

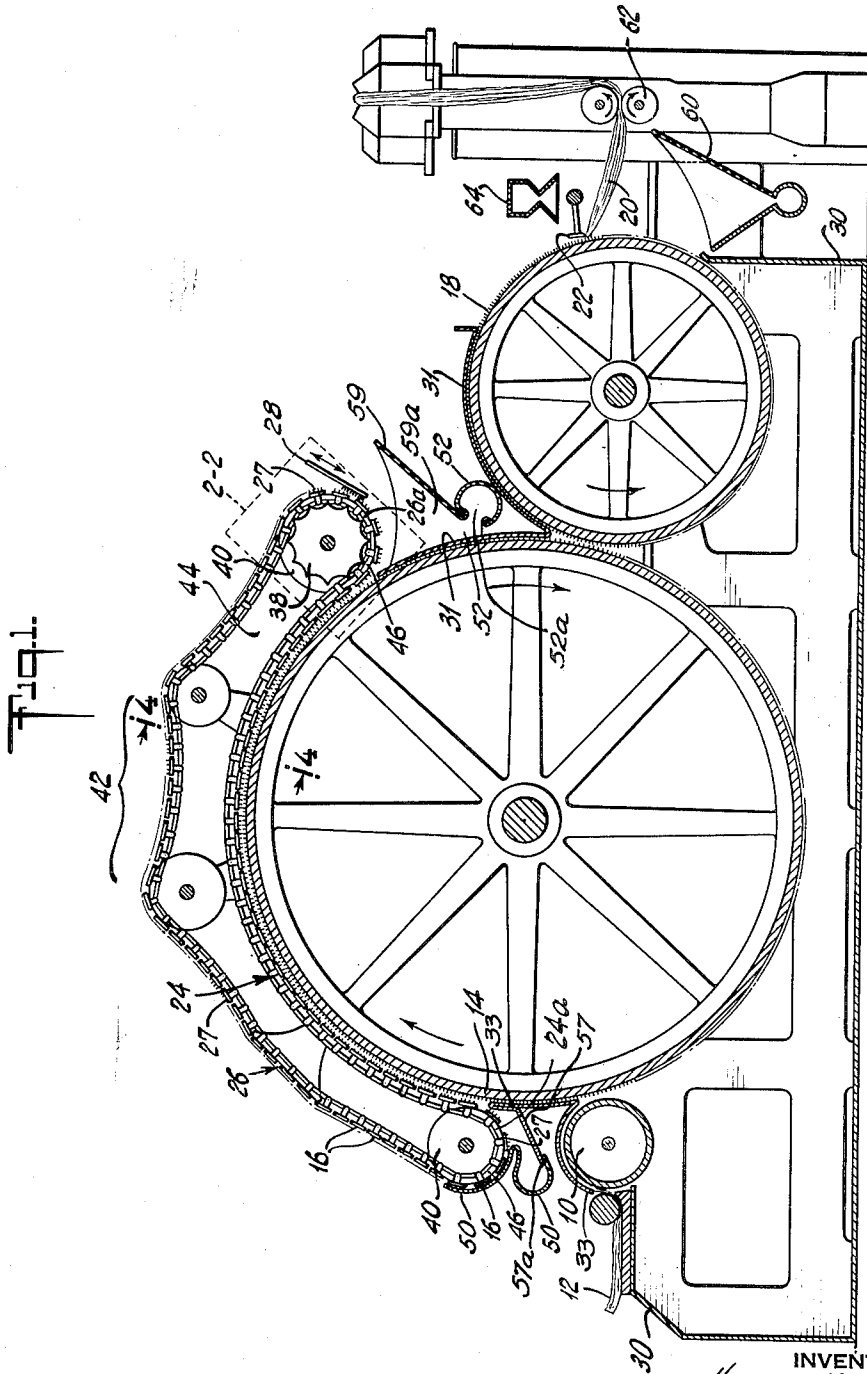
July 20, 1954

H. W. GRISWOLD
FLY PREVENTION FOR CARDS

2,683,901

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3 Sheets-Sheet 1



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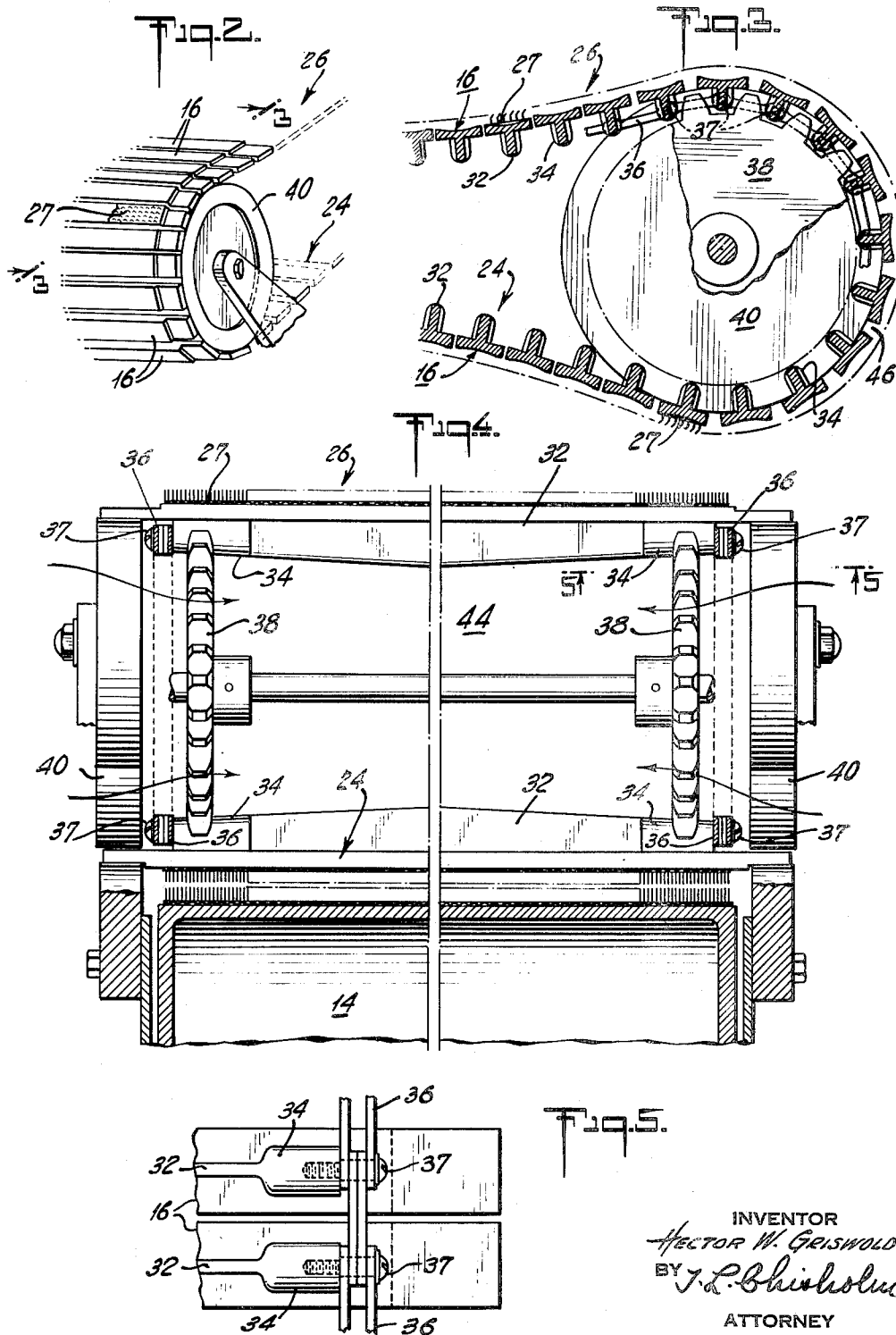
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3 Sheets-Sheet 2



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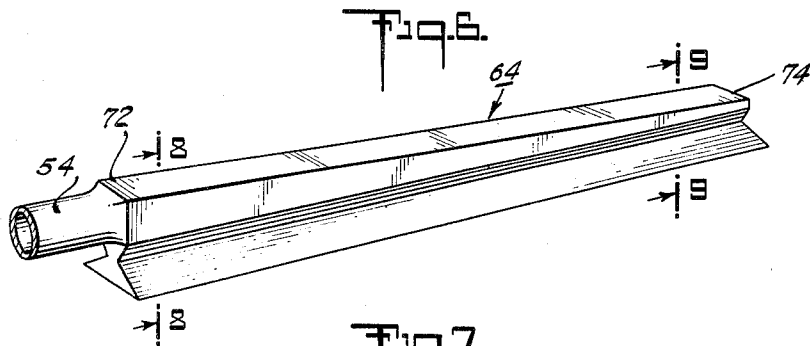
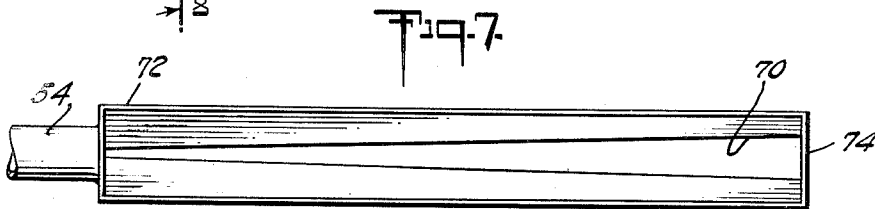
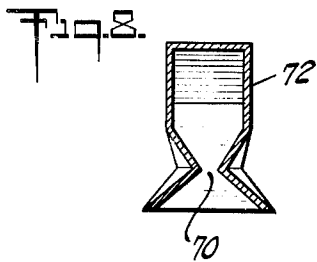
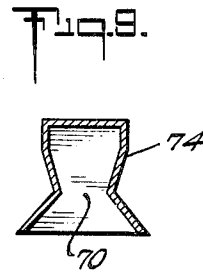
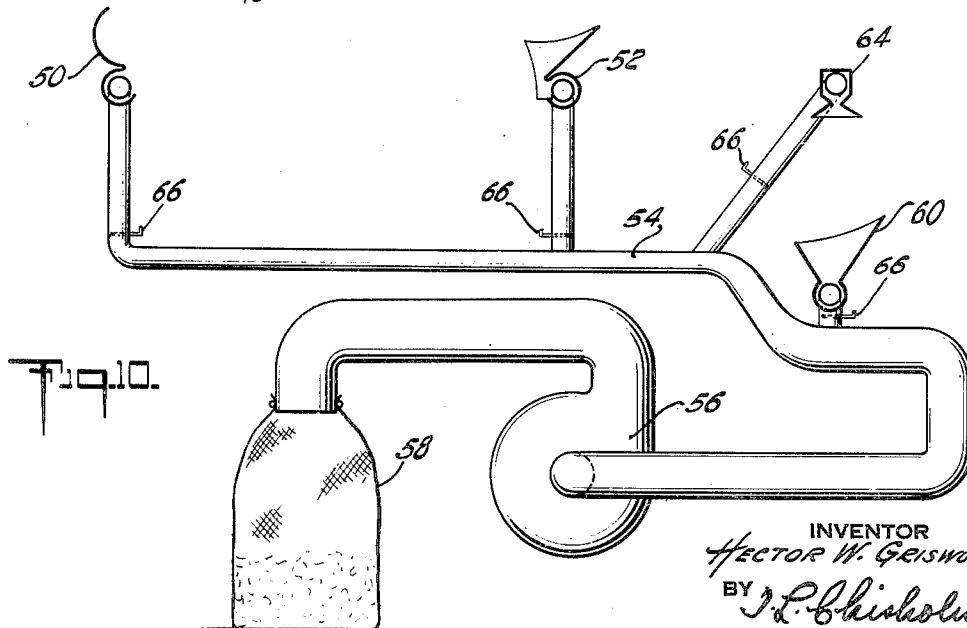
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FLY PREVENTION FOR CARDS

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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FLY PREVENTION FOR CARDS

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9 Claims. (Cl. 19—98)

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This invention relates to means and methods of eliminating or materially reducing the amount of lint and dust thrown into the air by textile carding machines.

Carding machines, or cards, have always released into the air annoying and dangerous quantities of a mixture of lint and dust, sometimes collectively called fly. The lint comes from the fibers which are being carded, both as complete fibers lost from the carding operation and as short pieces of fiber broken off in the course of separating the fibers from one another. The dust comes from dirt and trash (for example cotton leaf and stalk) originally mixed with the fibers but separated from the fibers as part of the carding operation. The rapidly rotating parts of the card throw off the fly and create air currents which carry it out into the room. It is impossible to make the cards air tight, for openings are necessary to feed in fiber and to remove the carded fiber, and in the case of revolving flat cards the design of the cards inherently requires a very large opening between the card cylinder and the air, in which opening the flats are located in carding relationship with the cylinder.

The quantities of lint and dust released are impressive. The lint or fiber collects rapidly like a virulent and grotesque fungus on all surfaces exposed to the air in the room. Unless this is frequently removed it forms a dangerous fire and explosion hazard and interferes with the operation of the machines. Cleaning also requires frequent stopping of the machines. The presence in the air of so much solid matter causes intense discomfort, and has long been recognized as a danger to the health of the people working around the cards.

Carding mill operators have always recognized the importance and expense of this problem, and much effort and time have been devoted to attempts to reduce the fly. However, as far as I am aware, no one has succeeded in adequately reducing the solids in the air by any means which can be economically and practically operated. In previous attempts, the solids content of the air has not been importantly reduced, or the operation has been prohibitively expensive, or else the operation and adjustment of the cards has been seriously hampered. The problem has been especially acute with revolving flat cards.

My invention is based in part on my discovery that gentle air currents can be created and controlled through the card itself and in the space immediately surrounding the card, in ways heretofore believed impossible, and that these currents

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can collect the lint and dust without disturbing the carding operation or the resulting web, or sliver, and so substantially eliminate the fly from the air by preventing its getting into the room.

This invention enables me to eliminate or substantially reduce the fly by simple means which can be economically constructed and operated without interfering with the normal operation or adjustment of the card.

The following description and the accompanying drawings show, for illustration only, one form which my invention may take.

In the drawings:

Fig. 1 is a diagrammatic vertical longitudinal section of one form of card embodying one form of my invention;

Fig. 2 is a perspective of the structure of a portion of the apparatus enclosed within the dotted line 2—2 of Fig. 1;

Fig. 3 is an enlarged section on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged structural section taken on the section line 4—4 of Fig. 1;

Fig. 5 is a fragmentary section on the line 5—5 of Fig. 4;

Fig. 6 is a perspective of one form of hood for collecting lint and fly from the card;

Fig. 7 is a plan view of the hood as seen from below Fig. 6;

Fig. 8 is a section on the line 8—8 of Fig. 6;

Fig. 9 is a section on the line 9—9 of Fig. 6; and

Fig. 10 is a diagram of one form of air piping and filtering system.

Apparatus embodying my invention may be used with any suitable conventional card. As diagrammatically represented in Fig. 1 this may have the usual lickerin cylinder 10, fed by any suitable picker lap 12, and which separates and delivers fibers to a main card cylinder 14, which combs or cards the fibers in cooperation with the flats 16 and delivers the fibers to a doffing cylinder 18 from which they are removed in the form of a card web 20 by the doffing comb 22. The flats are arranged in an endless chain which is separated by wheels and sprockets into two spaced flights 24 and 26, separated by bights 24a and 26a, the flight 24 being guided so that the clothed surfaces 27 of the flats are maintained in carding relationship with the card cylinder throughout a large part of its circumference. The flats are moved very slowly in the direction of rotation of the card cylinder so that any fibers clinging to them are progressively removed by the stripping brush 28. This movement is so slow that the flats may be considered stationary as far as action on the

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fibers is concerned. A casing 30 encloses as much of the card proper as is practical. However various large openings in the casing are essential. The most important of these is at the space occupied by the flight 24 of flats. Another large opening occupies a substantial portion of the circumference of the doffing cylinder to permit withdrawal of the carded web and operation of the customary vacuum stripper. The casing 30 includes shields 31 adjacent the main and doffing cylinders; and includes shield or cover 33 adjacent the lickering roll 10 and proximate portions of the main cylinder. These shields extend substantially the full axial length of the cylinders. As so far described the construction and operation of the card are well known.

Each flat 16 consists mainly of a bar 32 of T-shaped cross section (Fig. 3) extending across the width of the card cylinder. At each end, each bar has a lug 34, which is pivoted to an endless chain 36 at pivot points 37 (Figs. 3, 4, 5). The two endless chains pass over a pair of sprockets 38 (Fig. 3) and suitable wheels or rollers 40 (Fig. 2). As shown in Fig. 1 the chains and flats form a flight 24 which is concave with respect to the card cylinder, and a flight 26 which consists of a series of loops 42, which are convex with respect to the card cylinder, in which the individual flats are upside down with respect to the flats in the flight 24. Due to the offset position of the pivot points 37 with respect to the clothed surfaces 27 of the flats, the clothed faces of the flats can be very closely spaced (for example $\frac{1}{2}$ inch apart) or even in contact with each other when the flats are disposed in the flight 24 or the loops 42. But where the chain passes over the sprockets 38 and over the rollers 40, the flats are necessarily widely separated, the interval between them being of the order of $\frac{3}{8}$ to $\frac{1}{2}$ inch. The space between the two flights may be of the order of eight inches.

The closely spaced flats in the two flights in effect form walls of an air chamber or passage 44 open at both sides throughout the length of the flights. The widely separated flats which are passing over the rolls 43 and the sprocket 38 provide slots 46 constituting passages connecting with the main passage 44. The invention includes any suitable means for maintaining a gentle current of air through the passages 46 (which current entrains fly) and conveying this air to any suitable filter for separating the fly.

As exemplified herein, the means for creating and maintaining this air current includes a hood 50 close to the flats where they pass over the rolls 40 at the left of Fig. 1, and a hood 52 below and adjacent the flats where they pass over the sprockets 38 at the right of Fig. 1. Shield 33 is provided at one end with an apron 57 as shown which is disposed closely adjacent and in gas-tight contact with the other edge of hood 50 at 57a. These hoods are connected to any suitable suction duct 54 which leads to an exhaust fan 55. This draws air into the passage 44 at two principal entrances, these being the two sides of the space between the flights. Entering air currents are represented by the arrows in Fig. 4. Air leaves the passage 44 through two principal exits, the two sets of slots 46 at the ends of the flights. This current of air carries with it, into the hoods 50 and 52 a very large proportion of the fly liberated by the lickering and by the main card cylinder. This fly is carried to the filter 58 by the fan 56 and so is kept out of the atmosphere surrounding the card.

According to one embodiment of the invention, 75

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therefore, bight 24a adjacent lickering 10 is provided with a suction hood 50 for collecting air across the width of the lickering, said hood being adjacent the lickering cover 33 and arranged to draw air through said bight 24a and to draw in fly released adjacent cover 33.

The hood 52 is provided with an apron 59 which extends beneath the stripping brush 28 and as close to it as practical. This apron may, if desired, be provided with end pieces 59a to cause as much as possible of the air drawn into the hood to be drawn from the passage 44. The apron also serves to catch clumps of fibers which drop from the stripping brush 28. For best results the longitudinal air intake throttling slot 52a in the hood 52 should be at least about as wide as the maximum space between flats at the bight 26a, as shown in Figs. 1 and 3. Although appreciable quantities of air can be drawn into the hoods from outside the passage 44, sufficient air is drawn into passage 44 through its side entrances and thence out through the two sets of slots 46 to prevent important quantities of air and fly from leaving the main cylinder or lickering except through the filtering system.

A hood 63, provided with aprons and end pieces similar to hood 52, is preferably provided near and below the web 20 where the web passes from the doffing comb to the take off rolls 62. This serves two purposes. It creates a gentle current from the lower surface of the web which carries any fine fly liberated by the doffer comb, and catches any large particles or clumps which may drop from the web, as when a web becomes folded or broken.

A hood 64 is also provided above the doffer comb to suck in any fly liberated by the comb above the web. The hoods 63 and 64 are so placed, and the suction in them is so regulated (for example by slide dampers 66) that the currents drawn into the hoods do not disturb the thin fragile filmy web 20, but merely draw in fly from the neighborhood of this web. In the case of hood 64, the doffer comb and its associated parts protect the web from the current entering the hood.

Each of the hoods is constructed and arranged to provide a uniform suction across the width of the card. This is illustrated in connection with the hood 64 in Figs. 6 to 9. The intake opening 70 is narrow at the end 72 near the suction pipe 54 and progressively increases in width toward the remote end 74. The cross section of the hood is smallest at the remote end and increases progressively to the near end. In this way currents of uniform velocity across the width of the card enter the opening 70.

The invention claimed is:

1. A card comprising in combination a main card cylinder, a lickering, a lickering cover, an endless chain of flats in carding relationship to the cylinder and arranged in a pair of flights separated by a pair of bights, one of the bights being adjacent the lickering and a suction hood for collecting air across the width of the lickering, said hood being adjacent the lickering cover and arranged to draw air through said adjacent bight and to draw in fly released adjacent the cover.

2. In a card, the combination of a card cylinder, and endless chain of flats in carding relationship with the cylinder, the flats being disposed parallel to the axis of said cylinder in a pair of flights separated by a pair of bights, said flats being relatively close together substantially throughout the flights and relatively separated at the bights, whereby said flats form an air en-

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closure having side openings between the flights and end openings between the flats at the bights, hood means circumferentially coextensive with and in suction-applying relation with a sufficient portion of each of said bights to cause controlled currents of air to flow continuously at a substantially constant rate into said enclosure through said side openings and out of said enclosure through said end openings to exhaust into said hood means, and means for separating solids from the air so exhausted.

3. The method of reducing the amount of solids suspended in the air surrounding the web being doffed from a flat card, which method comprises inducing a flow of air away from the regions immediately above and below said web, collecting said air through suction hoods above and below said web, controlling said flow of air thereby to reduce substantially the amount of solids suspended in the air, and separating the solids from the air collected.

4. A card comprising in combination a main card cylinder, a doffing cylinder, a cover for adjacent segments of the cylinders, an endless chain of flats in carding relationship to the main cylinder, the flats being arranged in a pair of flights separated by a pair of bights, one bight being above the cover, means for removing fibers from the flats in said bight and a suction hood underlying and in suction-applying relation with a substantial portion of the area of said bight for collecting air across the width of the cover, said hood having a longitudinal air intake throttling slot at least about as wide as the maximum space between flats at the bight and being constructed and arranged to draw in fly released adjacent the bight and to draw in fibers dropped by the removing means.

5. A card comprising in combination a doffing cylinder, a doffing comb for removing fibers from the cylinder, means for collecting continuously a web of fibers doffed by the comb, and a suction hood localized near the comb extending the width of the web and arranged to draw in fly released at the comb, the hood having horizontal dimension transverse to the length of the comb substantially smaller than its longitudinal dimension, said hood being constructed and arranged on the opposite side of said comb from said web so as to minimize disturbance of the web by drafts induced by the hood.

6. A card comprising in combination a doffing cylinder, a doffing comb for removing fibers from the cylinder, roller means for collecting continuously a web of fibers doffed by the comb, a suction hood extending the width of the web subjacent and in suction-applying relation with the portion of said web between said comb and said roller means, and means for inducing a gentle suction in said hood for drawing fly from the

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regions immediately below the web while leaving the web intact.

7. The method of reducing the amount of solids suspended in the air surrounding a flat card having a card cylinder and an endless chain of flats in carding relationship with the cylinder, the flats being disposed parallel to the axis of the cylinder and in a pair of flights separated by a pair of bights, said flats being relatively close together substantially throughout the flights and relatively separated at the bights, whereby said flights form an air enclosure having side openings between the flights and end openings between the flats at the bights, which method comprises continuously flowing air into said enclosure through said side openings, continuously exhausting the air from said enclosure through said end openings, and controlling the air flow at a substantially constant rate sufficient to reduce the amount of solids suspended in the air surrounding said flat card.

8. A card comprising in combination a doffing cylinder, a doffing comb for removing fibers from the cylinder, a suction hood localized near the comb extending the entire width of the web and arranged to draw in fly released at the comb, means separate from said hood for collecting continuously a web of fibers doffed by the comb, the hood having horizontal dimension transverse to the length of the comb substantially smaller than its longitudinal dimension, and means for inducing a gentle draft in the suction hood for withdrawing fly from the vicinity of the comb while leaving the web intact.

9. The method of reducing the amount of solids suspended in the air in the neighborhood of the fiber-removing means at the doffer end bight of the chain of flats of a flat card, which comprises inducing a flow of air downwardly past said fiber-removing means and from said bight, collecting said air by hood means spaced from the bight, and controlling said induced air flow at a substantially constant rate sufficient to retard escape of fly which tends to be released from said flats.

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