To all whom it may concern:

Be it known that I, George F. Geb, of Franklin, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Comb Mechanism for Carding Machinery, of which the following is a specification.

The object of the present invention is to provide for a carding machine mechanism of improved construction for oscillating the doffer knife or comb by which the fibers are stripped from the doffer.

Hitherto it has been the practice to vibrate the comb by means of a cam formed to impart but a single reciprocation of the comb for each rotation of the cam. The speed of the doffer requires from eight hundred to one thousand reciprocations per minute of the comb, and when a complete rotation of the cam is required to impart one reciprocation to the comb, it is obvious that the cam must be rotated at a speed of from eight hundred to one thousand revolutions per minute. There are numerous objections to this form of mechanism. For example, a pulley of relatively large diameter is required to rotate the cam at the required speed in order to prevent undue slipping of the belt by which it is driven. The high speed of rotation of the cam shaft results in relatively rapid wearing of the bearing and soon causes the cam shaft to become loose in its bearing and rattle. The cam shaft requires an abundant supply of lubricating oil because of the rapid rate of rotation and the severe strain to which it is subjected. The oil, because of the rapid rotation, is thrown about in all directions by centrifugal force, and, in order to protect the stock being carded and in order to prevent an undue waste of oil, it is necessary to provide the machine with metal guards surrounding the cam and to provide a pan beneath the cam to receive the oil which drips from the guards.

From the foregoing explanation, it will be seen that the chief cause of the difficulty in reciprocating the doffer comb at the desired speed lies in the relatively rapid rotation of the actuating cam.

The present invention overcomes these difficulties by providing a cam which is formed to impart a plurality of reciprocations for each rotation of the cam. As illustrated by the drawings, the cam is adapted to impart four reciprocations for each rotation of the cam and the speed of the cam may therefore be reduced to one-quarter of its former speed. The difficulties arising from rotating a cam at a speed of from two hundred to two hundred and fifty revolutions per minute are negligible as compared to a speed of eight hundred to one thousand revolutions per minute. Reciprocatory motion, which is effected by the cam, is transmitted to the doffer comb through a cam arm and a rock shaft supporting the cam arm and likewise supporting the doffer comb.

The present invention includes a feature of novel construction in connection with the formation of the cam and its active relation with the cam lever by which the friction due to the coaction is reduced to a minimum. The usual form of connection between a path cam and a lever is a cam roll carried by the lever and extending into a path of the cam so as to be engaged by both of the complementary opposed surfaces of the cam. The cam roll is of course rotated in one direction when it is engaged by one of the complementary cam surfaces and is rotated in the opposite direction when it is engaged by the other of said cam surfaces, and the roll is therefore subjected to considerable friction whenever it engages one of said surfaces after being engaged by the other. In order to avoid such friction, the present invention provides a path cam provided with complementary opposed surfaces arranged to engage two separate cam rolls mounted upon the arm, each cam surface coacting exclusively with one of said rolls. The rotation of the rolls is therefore never reversed and neither roll is liable to engagement by more than one cam surface.

Of the accompanying drawings which illustrate one form in which the invention may be embodied,—Figure 1 represents a top plan view of a fragment of a carding machine including a doffer comb and actuating mechanism therefor. Figure 2 represents an elevation thereof on a larger scale. Figure 3 represents a section on line 3—3 of Figure 1. Figure 4 represents a similar section showing the parts in a different position.
Fig. 5 represents a section on line 5—5 of Fig. 3. Fig. 6 represents a section on line 6—6 of Fig. 4.

The same reference characters indicate the same parts wherever they occur.

Referring first to Fig. 1, 10 indicates a portion of the frame work of a carding machine and 11 indicates a portion of a doffer roll thereof. 12 indicates a doffer knife or comb which is reciprocated tangentially with relation to the doffer to strip off the stock of fibers to form a sliver. The comb is supported by a plurality of arms or rods such as that indicated at 13, said arms being affixed to a rock shaft 14. The rock shaft is provided with an arm by which it is actuated. This arm is composed of two members indicated respectively at 30 and 31. The member 30 is affixed to the rock shaft 14 and the member 31 is provided with a stud 16 for carrying two cam rolls 17 and 18. The member 30 is provided with a longitudinal slot 32 and the member 31 is provided with a longitudinal slot 33. The two members are clamped one upon another by a clamping bolt 34 extending through the slots 32 and 33 and provided with a head 35 on one end and clamping nuts 15 on the other end. A washer 19 is interposed between said rolls, and a spring is provided with a head 20 by which the rolls are confined in the desired position. The roll 17 is arranged to be engaged by the cam surface 21 of a cam disk 22, and the roll 18 is arranged to be engaged by the cam surface 23 of a cam disk 24, said disks 22 and 24 constituting a path cam. The cam surfaces 21 and 23 are opposed to each other and are complementary in their relation one to another, so that, when they are rotated in unison in the same direction, the arm will be positively reciprocated. As shown by Figs. 5 and 6, the hubs of the cam disks 22 and 24 are formed to fit and to be affixed to each other, and the two disks thus permanently related are affixed upon the cam shaft 25 by means of a pin 26 and a key 27. The cam shaft is mounted in a bearing 28 on the frame 10 and is provided with a pulley 29 which is arranged so that it may be driven by a belt (not shown) extending to a pulley (not shown) on any convenient shaft such as the fancy shaft (not shown).

The cam surfaces 21 and 23 are formed to impart four reciprocations to the cam arm for each rotation of the cam, but it is not desired to limit the number of such reciprocations with relation to the rotation of the cam. The friction, which would be occasioned were a single cam roll employed to cooperate with the two cam surfaces 21 and 23, is to a great extent avoided by providing independently rotatable rolls each coating exclusively with one of said cam surfaces. The relatively slow rotation of the cam requires considerably less power for operation than a cam formed to give a single throw and requiring a number of rotations commensurate with the number of reciprocations of the doffer comb.

The fibers of one class of stock vary from those of other classes and the different classes require different adjustments and strokes of the doffer knife in order to insure complete stripping of the fibers from the doffer. For example, it may be necessary to increase the length of the stroke of the doffer knife for one kind of stock, while on the other hand a shorter stroke may be sufficient for doffing another class of stock.

The length of the stroke of the doffer knife may be varied by changing the adjustment of the cam arm. Furthermore by means of this cam arm the mean position of the doffer knife may be varied, or in other words, the limits of the range of movement of the knife may be varied without increasing or decreasing the length of such range.

The two members 30 and 31 are so proportioned with regard to their length as to extend substantially transverse one with relation to another when the cam rolls are adjusted to the position required by the cam. It is obvious that the arc through which the member 30 is oscillated by the cam may be increased or decreased by moving the cam rolls toward or from the rock shaft 14. It is also obvious that the range of movement of the member 30 may be shifted without increasing or decreasing the length of its arc by moving the free end of the member 30 toward or from the stud 16. An incidental advantage of using a cam arm of this character is that the arm may be planed, keyed, or otherwise permanently fixed upon the rock shaft 14 without requiring any great degree of accuracy in positioning one with relation to the other.

Having thus explained the nature of my said invention and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim is:

1. In a carding machine, the combination with a doffer, of a doffer knife or comb, a rock-shaft, arms affixed to said rock-shaft for supporting said knife or comb, a driven shaft, an operating lever affixed to said rock-shaft, and a path cam affixed to said driven shaft, said lever being operatively connected with said cam, and said path cam being formed to impart to said knife a plurality of positive doffing strokes for each rotation of said driven shaft, whereby said shaft may be driven at a relatively slow speed.

2. In a carding machine, the combination with a doffer, of a rock-shaft, a doffer comb or knife, arms affixed to said rock-shaft to support and carry said knife, a continuously rotating path cam, an operating arm affixed...
to said rock-shaft, a cam roll, and means for mounting said cam roll on said operating arm in cooperative relation with said cam, said operating arm being formed and said means being adapted to adjust said cam roll toward and from said rock-shaft and to adjust said rock-shaft circumferentially, whereby the stroke of said knife may be increased and decreased at both ends, or at one end only.

In testimony whereof I have affixed my signature, in presence of two witnesses.

GEORGE F. GEB.

Witnesses:

DANIEL H. McLAUGHLIN,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."