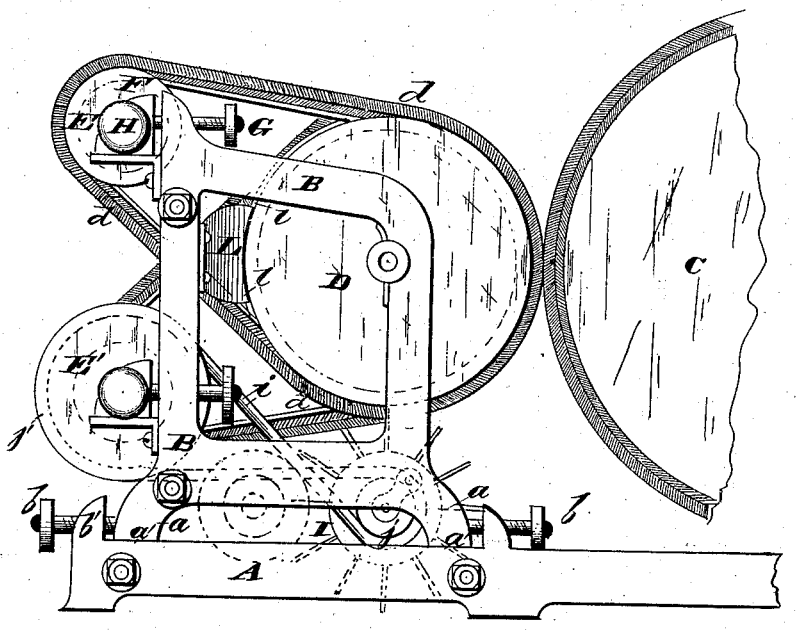
2 Sheets—Sheet 1.

F. CHRISTEN.

CARDING-MACHINES.

No. 194,412. Patented Aug. 21, 1877.

Fig. 1.



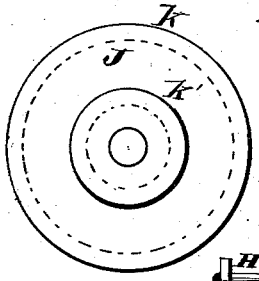
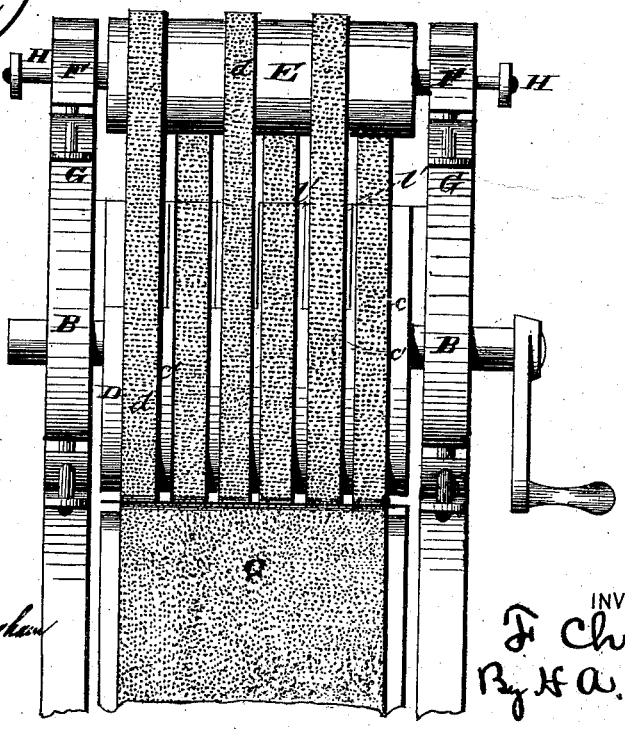


Fig. 2.



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2 Sheets—Sheet 2.

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Fig. 3.

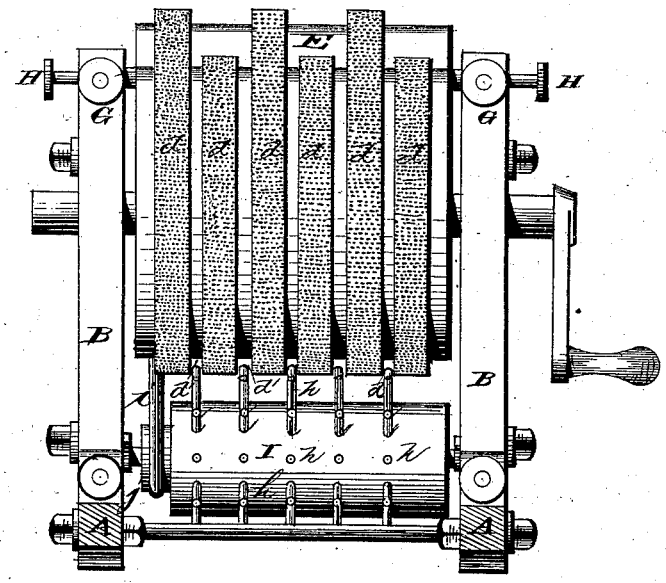
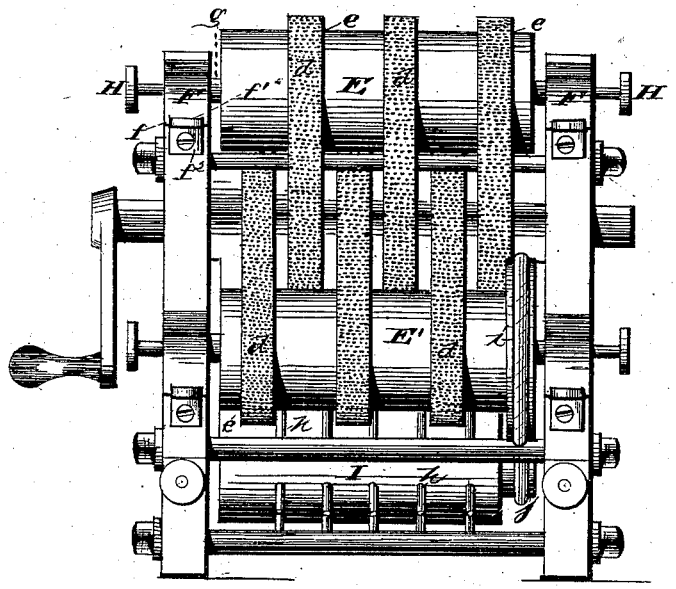


Fig. 4.



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UNITED STATES PATENT OFFICE.

FREDERICK CHRISTEN, OF HOMESTEAD, IOWA.

IMPROVEMENT IN CARDING-MACHINES.

Specification forming part of Letters Patent No. **194,412**, dated August 21, 1877; application filed May 17, 1877.

To all whom it may concern:

Be it known that I, FREDERICK CHRISTEN, of Homestead, in the county of Iowa and State of Iowa, have invented certain new and useful Improvements in Carding-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in wool-carding machines; the object of the same being to provide carding-machines with a stripping and dividing attachment constructed in such a manner as to strip and divide the continuous fleece of carded wool as it is delivered from the main cylinder to the doffer, into bands of any desired width, each of which will have its proper proportion of long and short fibers, whereby the yarns manufactured from the several bands will be of uniform quality and strength.

Heretofore it has been attempted to effect the desired object above set forth by the employment of what is technically termed the "two-doffer system," as used in connection with the finisher-card. In such cases the fleece is taken from the main cylinder by means of two doffers, one arranged above the other. Each doffer is furnished with rings of card-clothing, the rings being separated to form intervening spaces between the rings, and the rings on the respective upper and lower doffer so arranged that each ring on the upper doffer will be opposite or in line with the several spaces or naked portions of the lower doffer.

In order that the several rings of the upper and lower doffer shall take an equal quantity of fiber, the upper rings have been made narrower than the rings of the lower doffer, by reason of the fact that the fleece is first subjected to the action of the upper doffer, and were the rings equal in width the upper ones would take off a much greater quantity of fiber than would be taken off by the rings on the lower doffer.

The two-doffer system has been found to be defective in practice for the following reasons: The upper doffer, although its rings may be narrower than those of the lower doffer, operates to strip all that portion of the fleece from the main cylinder that is located in line with the rings of the upper doffer, and also it operates to take off considerable fiber located on the adjacent sides of each of its rings, as the card-teeth will engage with the ends of long fiber, the main portion of which may be disposed outside of the rings, and should properly be taken off by the lower doffer, and thus take off a large proportion of the long fiber onto the rings of the upper doffer. Such action on the part of the upper doffer operates to deprive the lower doffer of its proportionate quality and quantity of fiber, and the yarn made from the bands stripped from the rings of the upper doffer will be much stronger and larger than those of the lower doffer.

My invention consists in the combination, with the main cylinder of a carding-machine, of a single doffer, which is provided with independent rings of card-clothing, the rings being separated from each other by ribs on the doffer-cylinder, whereby the fleece on the main cylinder will be subjected to the simultaneous action of the several rings on the doffer, and cause each ring to take off its proportionate quantity and quality of fiber, and thereby render the yarn manufactured from the several bands of uniform quality, size, and strength.

Second, in combination with the main cylinder of a carding-machine, a single doffer-roll or cylinder, upper and lower delivery-rolls, and independent rings of card-clothing surrounding the doffer-roll and delivery-rolls of a dividing-roll, the latter arranged beneath the doffer and provided with rows of teeth arranged to register with or mesh into the several spaces intervening between the rings of the doffer, whereby the fibers disposed between the rings are laid evenly on the rings to which they belong.

Third, in the several arrangements of parts and details of construction, as will more fully appear from the following description and claims.

In the accompanying drawings, Figure 1 is a side elevation of my invention. Fig. 2 is a plan view of the same. Fig. 3 is an end view

of that portion of the device nearest the main cylinder; and Fig. 4 shows the opposite end of the same.

A represents an extension of the main frame of a finisher carding-machine, and B is an independent doffer-frame, the legs *a* of which rest on flat bearings *a'* of frame A, and are secured in any desired position by means of set-screws *b*, which extend through lugs *b'*. This construction of the independent doffer-frame allows the doffer to be readily moved toward or away from the main cylinder C, which latter may be of ordinary construction. D represents the doffer-cylinder, the periphery of which is subdivided into any desired number of rabbets, *c*, the same being insulated from each other by means of thin ribs *c'*. These latter project outwardly from the main body of the doffer-cylinder a distance greater than the thickness of the backs of card-clothing ordinarily employed on carding-machines, and extend approximately half way up to the knee of the teeth, in order to keep the teeth in line and support the same while the rings are ground. Doffer D is surrounded by rings *d* of card-clothing, the several rings being situated in the rabbets *c*, and their edges kept insulated from each other by means of the ribs *c'*, whereby intervening spaces *d'* are formed between the adjacent edges of each of the several rings.

E and E' represent respectively the upper and lower delivery-rolls, each of which has rabbets *e* formed in its surface, and, as in the case of the doffer, the rabbets are of the same width as the rings *d* of card-clothing. Each roller is provided with one-half the number of rabbets on the doffer-cylinder, and rings *d* are arranged so that every alternate ring on the doffer passes around the upper delivery-roller E while the remaining rings pass around the lower delivery-roller E'.

Rollers E E' are journaled in laterally-adjustable bearings F, the lower surfaces of which are formed with undercut mortises *f*, which snugly fit the arms f^1 of supporting-brackets f^2. Set-screws G extend through the doffer-frame, opposite bearings F, and hence by turning the same in either direction the distance between the delivery-rolls and the doffer may be easily regulated in order to impart the desired tension to the rings *d*. It is desirable that some provision be made for giving longitudinal adjustment to the delivery-rollers, in order that the rabbets on the same may be kept perfectly in line with the rabbets on the doffer-cylinder. This result is accomplished as follows: The journals *g* of the upper and lower delivery-rollers are of sufficient length to form an intervening space between the ends of the rollers and the inner surfaces of their bearings. Set-screws H extend through the bearings in line with journals *g*, and by turning the set-screws in either direction the delivery-rollers may be accurately adjusted so that the edges of the rings will not bind on the ribs either of the doffer or delivery rollers. It is evident that many different methods for adjusting the delivery-rollers may be resorted to; and hence I do not limit myself to the means above described, the same only illustrating one of the many forms of construction adapted to effect the desired result.

I is a dividing-roller, which is journaled immediately below the doffer. The periphery of said roller I is furnished with rows of teeth *h*, which register with and project into the spaces *d'* between the rings *d* on the doffer, the teeth being slightly inclined toward the main cylinder. The dividing-roller is revolved in an opposite direction to that of the doffer, and with a surface speed two or three times greater than the same, by means of a twisted belt or band, *i*, which passes over band-wheels *j* and *j'*, attached, respectively, to the ends of the dividing-roller I and lower delivery-roller E'. Should it be desirable to increase the speed of the dividing-roller when carding long and coarse stock, it may be accomplished by journaling a compound band-pulley, J, consisting of the large and small band-pulley *k k'* between the dividing-roller and lower delivery-roller. A belt is then arranged to connect the large pulley *j'* on the delivery-roller with the small pulley *k'*, and another belt passes over the large pulley *k*, and the band-pulley *j* secured to, or formed as a part of, the dividing-roller. The dividing-roller may be journaled in bearings, whereby it can be adjusted both laterally and vertically, if desired.

L is dirt-guard, which is rigidly secured to any portion of the doffer-frame. Guard L consists of a concave plate, *l*, preferably constructed of sheet metal, to which are secured the several independent plates *l'*, the same being arranged to cover the several rabbets formed in the doffer, and prevent flyings from settling between the under surfaces of the rings and doffer.

The operation of my improved carding-machine is as follows: The main portion of the machine being of the ordinary construction, the wool is fed to the main cylinder and carded in the usual manner. As the fleece on the main cylinder comes in contact with the card-teeth of the several rings *d* on the doffer, both doffer and cylinder moving downward are in contact, and the delivery of the wool is accomplished by the opposite inclination of the teeth and the difference in their velocity. The entire body or width of the fleece is subjected to the simultaneous action of the several independent rings of card-clothing, which practically cover the entire periphery of the doffer. The result is that an equal amount and uniform quality of fiber is deposited on each one of the several rings *d* of card-clothing, thereby forming any desired number of bands of of fleece, each of which will be of the same quality or have a proportionate share of long and short fiber, and also consist of an equal amount of such fiber. As a portion of the fleece will not be properly combed or carded,

and hence lie tangled on the main cylinder when it reaches the doffer, it follows that the intervening spaces between the several rings will be partially filled with tangled and uncombed fiber, which result is also partially due to the attraction between the fibers caused by the electrical action existing between the same during the process of carding. As the several rings are moved beneath the doffer, the teeth of the dividing-roller, which latter, as heretofore stated, has a much greater surface speed than that of the rings of card-clothing, operate to straighten and separate the fiber that has collected between the rings, and cause the fiber to adhere to the rings having the best purchase, or with which it is most intimately connected. The several bands of fleece are then carried to the delivery-rollers from which they are stripped by doffer-knives in the usual manner.

From the above description it will be seen that the yarns manufactured from the several bands taken from the main cylinder by the independent rings of card-clothing will be of uniform texture, size, and strength.

It is evident that any desired number of rings may be employed. If a fine quality of yarn is required, a greater number of rings will be used than would be necessary to produce a coarse quality of yarn, and hence the rabbets formed in the doffer-cylinder and delivery-rollers are formed to correspond to the width and number of rings of card-clothing necessary to produce the desired size and quality of yarn.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the main cylinder of a carding-machine, of a single doffer, consisting, essentially, of independent rings of card-clothing, separated from each other by ribs on the doffer-cylinder, substantially as and for the purpose set forth.

2. The combination, with the main cylinder of a carding-machine, of a doffer-cylinder provided with ribs, to guide the rings of card-clothing, upper and lower delivery-rollers, and independent rings of card-clothing, the latter arranged so that alternate rings pass over either the upper or lower delivery-rollers, substantially as described.

3. The combination, with the main cylinder of a carding-machine, of a doffer-cylinder provided with ribs to guide the rings of card-clothing, upper and lower delivery-rollers, independent rings of card-clothing, and a dividing-roller, the latter provided with rows of teeth arranged to register with, and mesh into, the spaces between the intervening edges of the rings on the doffer-cylinder, substantially as described.

4. A doffer-cylinder constructed with a series of rabbets formed in its periphery, and ribs formed between each of the several rabbets, in combination with a series of independent rings of card-clothing, substantially as and for the purpose set forth.

5. The combination, with a doffer-cylinder provided with ribs, to guide the rings of card-clothing, of upper and lower delivery-rollers, journaled in laterally-adjustable bearings, whereby the tension of the rings may be regulated as desired, substantially as described.

6. The combination, with the doffer-cylinder and independent rings of card-clothing, of upper and lower delivery-rollers, the latter adapted to be longitudinally adjusted, in order to bring the rabbets on the rollers in line with those on the doffer-cylinder, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 14th day of May, 1877.

FRED. CHRISTEN.

Witnesses:

GOTTLIEB CHRISTEN,

LEONHARD GRAF.