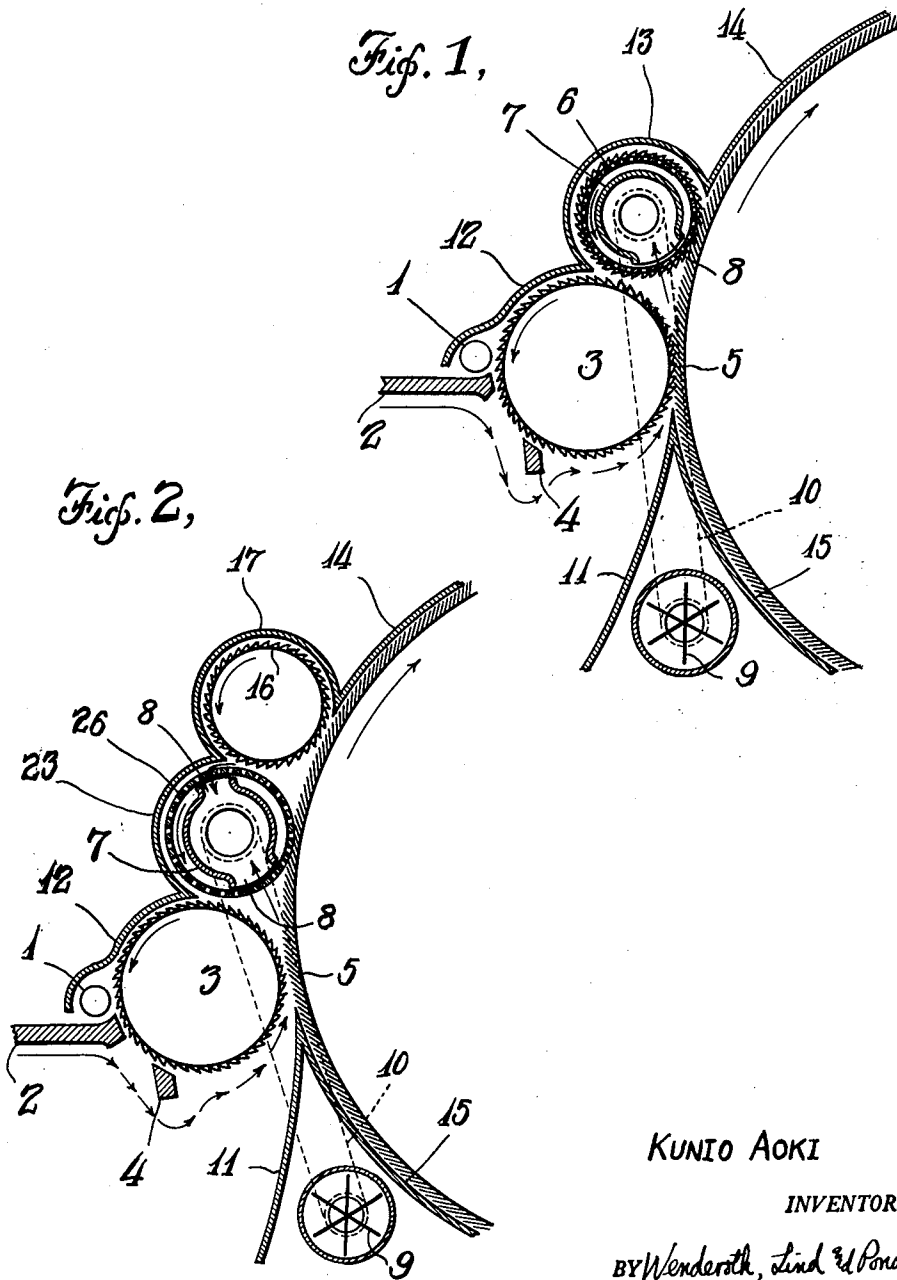


Feb. 19, 1963

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APPARATUS FOR OPENING, CARDING AND CLEANING
FIBROUS MATERIALS
Filed April 18, 1960

3,077,641



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APPARATUS FOR OPENING, CARDING AND CLEANING FIBROUS MATERIALS

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Filed Apr. 18, 1960, Ser. No. 22,889
3 Claims. (Cl. 19-105)

The invention relates to apparatus for opening, carding and cleaning fibrous materials.

The object of the invention is to provide a simple apparatus which, during the operation of opening or carding fibrous material, can produce and regulate an air current so as to effect a separation of fibers and can also remove short fibers and other impurities contained in the material.

The apparatus according to the invention includes a worker roller or a cage roller which is formed with perforations in the exterior thereof and which is positioned in close proximity to both a licker-in and cylinder of the carding machine. A suction tube is secured within said worker roller or cage roller with the opening of said tube directed toward the point at which the licker-in contacts the cylinder.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:

FIGURE 1 is a side elevation view of the apparatus showing a worker roller positioned in close proximity to both the licker-in and the cylinder, and having perforations in its exterior wall, and having a suction tube in its interior; and

FIGURE 2 is a side elevation view of a different form of apparatus in which the worker roller and cage roller are separate from each other.

Referring to FIG. 1 of the drawing, there are shown the conventional parts of a carding apparatus, a feed roller 1, a dish plate 2, a licker-in 3, a mote knife 4, and a carding cylinder 5. A worker roller 6 having perforations in the exterior wall thereof and having a suction tube 7 therein is positioned immediately above the licker-in 3 and tangent to the carding cylinder 5 and with the suction opening 8 in the suction tube 7 pointing toward the point at which the licker-in 3 contacts the carding cylinder 5 and rotating in the same direction as the licker-in 3. A suction fan 9 is connected to the end of a duct 10 on said tube 7, and a dividing plate 11 separates the fan 9 from the licker-in 3 and the mote knife 4. A cover 12 is provided over the licker-in, and a worker roller cover 13 is provided over the worker roller 6. A back sheet 14 covers the top portion of the carding cylinder and an undercasing 15 covers the bottom portion of the carding cylinder.

By drawing the air through the suction tube 7 by operating the fan 9, the space enclosed by the licker-in 3, the carding cylinder 5 and the worker roller 6, and also the space between the licker-in 3 and the cover 12 thereover are held at a low pressure. This low pressure, together with the action of an air current generated by the rotation of the carding cylinder 5, causes the pressure in the space under the point of contact of the licker-in 3 with the carding cylinder 5 to be even lower than the pressure in the above-mentioned spaces. Thus the air current which flows under the licker-in 3 in the direction of its rotation is regulated and the eddy current which would otherwise be generated beneath the point of contact of the licker-in with the carding cylinder is completely eliminated. Fibrous material fed past the feed roller 1 is caught by the licker-in 3, and simultaneously seeds and other impurities of heavier specific gravity than the fibrous material are thrown off the wire teeth on the licker-in 3 by the centrif-

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ugal force due to its high rotational speed and are caught by the mote knife 4 and fall into the space beneath the licker-in. The fibers left adjacent the wire teeth on the licker-in 3 flow toward the carding cylinder 5 entrained by the air current and flow under the mote knife 4, and they are transferred, together with the fibers which stick to the licker-in 3, onto the carding cylinder 5 near the position of contact of the licker-in 3 with the carding cylinder 5.

The fibers thus transferred onto the carding cylinder 5 move in the direction of its rotation, part of them being caught and carded by the wires on the worker roller 6, and simultaneously short fibers and fine impurities contained in the fibrous material are being sucked into the perforations in the worker roller 6 and are exhausted out of the machine. The fibers and the impurities which are thrown off the wires on both the licker-in 3 and the carding cylinder 5 after these parts pass the point of contact, and also the fibers which still remain on the licker-in 3 are likewise sucked into the suction tube 7 through the perforations in the worker roller 6 and exhausted out of the machine.

Long or spinnable fibers are caught by the worker roller 6 and transferred during its rotation, onto the carding cylinder 5, while the fibers which still remain on the surface of the worker roller 6 after they pass the point at which the worker roller 6 contacts the carding cylinder 5 are transferred onto the licker-in 3 during the rotation of the worker roller 6 and are further transferred from the wires on the licker-in 3 to the space between the feed roller 1 and the dish plate 2.

Referring to FIG. 2 of the drawing, there are shown the conventional parts of a carding apparatus, a feed roller 1, a dish plate 2, a licker-in 3, a mote knife 4, and a carding cylinder 5. A cage roller 26 is positioned immediately above the licker-in 3 and tangent to the carding cylinder 5 and with the suction opening 8 in a suction tube 7 within the cage roller 26 pointing toward the point at which the licker-in 3 and the carding cylinder 5 contact each other and rotating in the same direction as the licker-in 3. A suction fan 9 is connected to the end of a duct 10 on said tube 7, and a dividing plate 11 separates the fan 9 from the licker-in 3 and the mote knife 4. Immediately above the cage roller 26 is a worker roller 16 which is tangent to the carding cylinder 5 and which also rotates in the same direction as the licker-in 3. A cover 12 is provided over the licker-in 3, a cover 23 is provided over the cage roller 26, and a cover 17 is provided over the worker roller 16. A back sheet 14 covers the top portion of the carding cylinder and an undercasing 15 covers the bottom portion of the carding cylinder.

By sucking air through the opening 8 of the suction tube 7 by means of the fan 9, the space enclosed by the licker-in 3, the carding cylinder 5 and the cage roller 6 is held at a low pressure. This low pressure together with the action of an air current generated by the rotation of the carding cylinder 5, causes the pressure in the space under the point of contact of the licker-in 3 with the carding cylinder 5 to be even lower than the pressure in the above-mentioned space. Thus the air current which flows under the licker-in 3 in the direction of its rotation is regulated and the eddy current which would otherwise be generated beneath the point of contact of the licker-in 3 with the carding cylinder 5 is completely eliminated.

The stock fed by the feed roller 1 is caught by the licker-in 3, and seeds and other impurities of heavier specific gravity than the fibrous material of the stock are thrown off the wire on the licker-in by centrifugal force, due to the high speed of rotation of the licker-in, and fall into the space beneath the licker-in after being separated by the mote knife 4. The fibers left adjacent the

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surface of the licker-in 3 flow toward the carding cylinder 5 entrained by the air current flowing beneath the mote knife 4, and they are transferred, together with the fibers which stick to the licker-in 3 onto the carding cylinder 5 near the point of contact of the licker-in 3 with the carding cylinder 5. The fibers which still remain on the surface of the licker-in 3 after they pass the point of contact of the licker-in 3 with the carding cylinder 5, the short fibers and impurities of lesser specific gravity contained in the material which have been transferred onto the carding cylinder 5, and the short fibers and impurities thrown off the wires on the two, are all sucked into the suction tube 7 through the cage roller 6 and exhausted out of the machine.

However, the long fibers in the material are picked up by the cage roller 6 and transferred during the rotation of the roller, onto the carding cylinder 5. These fibers are joined with the fibers which are picked up by the carding cylinder 5 from the licker-in 3, and at the point of contact of the carding cylinder 5 with the worker roller 16, and are carded by the wires on the worker roller 16, and then moved in the direction of rotation of the carding cylinder 5. The fibers which still remain on the worker roller 16 are transferred during the rotation of the roller at the point of contact with the cage roller 6 onto the cage roller 6 by the suction effect from inside the cage roller. The fibers which are transferred onto the licker-in 3 during the rotation of the cage roller are transferred to the space between the feed roller 1 and dish plate 2.

It will thus be understood that apparatus according to the invention makes it possible to improve opening and carding efficiencies as well as to achieve a complete cleaning of the fibrous materials by removing the impurities of comparatively greater specific gravity under the licker-in, forming a space of low pressure under the point of contact of the licker-in with the carding cylinder, thus positively regulating the air current, making the fibers float on said air current while the heavier impurities fall away, collecting these fibers on the carding cylinder, sucking the short fibers and other impurities which still remain on the carding cylinder and licker-in into the perforations formed in the exterior of the worker roller or the cage roller, exhausting them out of the machine through the suction tube fixed within these rollers, transferring the long fibers onto the surface of the cylinder,

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and carding the fibers by the worker roller while preventing the fibers and impurities from loading the carding cylinder.

I claim:

1. An apparatus for opening, carding and cleaning fibrous materials, comprising a carding cylinder, a licker-in beside said carding cylinder and in contact therewith, a feed roller and dish plate adjacent said licker-in for feeding fibrous materials to said licker-in, a mote knife beneath said licker-in, a hollow perforated roller immediately above said licker-in and tangent to said carding cylinder, and rotating in the same direction as said licker-in, a suction tube in said hollow perforated roller connected to an exhaust means, said suction tube having a suction opening therein pointing toward the point at which said carding cylinder and licker-in are in contact, and covers over said carding cylinder and said licker-in and said hollow roller, whereby a reduced pressure can be created in the space between said licker-in, said carding cylinder and said hollow roller, which reduced pressure creates a stream of air flowing along the bottom of said licker-in over said mote knife and through the point of contact between said licker-in and said carding cylinder into said space, and eliminates eddy currents beneath said point of contact.

2. An apparatus as claimed in claim 1 in which said hollow perforated roller is a worker roller having carding means on the external surface thereof.

3. An apparatus as claimed in claim 1 in which said hollow perforated roller is a cage roller, and in which said apparatus further comprises a worker roller immediately above said cage roller and tangent to said carding cylinder and rotating in the same direction as said licker-in, and a cover over said working roller.

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