

E. V. BATES & R. B. ROBINSON.  
CARDING MACHINE.  
APPLICATION FILED SEPT. 30, 1907.

906,993.

Patented Dec. 15, 1908.

2 SHEETS—SHEET 1.

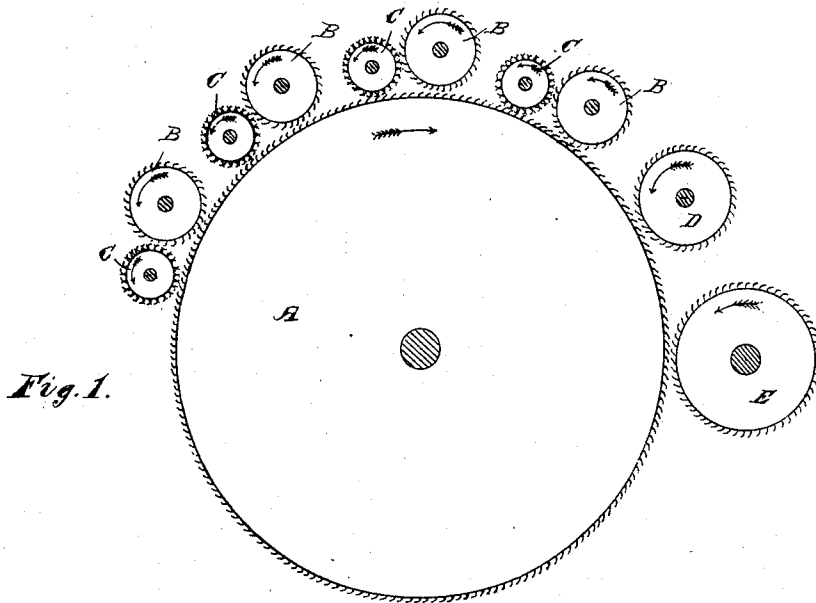


Fig. 1.

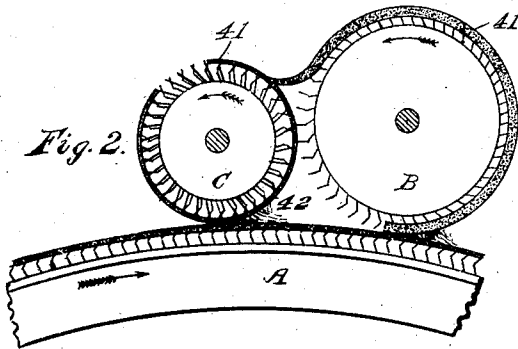


Fig. 2.

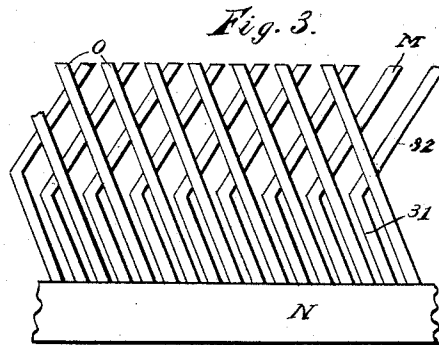


Fig. 3.

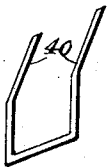


Fig. 4.



Fig. 5.

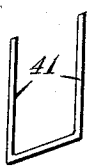


Fig. 6.

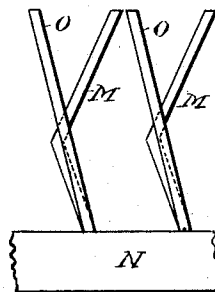


Fig. 7.

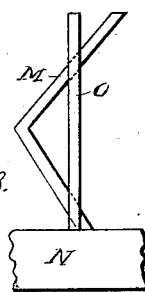


Fig. 8.

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2 SHEETS—SHEET 2.

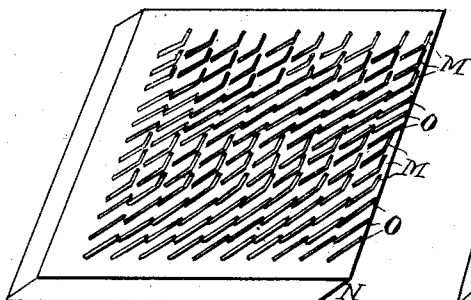


Fig. 9.

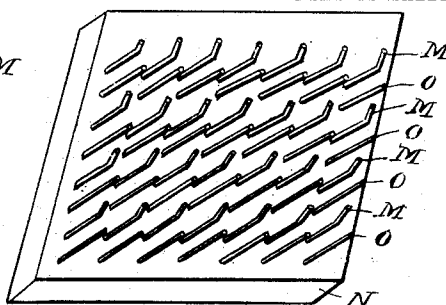


Fig. 10.

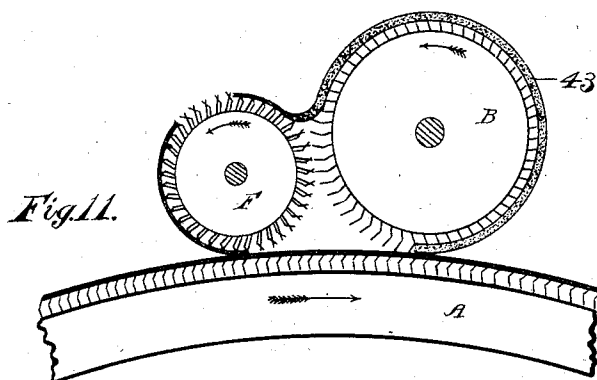


Fig. 11.

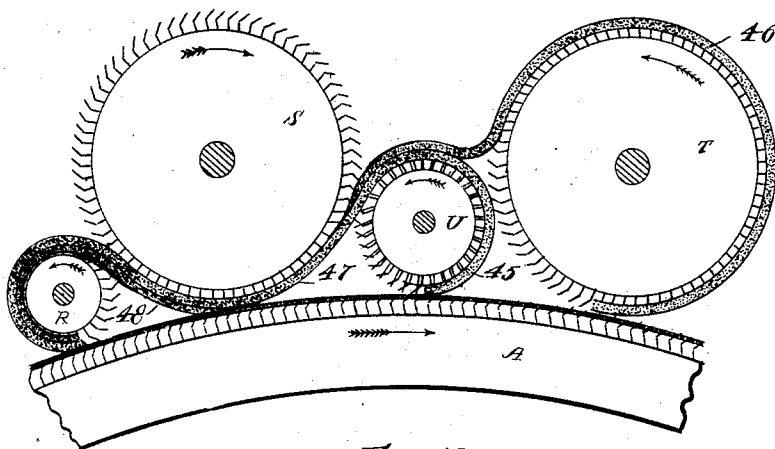


Fig. 12.

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# UNITED STATES PATENT OFFICE.

EDDO V. BATES AND ROBERT B. ROBINSON, OF LOWELL, MASSACHUSETTS, ASSIGNORS TO  
BATES & ROBINSON MACHINE COMPANY, A CORPORATION.

## CARDING-MACHINE.

No. 906,993.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed September 30, 1907. Serial No. 395,170.

*To all whom it may concern:*

Be it known that EDDO V. BATES, a citizen of the United States, and ROBERT B. ROBINSON, a citizen of Canada, both residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Carding-Machines, of which the following is a specification.

Our invention is upon machines for carding or straightening the fibers of wool, cotton, and other similar stock, more particularly wool.

It lies principally in the construction of the card clothing and in applying it to what are known as strippers and transfer rolls on carding machines.

Our purpose is to so make the card clothing and to so arrange the rolls that a stripper or transfer roll can be used as a stripper or transfer roll and as a worker at the same time. Its principal purpose is to permit a larger number of workers and therefore a larger number of carding points upon the same main cylinder. By its use, we produce a better and stronger sliver and one in which the fibers are straighter than is usual. By our invention, one card will do the work of two or three and the resulting yarn is smoother and has fewer specks.

In the drawings, Figure 1 is a diagrammatic side view of a card including the main cylinder, the workers, combination strippers and workers, fancy, and doffer. Fig. 2 shows in detail a single worker with our stripper-worker in connection with the main cylinder and also shows the course of the different webs, part of one web being broken to show the teeth. Fig. 3 is a magnified side view of a strip of card clothing made according to our invention. Figs. 4, 5 and 6 show different forms of staples. Figs. 7 and 8 show different arrangements of the teeth of the card clothing. Fig. 9 shows in perspective an arrangement of teeth wherein a plurality of rows of straight teeth alternate with a plurality of rows of bent teeth. Fig. 10 shows a similar construction with adjoining single rows of straight teeth and bent teeth. Fig. 11 shows a worker, and a stripper provided with teeth of different pitches in the reversed position from that shown in Fig. 2 and also shows the web partly broken to show the teeth. Fig. 12 shows a pair of workers between which is a connecting stripper-worker

which acts as a transfer roll, and a stripper in front of the first worker.

It is well-known, in the art of carding, that where two rolls covered with card clothing travel with their points in close proximity to each other and where one or the other or both carries a web, by different arrangements of the teeth of the card clothing, different results are produced. In one case, carding or straightening of the fibers will occur; in another case one roll will strip the fiber from the teeth of the other roll; and in still another case, the fiber will be brushed off and rolled up between the two.

The ordinary card clothing has teeth which are bent towards their points at an angle with the radial lines of the cylinder to which they are attached. When clothing with such teeth is run point to point, as a rule, carding will take place. On the other hand, if the teeth are set with their points in the same direction and the cylinders run at different speeds towards the points of the card clothing teeth, the cylinder with the faster surface speed will strip or brush the web from the other. Numerous other combinations are familiar to carders.

In the common form of cards, the main cylinder travels at a very high surface speed, as say one thousand feet a minute, and it is surrounded by a plurality of slow running workers whose teeth are point to point with those on the main cylinder. The surface speed of the workers is say sixteen feet a minute. In front of each worker is a stripper which cleans the stock from the worker and is itself cleaned or stripped by the main cylinder. In such case the card clothing is attached to the stripper in the opposite way from the workers and the main cylinder. Thereby the teeth of the stripper point in the same direction with those on the worker and on the main cylinder and are not point to point therewith. The surface speed of the stripper is say two hundred and fifty feet a minute. No carding takes place between the strippers and the main cylinder in such case, but the carding all takes place between the workers and the main cylinder.

We make our card clothing as shown in Fig. 3 with certain rows or sets of bent teeth M, M of the ordinary construction. These teeth start backward at a reverse angle from the foundation N of the card clothing to form a leg 31 and are bent to pitch forward to

form a leg 32. Thereby a sort of hook is formed, the point of which is preferably in advance of its base. The other teeth O O which are straight pitch backwards substantially in the same direction with leg 31. Preferably leg 32 of teeth M should pitch or slant forward from a perpendicular line through foundation N which is substantially coincident with a radial line of the roll to which the card clothing is attached, when it is in place. Straight teeth O, on the other hand, preferably pitch backwards from such line. The rows of straight teeth O and of bent teeth M may be arranged singly as shown in Fig. 10 or a plurality of rows of straight teeth can alternate with a plurality of rows of bent teeth as shown in Fig. 9.

The card clothing may be made of staples with two bent legs 40, as shown in Fig. 4, which alternate in different combinations with staples having two straight legs 41 such as shown in Fig. 6, or staples may be used such as shown in Fig. 5 with one straight leg 41 and one bent leg 40. With clothing so made, there will be more or less flexibility or give to the teeth.

We do not confine ourselves to the exact degree of pitch for the teeth shown in Fig. 3, as the angles between the legs of the straight and the legs of the bent teeth M and O may be varied as shown in Fig. 7, and in fact the straight teeth may stand at right angles to the foundation N as shown in Fig. 8.

Such card clothing as described is the subject of a separate application pending herewith, said application being a division of this application.

In the drawings, A is the main cylinder in every case, B, B are workers, C, C are combination stripper-workers, D is the fancy and E is the doffer.

Our preferred form of card is shown in Figs. 1 and 2. Main cylinder A travels forward with its teeth pointing forward, workers B, B travel backward with their teeth pointing forward. Carding takes place between the workers and main cylinder and a certain amount of web 41 is carried over and back by workers B, B all in the usual manner. Instead of the ordinary stripper however, we cover the stripper roll with our combination toothed card clothing and attain very much better results.

We attach our card clothing to the roll which is to be used as stripper-worker C with the points of the bent teeth M M point to point with those on the main cylinder A and those on the worker B. The workers B, B travel in the opposite direction from the main cylinder A at a much slower speed and their teeth are point to point with those on the main cylinder. Stripper-workers C, C travel in the same direction as workers B, B at a much greater speed but at a considerably less speed than the main cylinder A.

For example, if the surface speed of the main cylinder is one thousand feet a minute, the surface speed of the workers will be sixteen feet a minute and of the stripper-workers two hundred and fifty feet a minute. This arrangement brings the straight teeth O, O in a proper stripping relationship with the teeth on the workers B, B.

It will be readily seen that a carding takes place between the bent teeth M, M, of stripper workers C and the teeth of the main cylinder A. The straight teeth O, O, on the other hand, have sufficient slant to effectively strip the web 41 from worker B carrying it over and back until it again reaches the point of contact with the main cylinder A. Such stripping would take place to some extent without straight teeth O, O, but it would be a brushing or tearing off of flakes and would not be as smooth and perfect. As stripper-worker C travels at a much higher surface speed than worker B, it will be readily seen that the web 41 will be attenuated thereby and that it will be brought in carding contact with the teeth of the main cylinder A more frequently than if stripper-worker C traveled at a slower speed.

A certain amount of thin web 42 is picked up from main cylinder A and is retained on the bent teeth and on the straight teeth of stripper-worker C and this is carried around and merged with web 41 until properly carded. The result of using the straight teeth O, O on stripper-worker C is that they strip in a clean and efficient manner the web 41 which is carried over and back by worker B, thus leaving the teeth of worker B clean and in good condition to card with the main cylinder. Moreover, straight teeth O, O, also hold firmly the thin web 42 which is carried up and back by stripper-worker C. For the last named reason, the web 42 is not ruffed up by the teeth of worker B, and is not torn off and rolled up thereby making uneven work as is the case where the straight teeth are not used. We find that the thin web 42 is formed on stripper-worker C and is held firmly there but that any excess of stock is carded or is carried forward by the main cylinder A. We find also that the web on stripper-worker C and on other similar rolls upon which our card clothing is used does not sink into the teeth, but is carried firmly by the points thereof. We account for this by the fact that the teeth cross each other near their points and thus hold the stock well up. We find also that the constant brushing which the web 42 on stripper-worker C gets from the smooth backs of the teeth on worker B cleans all grease, very short stock and other dirt from it, thus improving its condition. This keeps stripper-worker C at all times clean and free. We thus, instead of one carding point, between the worker and main cylinder, get two that is we get an ex-

tra carding point between stripper-worker C and main cylinder A, and we thus utilize the space ordinarily occupied by the strippers. The size of the stripper-worker C is not material, as it may be larger or smaller than shown herein. It is better to have it of somewhat less diameter than the worker which it strips however.

While we prefer the arrangement of rolls shown in Fig. 2, we find that it is a decided advantage over ordinary methods to use our card clothing on the ordinary stripper F with its teeth set in the direction opposite to that shown in Fig. 2. This arrangement with one worker and stripper is shown in Fig. 11. In such case the worker B is stripped of web 43 by the bent teeth of stripper-worker F in the ordinary way. We find however, that by using the interspersed straight teeth, the stock is not taken off of stripper F by main cylinder A in flakes but is carried along in a smooth regular web.

Another arrangement which we can use is to arrange the workers in pairs around the main cylinder. One such pair is shown in Fig. 12. In this arrangement, we have a forward running worker S, a backward running worker T, a combination stripper-worker or transfer roll U between them with its bent teeth arranged to card with the main cylinder and also with worker S, and an ordinary stripper R provided with bent teeth only which are set to strip worker S and not to card with the main cylinder. In this arrangement, transfer roll U acts with reference to worker T and main cylinder A, in a way similar to stripper-worker C in the construction shown in Fig. 2. It cards with main cylinder A and strips worker T.

Transfer roll U travels backwards and at the same or a somewhat greater surface speed than backward running worker T, say eight feet a minute. It cards with main cylinder A and also with forward running worker S. It picks up a thin web 45 from main cylinder A and strips from worker T the web 46 which that worker has picked up from main cylinder A. As stripper-worker U travels at about the same surface speed as worker T, web 46 is not attenuated until it reaches the point of contact with worker S. Forward running worker S travels at a higher surface speed than transfer roll U, as say sixteen feet a minute and cards with it. It also strips webs 45 and 46 therefrom and merges them into web 47. Web 47 is recarded by main cylinder A and what remains thereof together with the thin web 48 picked up from the main cylinder is carried back. All the web on worker S is stripped therefrom by ordinary stripper R which travels at a much higher surface speed than worker S, as say two hundred and fifty feet a minute, but less than main cylinder A.

It will be noted that on account of the rel-

atively slow drawing apart of adjoining points on worker S and transfer roll U as they revolve and the fact that the teeth of worker S are kept clear of stock by fast running stripper R, practically all the stock including webs 45 and 46 are stripped from transfer roll U and its teeth are left clear to card with main cylinder A. In this arrangement we get four carding points out of a pair of workers, a transfer roll and a stripper. That is carding takes place between S and A, S and U, U and A, and T and A. It is useful for some kinds of stock.

Other arrangements of rolls provided with our improved card clothing will suggest themselves to those familiar with the art of carding, where it is desirable for a roll to card and, at the same time, to strip another roll.

Our principal invention resides in providing card clothing wherein the teeth pitch in different or opposite directions and in applying it to the rolls of a carding machine.

What we claim as our invention and desire to cover by Letters Patent is,

1. In a carding machine, a roll covered with card clothing in which different teeth pitch in different directions, said teeth being arranged around the periphery of the roll in the same or parallel planes which planes are perpendicular to the axis of the roll.

2. In a carding machine, a stripper which is covered with card clothing of which the teeth pitch in different directions, said teeth being arranged around the periphery of the stripper in the same or parallel planes which planes are perpendicular to the axis of the stripper.

3. In a carding machine, a main cylinder combined with a plurality of sets of rolls co-operating therewith, each set including a worker which engages the main cylinder, and a stripper which engages the main cylinder and the worker and is covered with card clothing the teeth of which pitch in different directions said teeth being arranged around the periphery of the roll in the same or parallel planes which planes are perpendicular to the axis of the roll.

4. In a carding machine, a main cylinder combined with a plurality of sets of rolls co-operating therewith, each set including a worker which engages the main cylinder, and a stripper-worker which engages the main cylinder and the worker and is covered with card clothing the teeth of which pitch in different directions.

5. In a carding machine, a main cylinder combined with a plurality of sets of rolls co-operating therewith, each set including two workers each of which engages the main cylinder, a transfer roll between said workers and the main cylinder which engages both workers and the main cylinder and is covered with card clothing the teeth of which pitch in different substantially radial directions

whereby stock is transferred from the second to the first worker, and a stripper for taking stock from the first worker and replacing it upon the main cylinder.

5 6. In a carding machine, a roll provided with flexible teeth so set that different teeth pitch in different directions in the same or parallel planes which planes are perpendicular to the axis of the roll.

10 7. In a carding machine, a roll covered with card clothing which comprises a foundation and wire legs forming teeth which pitch in one direction and are interspersed with other wire legs which pitch in a different direction.

15 8. In a carding machine, a roll covered with card clothing which comprises a foundation and flexible teeth which pitch in one direction interspersed with other flexible teeth which pitch in a different direction.

20 9. In a carding machine, a roll covered with card clothing which comprises a foundation and bent teeth which pitch in one direction interspersed with straight teeth which pitch in a different direction.

25 10. In a carding machine, a roll covered with card clothing which comprises a foundation and rows of teeth which pitch in one direction and alternate rows of teeth which pitch in a different direction.

30 11. In a carding machine, a roll covered with card clothing which comprises a foundation and rows of bent teeth which pitch in one direction and alternate rows of straight teeth which pitch in a different direction.

35 12. In a carding machine, a stripper provided with flexible teeth so set that different teeth pitch in different directions in the same or parallel planes which planes are perpendicular to the axis of the stripper.

40 13. In a carding machine, a stripper covered with card clothing which comprises a foundation and wire legs forming teeth which pitch in one direction and are interspersed with other wire legs which pitch in a different direction.

45 14. In a carding machine, a stripper covered with card clothing which comprises a foundation and flexible teeth which pitch in one direction interspersed with other flexible teeth which pitch in a different direction.

50 15. In a carding machine, a stripper covered with card clothing which comprises a foundation and bent teeth which pitch in one direction interspersed with straight teeth which pitch in a different direction.

55 16. In a carding machine, a stripper covered with card clothing which comprises a foundation and rows of teeth which pitch in one direction and alternate rows of other teeth which pitch in a different direction.

60 17. In a carding machine, a stripper covered with card clothing which comprises a foundation and rows of bent teeth which pitch in one direction and alternate rows of

straight teeth which pitch in a different direction.

18. In a carding machine, a main cylinder combined with a plurality of sets of rolls cooperating therewith, each set including a worker which engages the main cylinder, and a stripper which engages the main cylinder and the worker and is provided with flexible teeth so set that different teeth pitch in different radial directions.

19. In a carding machine, a main cylinder combined with a plurality of sets of rolls cooperating therewith, each set including a worker which engages the main cylinder and a roll which engages the main cylinder and the worker and is covered with card clothing which comprises a foundation and wire legs forming teeth which pitch in one direction and are interspersed with other wire legs which pitch in a different direction.

20. In a carding machine, a main cylinder combined with a plurality of sets of rolls cooperating therewith, each set including a worker which engages the main cylinder and a roll which engages the main cylinder and the worker and is covered with card clothing which comprises a foundation and flexible teeth which pitch in one direction interspersed with other flexible teeth which pitch in a different direction.

21. In a carding machine, a main cylinder combined with a plurality of sets of rolls cooperating therewith, each set including a worker which engages the main cylinder and a roll which engages the main cylinder and the worker and is covered with card clothing which comprises a foundation and bent teeth which pitch in one direction interspersed with straight teeth which pitch in a different direction.

22. In a carding machine, a main cylinder combined with a plurality of sets of rolls cooperating therewith, each set including a worker which engages the main cylinder and a roll which engages the main cylinder and the worker and is covered with card clothing which comprises a foundation and rows of teeth which pitch in one direction and alternate rows of teeth which pitch in a different direction.

23. In a carding machine, a main cylinder combined with a plurality of sets of rolls cooperating therewith, each set including a worker which engages the main cylinder and a roll which engages the main cylinder and the worker and is covered with card clothing which comprises a foundation and rows of bent teeth which pitch in one direction and alternate rows of straight teeth which pitch in a different direction.

24. In a carding machine, a main cylinder combined with a plurality of sets of rolls cooperating therewith, each set including a worker which engages the main cylinder and a roll which engages the main cylinder and

the worker and is covered with card clothing which comprises a foundation and rows of bent teeth which pitch in one direction and alternate rows of straight teeth which pitch  
5 in a different direction in substantially radial parallel planes.

25. In a carding machine, a main cylinder which rotates forward and is covered with card clothing the teeth of which are bent  
10 forward, a plurality of workers cooperating therewith each of which rotates backwards and is covered with card clothing the teeth of which are bent forward, a plurality of strin-

per-workers each of which is placed behind a worker and cooperates therewith and with  
15 the main cylinder and is covered with card clothing part of the teeth of which are bent forward and are interspersed with straight teeth which pitch backward.

In testimony whereof we affix our signatures in presence of two witnesses.

EDDO V. BATES.

ROBERT B. ROBINSON.

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FLORENCE A. PARR.