed by the fibers being carded. This apron 48 may be supported over a frame 49 of rollers pivotally mounted upon the axis of one of the rollers so that it may be moved to an inoperative position shown in Fig. 1. A lower apron 50 mounted upon a pair of parallel rollers 51 provides a support for the extended portion of the compressing apron 48 and further aids in compacting the fibers into a close web.

Adjacent the compressing aprons 48 and 50 may be introduced cutting or dividing members 52 so that the strips of fibers passing through the compressing aprons 48 and 50 may be sub-divided. By suitably spacing the cutting discs 53 or the dividing rollers 54 shown in Figs. 5 and 4, respectively, each strip may be divided into any number of equal widths.

After the strips of carded fibers have been reduced to their final width determined by the width of cutter rings 54 or spacings of the dividing members 53, they may be finished in any usual or desired manner. As an example of one manner of finishing the fibers, condensers 13 previously referred to are indicated, these preferably having a transversely reciprocatory movement imparted to their aprons or rollers. This operation of the condensers reduces the thin strips of fibers to a strand of roving suitable for the successive operations of spinning or drawing to form yarn of suitable strength and thickness.

As a final operation the strands may be sprayed or soaked in a sizing solution supplied through nozzle 57 or to the roller 58 and subsequently passed over a steam or other form of drying cylinder 12 and further compressed by rollers 59.

What I claim is:

1. A doffing device for carding machines comprising in combination, a doffing cylinder adapted to be positioned adjacent a carding roll of a carding machine, a fixed cylinder adjacent said doffing cylinder, a perforated sleeve rotatably surrounding said cylinder adapted to take fibers from said doffing cylinder, and means permitting air to be exhausted from and supplied to said fixed cylinder at diametrically opposite portions to aid in removing fibers from said doffing cylinder and from said sleeve.
2. A doffing device for carding machines comprising in combination, a doffing cylinder adapted to be positioned adjacent a carding roll of a carding machine, a cylinder adjacent said doffing cylinder, means permitting air to be exhausted through said last mentioned cylinder to aid in removing the fibers from said doffing cylinder, and a perforated rotatable sleeve upon said second cylinder for conveying the fibers after leaving the doffing cylinder.
3. A doffing device for carding machines comprising in combination, a doffing cylinder adapted to be positioned adjacent a carding roll, card clothing on said doffing cylinder, members interposed between the needles of said clothing, means to rotate said doffing cylinder, means to move said members radially in timed relation to the rotation of said doffing cylinder, a fixed cylinder adjacent said doffing cylinder, a conduit for air extending therethrough from an area along said fixed cylinder and adjacent said doffing cylinder, and a rotatable sleeve surrounding said fixed cylinder on which fibers being carded may be conveyed from said doffing cylinder.

4. A doffing device for carding machines comprising in combination, a doffing cylinder adapted to be positioned adjacent a carding roll, card clothing thereon, members interposed between the needles of said clothing, means to rotate said doffing cylinder, a second cylinder adjacent said doffing cylinder, means permitting air to be drawn from one side and permitting air to be supplied under pressure thereto at the opposite side of said second cylinder, and condensers adjacent said second cylinder to receive fibers delivered from said doffing cylinder.

5. A doffing device for carding machines comprising in combination, a doffing cylinder adapted to be positioned adjacent a carding roll, card clothing thereon, members interposed between the needles of said clothing, means to rotate said doffing cylinder, a cylinder adjacent and parallel to said doffing cylinder, means permitting air to be drawn from and supplied thereto along the length thereof at substantially diametrically opposite portions, and condensers adjacent said second cylinder to receive fibers delivered from said doffing cylinder.

6. A carding machine comprising in combination, a carding roll, a doffing cylinder adjacent thereto, a fixed cylinder adjacent said doffing cylinder and having a sleeve thereon rotating at substantially the same peripheral speed as said doffing cylinder whereby fibers may be transferred from said doffing cylinder to said sleeve, and means permitting air to be forced through said sleeve into said second cylinder disposed substantially at the line of tangency between said doffing and second fixed cylinder, whereby removal of fibers from said doffing cylinder may be aided.

7. A carding machine comprising in combination, carding rollers, a doffing cylinder adapted to receive fibers being carded from said rollers, finishing rolls for said fibers, a perforated sleeve adjacent said doffing cylinder adapted to convey fibers from said doffing cylinder to said finishing rolls, and means associated with said perforated sleeve permitting air to be exhausted at one side and forced at the opposite side of the periphery of said perforated sleeve, whereby removal of said fibers from said doffing cylinder and conveying to said finishing rolls is facilitated.

8. A carding machine comprising in combination, carding rollers, a doffing cylinder adapted to receive fibers being carded from said rollers, a rotatable perforated sleeve adjacent said doffing cylinder adapted to convey fibers from said doffing cylinder to finishing rolls, and means permitting air to be forced inwardly through said sleeve at one side and forced outwardly therefrom at the opposite side thereof to aid in removal of said fibers from said doffing cylinder and from said sleeve.

9. A carding machine comprising in combination, carding rollers, a doffing cylinder adapted to receive fibers being carded from said rollers, condensers adapted to receive fibers from said doffing cylinder, a perforated sleeve disposed between said doffing cylinder and said condensers adapted to convey fibers from said doffing cylinder to said condensers, and means permitting air to be forced inwardly through said sleeve at a position adjacent said doffing cylinder and forced outwardly therethrough adjacent said condensers to aid in removal of said fibers from said doffing cylinder and conveying said fibers to said condensers.

10. A cylinder for carding machines comprising in combination, a doffing cylinder, a fixed member adjacent thereto having separated passages therethrough provided with openings substantially along the length of said member upon diametrically opposite portions, whereby air may be exhausted from one passage and forced into the other, and a rotatable foraminous sleeve surrounding said cylinder.

11. A cylinder for carding machines comprising in combination, a fixed member having separated passages therethrough and provided with openings at opposite sides substantially along the length of said member, adjustable plates upon said member for varying the width and position of said openings, means permitting exhausting air from one passage and for forcing air into the other, and a rotatable foraminous sleeve surrounding said cylinder.

12. A carding machine comprising in combination, a carding roll, a doffing cylinder adjacent thereto, a member fixed in position adjacent said doffing cylinder and having a perforated sleeve thereon rotatable at substantially the same peripheral speed as said doffing cylinder whereby fibers may be transferred from said doffing cylinder to said member, means permitting air to be forced inwardly through said sleeve substantially at the line of tangency of said doffing cylinder and member, and means supplying air through said member outwardly through said sleeve at a point diametrically opposite the portion of the sleeve through which air is drawn into the member.

13. A doffing device for carding machines comprising in combination, a doffing cylinder adapted to be positioned adjacent a carding roll, card clothing thereon, members interposed between rows of needles of said clothing, means to rotate said doffing cylinder, means to support said interposed members upon an axis adjacent and parallel to the axis of said doffing cylinder whereby rotation of said doffing cylinder will move said interposed members longitudinally of the needles of said clothing, a fixed member adjacent and parallel to said doffing cylinder, means permitting air to be drawn from and supplied to said fixed member along the length thereof at diametrically opposite portions, perforated fiber conveying means surrounding said fixed member, and means adjacent said fixed member to receive fibers delivered from said conveying means.

14. A doffing device for carding machines comprising in combination, a doffing cylinder adapted to be positioned adjacent a carding roll, card clothing thereon, members interposed between rows of needles of said clothing, means to rotate said doffing cylinder, means to support said interposed members upon an axis adjacent and parallel to the axis of said doffing cylinder whereby rotation of said doffing cylinder will move said interposed members longitudinally of the needles of said clothing, a fixed member adjacent and parallel to said doffing cylinder, means to draw air into said fixed member along the length thereof closely adjacent the position where the interposed members on said doffing cylinder are in their outermost position, perforated fiber conveying means rotatably surrounding said fixed member, and means adjacent said fixed member to receive fibers delivered from said conveying means.