Nov. 3, 1970 J. F. KING, JR 3,537,144

RECIRCULATION OPENER AND CLEANER FOR THE LICKER-IN SECTION OF CARDING MACHINES

Filed Sept. 20, 1968 2 Sheets-Sheet 1

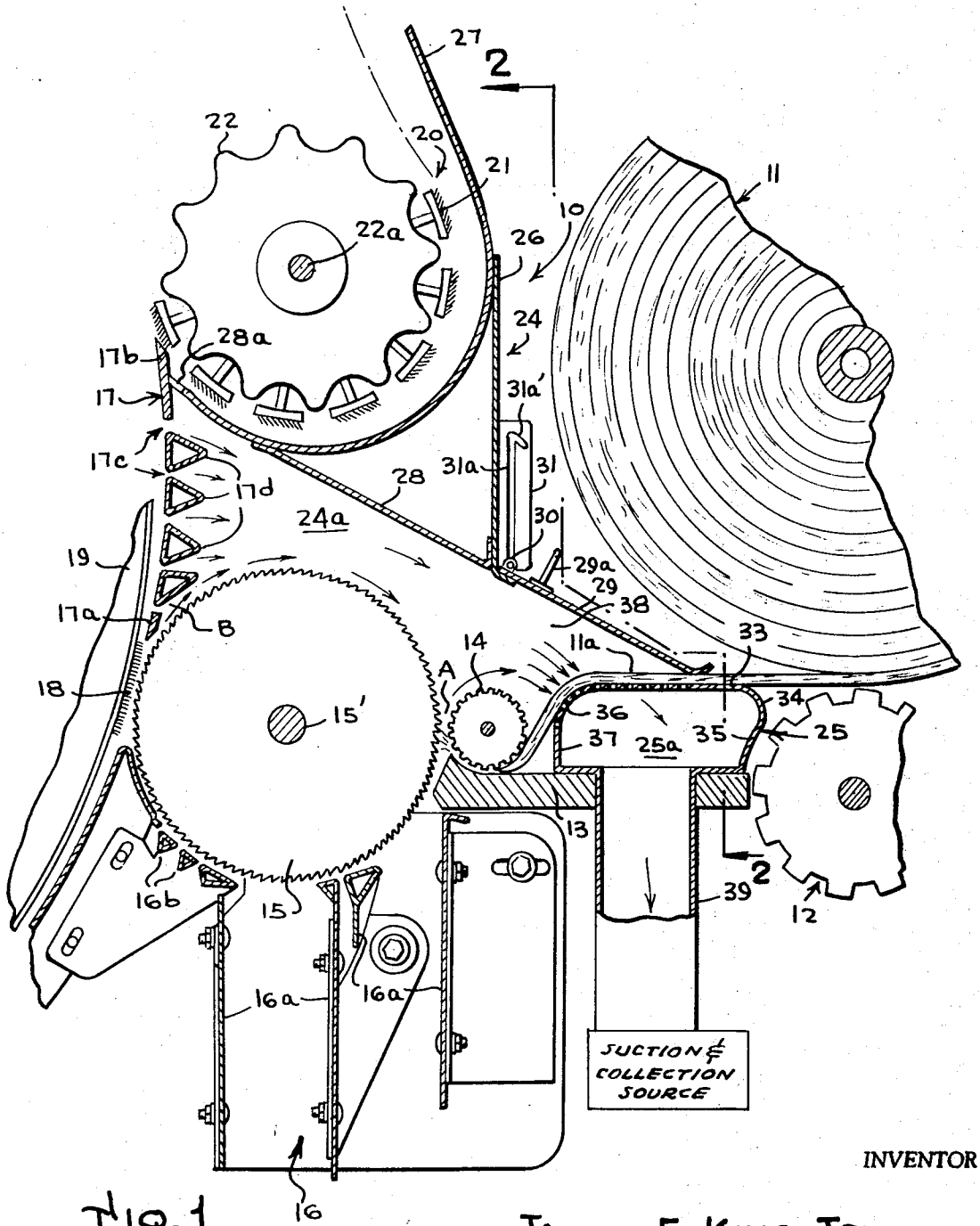


Fig-1

INVENTOR

JAMES F. KING, JR.

BY Mason, Fenwick & Lawrence ATTORNEYS

Nov. 3, 1970 J. F. KING, JR 3,537,144
RECIRCULATION OPENER AND CLEANER FOR THE LICKER-IN SECTION OF CARDING MACHINES
Filed Sept. 20, 1968 2 Sheets-Sheet 2

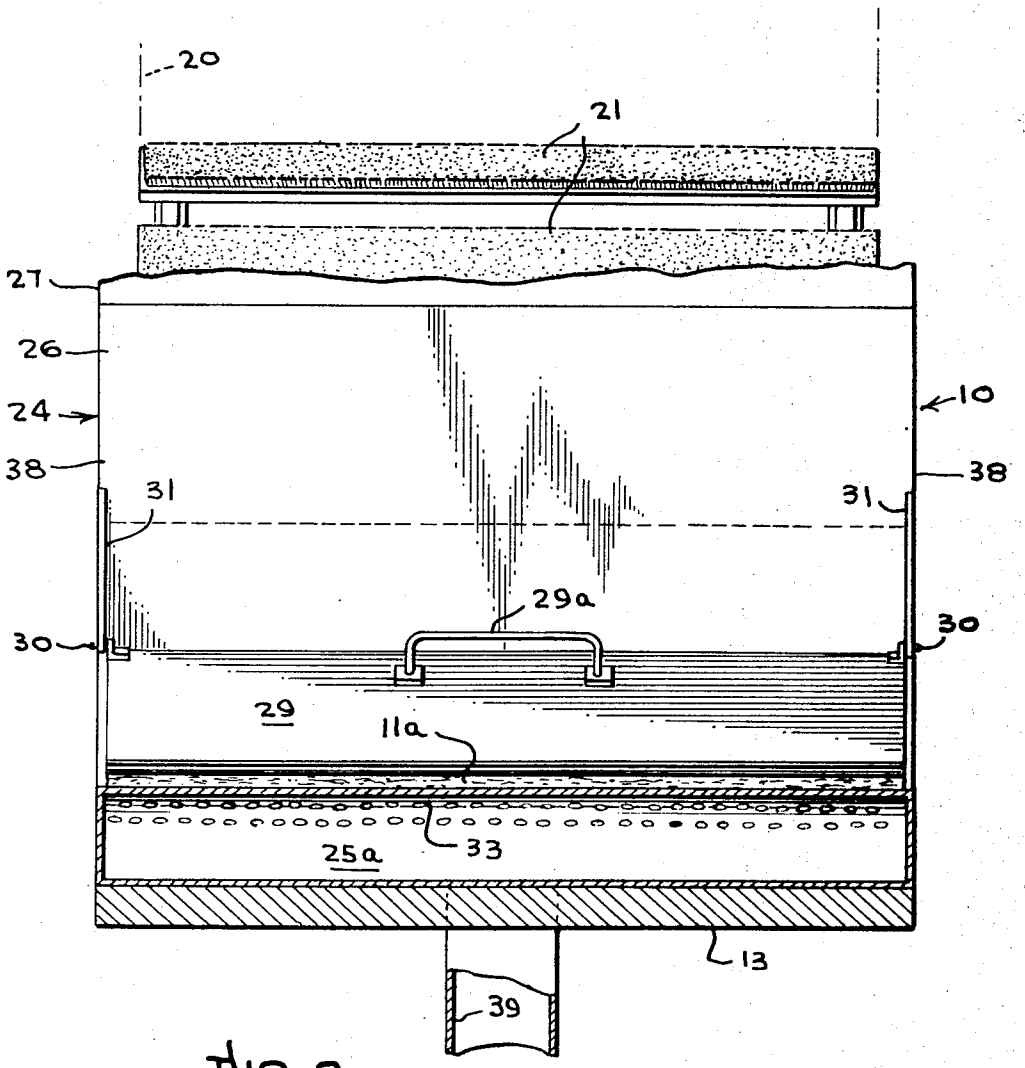


FIG-2

INVENTOR
JAMES F. KING, JR.
BY
Mason, Fenwick & Lawrence
ATTORNEYS

United States Patent Office 3,537,144 Patented Nov. 3, 1970

3,537,144

RECIRCULATION OPENER AND CLEANER FOR THE LICKER-IN SECTION OF CARDING MACHINES

James F. King, Jr., Winston-Salem, N.C., assignor to The Bahnson Company, Winston-Salem, N.C., a corporation of North Carolina

Filed Sept. 20, 1968, Ser. No. 761,131
Int. Cl. D01g 15/82
U.S. Cl. 19—107 14 Claims

ABSTRACT OF THE DISCLOSURE

A suction manifold assembly for the licker-in section of carding machines having a first upper suction chamber overlying the licker-in, the feed roll, and a portion of the lap leading to the feed roll, and a second lower suction chamber underlying that lap portion, with suction applied to the second suction chamber and communicated to the first suction chamber to capture fly from orifices adjacent the licker-in and deposit usable fiber constituents of the fly on the lap portion as the captured fly is conveyed in flow streams through the lap portion toward the second suction chamber.

BACKGROUND AND OBJECTS OF THE INVENTION

The present invention relates in general to pneumatic cleaning of carding machines, and more particularly to suction manifold structure for the licker-in section of a carding machine for pneumatically capturing and removing dust-like trash and lint, herein often generally referred to as fly, being discharged as blowout from the licker-in region of a carding machine during operation, and for recirculating tufts of cotton and usable cotton fibers entrained with this blowout back to the lap for reprocessing through the licker-in.

Much effort has been devoted to the elimination or reduction of escape of fly, usually in the form of a mixture of short waste fibers and trash, from carding machines, especially as the problem of fiber and trash escape increased with increasing speeds of operation of the carding machines. It is important to eliminate or minimize the escape of such fibers and trash into the air in the textile machinery room, as the resultant contamination would produce unhealthy working conditions for the operators, impair the quality of the silver because of intermingling of the airborne trash therewith, and cause deposits of the contaminants on the machinery in the room creating fire hazzards and interference with operation of the machinery.

Various pneumatic cleaning devices have been proposed to effect suction withdrawal of fly from carding machines or various portions thereof to reduce the escape of the fly into the surrounding atmosphere. Particular effort has been devoted to the design of pneumatic cleaning equipment for preventing or reducing the escape of fly and similar trash from the licker-in region of the carding machine, as especially troublesome discharge of trash occurs in this region. As will be appreciated by those skilled in the art, the licker-in section of a standard carding machine of the flats chain type includes a licker-in cylinder which rotates at high speed beneath a licker-in cover or bonnet and has teeth on its periphery to draw

the cotton as fibers or tufts from a lap being fed thereto between a feed roll and feed plate and convey them downwardly in an arcuate path past mote knives or a fiber retriever section, to a main cylinder or swift. There, some of the cotton is transferred directly to the main cylinder, and some of it is impinged against the sharp knife edge of a back knife plate adjacent the main cylinder periphery and retained momentarily. Any cotton that is not immediately picked up off the knife edge or by the main cylinder is wiped off the knife edge by the rotating licker-in cylinder and is conveyed under the licker-in cover back to its original feed end location. Thus, a large quantity of usable fiber is being conveyed in a circular manner at all times underneath the licker-in cover and any opening in this cover will allow usable fibers to escape to the atmosphere. Obviously, there is also a large amount of waste spinning around this licker-in cylinder underneath the licker-in cover along with the cotton, and such waste tends to be centrifuged out to the outermost possible location. The slight separation or spacing at the junction between the exit edge of the licker-in cover and the back plate of the conventional card, and at the junction between the feed roll and the adjacent entrance edge of the licker-in cover each constitute junction openings or spaces through which this trash can escape.

Efforts have been made to minimize blowout of cotton and fly at these locations by providing a seal or filler strip at the junction between the licker-in cover and back plate and a rotatable seal roller or scavenger roll bearing against the feed roll and overlying the junction between the feed roll and the licker-in cover. Neither of these seals, however, has provided a satisfactory solution to the problem of eliminating escape of trash from these zones, due in part to the inability to maintain a perfect seal at these junction orifices.

In an effort to solve the problems of contaminant discharge from these licker-in regions, pneumatic cleaning devices in the form of suction manifold structures have been developed to establish a reduced air pressure region above the licker-in cover in communication with the junction openings between the licker-in cover and back plate and between the feed roll and the licker-in cover, to produce suction air streams which capture the trash and fly being discharged from these zones and withdraw the captured material to a remote collection facility. However, it has been found from studies of the captured material withdrawn from these junction openings, especially the opening between the licker-in cover and feed roll, when pressure is reduced above these openings that the amount of usable fiber removed increases rapidly as the air pressure is reduced below atmospheric pressure. For example, if one inch of water suction pressure is applied to the junction opening between the licker-in cover and feed roll (without a scavenger roll covering this opening), about 4.25 percent of usable cotton is withdrawn as waste, and if even one-quarter inch suction pressure is applied, 2 percent of usable cotton is withdrawn, producing intolerable loss of good fiber. Exceedingly difficult design problems are thus presented to achieve effective cleaning by suction removal of fly and trash from these junction openings while keeping to an absolute minimum the loss of usable fiber carried away by suction.

Also, the licker-in cover presents problems, as it limits the licker-in speeds due to the air pumping action of the licker-in rotating immediately beneath the cover and the

inherent increase in loss of good fiber as air recirculated by the licker-in increases, and the cover also retains seated on the licker-in teeth the fibers not transferred to the main cylinder and thus retards any unloading of the teeth as they progress from the back knife plate to the lap to receive more incoming fibers from the lap. However, increasing licker-in speeds above those normally employed achieves improved trash removal.

An object of the present invention, therefore, is the provision of a suction manifold structure for use at the licker-in region of carding machines which produces suction pressure conditions for drawing air, and thus capturing trash and fly from the junctions between the feed roll and licker-in and between the licker-in and back plate of a carding machine, and which filters the captured material through the lap being presented to the feed roll to retain on the lap and recirculate through the licker-in any cotton fibers in the captured material.

Another object of the present invention is the provision of a novel suction manifold for the licker-in section of carding machines as defined in the immediately preceding paragraph, wherein the portions of the licker-in above and between the junctions of the licker-in and the feed roll and back knife plate are uncovered and directly exposed to the suction zone in the manifold, permitting partial unloading of the licker-in teeth during return toward the feed roll and higher licker-in speeds.

Another object of the present invention is the provision of a novel suction manifold for the licker-in section of carding machines, wherein tufts and fibers which will not card properly at the flats are allowed to escape from the main cylinder after passage behind the back knife plate and are recirculated to the lap to be reprocessed by the licker-in.

Other objects, advantages and capabilities of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings illustrating a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a vertical section view of the suction manifold structure of the present invention installed at the licker-in section of a carding machine, with fragmentary diagrammatic and sectional illustration of certain carding machine components, and

FIG. 2 is a vertical section view of the manifold structure taken along the line 2—2 of FIG. 1.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings, and particularly to FIG. 1, the suction cleaning and fiber retrieving manifold assembly of the present invention, indicated in general by the reference character **10**, is shown in its proper relationship and reasonably to scale relative to the card components in the licker-in section of a conventional flat carding machine. This includes the usual lap roll **11**, in the form of a rolled batt of cotton, shown in outline form, which rests on a revolving lap drive roller **12**, so that the lap can be fed from the lap roll **11** along a feed path between a feed plate **13** and under feed roll **14** into the teeth of the licker-in cylinder **15**. The licker-in cylinder is mounted for rotation in the usual manner about a shaft **15'** supported by bearings on the usual apron or main frame of the carding machine. The cotton is drawn off the lap **11** at the raw edge of the batt **11***a* and conveyed downwardly as fibers or tufts past the usual series of note knives (not shown) or past a fiber retriever section **16** of conventional construction formed of vertical baffles **16***a* and screen bars **16***b*, and thence to the zone immediately below the lower edge of the back knife plates **17** where the fibers are either transferred directly to the spiked clothing **18** of the main cylinder **19** or are impinged and retained momentarily against the sharp lower knife edge **17***a* of the back knife plate and then reconveyed

by the rotating licker-in cylinder back to the original feed end location. The usual flats chain **20** having flats bars **21** negotiates the usual path about the upper periphery of the main cylinder **19** defining a bight above the licker-in where the flats chain rounds the flats idler **22** journaled on the usual stud or bolt **22***a*.

The manifold assembly **10** of the present invention includes an upper manifold section **24** defining a first suction chamber **24***a* above the licker-in **15** and feed roll **14** and the lap **11***a* and a lower manifold section **25** below the lap **11***a* between the latter and the feed plate **13** defining a second suction chamber **25***a*. The upper manifold section **24***a* is formed of a vertical plate **26** transversely spanning the width of the carding machine spaced above the feed roll **8** and joined at its upper end, as by welding, to a curved baffle sheet **27** extending from a location above the flats idler **22** outwardly adjacent the path of the outer flight of the flats chain **20** about the bight to a location closely adjacent the upper end of the back knife plate **17**. An internal filler plate **28** is joined to the baffle sheet **27** at a location near the lowermost portion of the baffle sheet and inclines downwardly to join the vertical plate **26**, to tend to keep the velocity up through the entire upper manifold section **24** and give a more positive direction to the flow of air and fibers. A cover plate **29**, preferably of transparent material, permitting observation of the interior of the suction chamber **24***a*, overlies the picker lap **11** entering the card. The cover plate **29** includes a handle **29***a* and is mounted to the vertical plate **26**, for example, by outwardly projecting pins **30** at the upper edges of the cover plate **29** extending into companion guide brackets **31** having a guide slot **31***a* therein in which the pins **30** track to permit manual elevation of the cover plate **29** from the lower position illustrated in solid lines lying substantially in the extended inclined plane of the filler plate **28** to an upper position, shown in broken lines, wherein the pins **30** seat in the upper hook portions **31***a'* of the slots **31***a*. In this upper position, the cover plate **29** swings straight downward to offer a partial seal but expose the feed roll for manual cleaning of contaminants therefrom or piecing a new lap between the feed roll and feed plate. The cover plate **29** acts as a safety device in this raised position to protect the machine tender from inadvertently getting his fingers in contact with the teeth of the licker-in cylinder **15**, and also serves to reduce discharge of fly into the room when the new lap is being applied and while the card is still in full scale operation. It will be noted that there is no licker-in cover or bonnet overlying the licker-in cylinder **15** in this construction, so that the upper portions of the licker-in lying between the licker-in junctions with the feed roll **14** and back knife plate **17** are fully exposed to the suction chamber **25***a*.

The lower manifold section **25** is in the form of a generally rectangular cross section, elongated box-like member, spanning the width of the feed plate **13**, overlying the feed plate and including a perforated top wall **33** joined by a rounded nose **34** at the entrance edge thereof to the front wall **35** and by a rounded surface **36** to the rear wall **37** adjacent the feed roll **14**. The round nose portion **36** in proximity to the feed roll is perforated for the entire arc of the curve as well as the entire width of the top wall **33** underlying the lap **11***a*. The ends of the chamber defined by the manifold section **25** are closed in any desired manner, as by extensions of end plates **38** which close and seal the opposite ends of the upper manifold section **24**. The interior of the second suction chamber **25***a* defined by the lower manifold section **25** is connected to a conventional source of suction, such as the air handling system of the mill by suction connection **39**, here shown as extending through a hole in the feed plate **13**, so that it may be attached from underneath the card. If desired, the suction connection to the interior of the lower manifold assembly **25** may be made from either end rather than by the bottom suction connection **39** shown.

Instead of using the usual solid back knife plate **17**, the back knife plate is modified to preserve the lower knife edge **17***a* adjacent the junction between the licker-in **15** and main cylinder **19** and the upper knife edge **17***b* adjacent the junction between the flats chain and the main cylinder, but the intermediate region of the back knife plate is cut out to provide an opening **17***c* and screen bars **17***d* defining a screen which allows escape of dirt and dust from the region between the back knife plate and the perimeter of the main cylinder and allow escape and recirculation of tufts of cotton which have not been evenly distributed on the main cylinder clothing **18**.

It will be apparent that by this construction, suction pressures are established in the second suction chamber **25***a* and communicated through the overlying lap **11***a* to the suction chamber **24***a* to capture trash and fly from the junction orifice A defined between the licker-in **15** and feed roll **8** and the junction orifice B defined between the licker-in and the lower knife edge **17***a* of the back knife plate **17**, by drawing air upwardly through these junction openings A and B and create suction air streams to move the captured material, which is predominantly fibers, to the lap **11***a* overlying the perforated top **33** of the lower suction chamber **25***a*. The suction system is regulated to remove more air from the general plenum defined by the upper suction chamber **24***a* above the licker-in than the licker-in plus main cylinder would be pumping into the upper suction chamber **24***a*. Thus, the entire area of the upper suction chamber **24***a* is under a mild suction pressure, creating a reasonably slow moving air stream which captures all fibers which are discharged from the junction zones A and B and redeposits them evenly on the filtering cotton lap **11***a* overlying the perforations in the lower manifold section **25**. If desired, a small orifice, indicated by the reference character **28***a*, may be provided near the junction between the flats and the main cylinder **19** to draw some air from this junction region and relieve any small but possible blowout that can occur at this pressure point, and also to cause a mild flow of air down and around the bight of the flats chain **20** from the outside to convey an trap any fibers that may happen to fall in the curved upper section of the manifold defined by the baffle sheet **27**. By this construction, a reasonable amount of suction can be applied to all of the licker-in pressure points, particularly those at the junction orifices A and B, without a disastrous loss of usable fiber, since all of these discharge points are separated from the suction system by the lap **11***a* overlying the perforated top wall of the lower manifold section **25**, whereby the lap acts as a very effective filter for usable fibers, but allows dust and short staple material to pass through into the lower suction chamber **25** for withdrawal to the remote collection point. The absence of a licker-in cover overlying and closely adjacent the periphery of the licker-in aids in keeping air from being pumped by the licker-in cylinder **15** revolving at high speed and allows a higher licker-in speed for better trash removal without the inherent loss of good fiber which would arise from comparable increases in licker-in speed where a licker-in cover is present.

Removal of the cover also allows the licker-in to partially unload itself, certainly of unopened tufts, so that it presents itself to the incoming fibers of the lap in a much sharper, receptive condition. Also, the maintenance of a mild suction pressure immediately above the junction orifice A between the licker-in **15** and feed roll **8** avoids the affects on transfer of cotton in this region caused by the high pressure air normally existing at this junction, and the absence of the significantly downwardly directed air stream through this junction A normally produced when a licker-in cover is present avoids the adverse tendencies of such a downwardly directed air flow to keep the long fibers of cotton from adhering solidly to the teeth of the licker-in cylinder and to blow fibers away from the mote knives or the baffles of a fiber retriever where they become lost in this cleaning section of the card.

Furthermore tufts of unopened cotton and loose fibers, which have not been evenly distributed on the main cylinder clothing and will not card properly when they reach the flats, are allowed to escape with pumped air through the screen defined by the orifice **17***c* in the back knife plate and the screen bar **17***d* as they pass upwardly between the back plate and the main cylinder, to be conveyed by the air stream in the upper suction chamber **24***a* and be redeposited back onto the lap **11***a* overlying the perforated top wall of the lower suction chamber **25** to be again attacked an dopened by the licker-in. The screen in the back knife plate **17** will also keep random, unattached fibers from rolling between the back knife plate **17** and the main cylinder **19** until they come off the upper knife edge **17***b*, where they may cause neps which cannot be restraightened and paralleled by the operation of the flats against the cylinder **19**. Also, cotton fibers which continue to adhere to the main cylinder **19** after passing the screen in the back knife plate would then be smoothed down by the upper knife edge **17***b* and fed onto the flats **21** in an almost conventional manner, but with no air flow, since most of the air would already have escaped through the screen openings between the screen bars **17***d* by the time the cotton reaches the location of the flats. This general escape of air through the screen in the mid-region of the back knife plate **17** into the upper suction chamber **24***a* causes much less blowout and fiber loss at the junction between the flats **21** and the main cylinder **19** where inherent detrimental reversal of fibers occurs, because of the substantial absence of blowout air flow at this junction. Otherwise, the fibers at this junction would have a great tendency to follow the blowout of air. Thus, by the present construction, the fibers, fly and dust captured from the junction orifices forming the normal sources of escape of this material are captured by the suction air streams in the upper suction chamber **24***a* and conveyed to the lap **11***a* overlying the lower suction chamber **25***a* where the lap acts as a filter to collect and feed back to the licker-in the usable fiber material and allows the dust and short staple to pass through into the lower suction chamber **25***a* and out to the external collection facility. In this manner, effective suction pressures can be applied to the junction orifices where this material normally escapes to capture and remove this material without passage into the mill room, while preventing loss of good usable fiber material as waste.

It will be appreciated that the present invention can be applied with similar advantage to other types of carding machines other than the type employing a continuous and rotating chain of flat bars described herein by way of illustration. For example, the suction clearing and fiber retrieving manifold **10** can also be installed in the licker-in section of roller top cards which have a number of slowly revolving, clothed rolls replacing the conventional chain of flats bars, or in the licker-in section of granular top cards having a top plate overlying the upper region of the main cylinder covered on its lower surface confronting the main cylinder periphery with coated fabric material forming the granular carding surface. In such installation, the manifold **10** also defines a lower suction chamber below the lap directly connected to the suction source and an upper suction chamber overlying the licker-in cylinder and feed roll and communicating with the lower suction chamber through the lap portion leading to the feed roll to collect on the lap the usable fibers captured with the trash blowout from the junction orifices into the upper suction chamber.

What is claimed is:

1. In a carding machine having a main cylinder, a licker-in having a portion lying closely adjacent said main cylinder at a selected transfer zone for conveying fibers to the main cylinder, and a feed roll and underlying

feed plate for feeding a fiber lap along a lap feed path to said feed roll and onto said licker-in, said licker-in defining first and second junction orifices with said feed roll and adjacent said main cylinder at said transfer zone respectively through which fly can discharge; a suction manifold assembly for capturing the fly discharged through said junction orifices comprising wall means defining first and second suction chambers, said second chamber including a perforated top wall forming a common wall of said chambers located immediately upstream from said feed roll over which the lap is drawn along said lap feed path, said suction chambers being in communication with each other only through said perforated top wall whereby the lap portion drawn over the latter forms an air-pervious filtering web separating said chambers, said first suction chamber overlying said licker-in and feed roll and said perforated top wall in open communication with said junction orifices, and means applying suction from a suction source directly to said second suction chamber to establish suction conditions therein and communicate suction conditions through said perforated top wall and the lap portion covering the same to said first suction chamber for drawing air and fly from the region of said junction orifices into said first suction chamber and conveying the same in flow streams passing through said covering lap portion into said second suction chamber to thereby filter out usable fibers and collect the same in said covering lap portion.

2. Apparatus as defined in claim 1, wherein said first suction chamber is in open communication throughout with the upper portion of said licker-in extending between said feed roll and said transfer zone.

3. Apparatus as defined in claim 1, including a back knife plate having a lower knife edge upwardly adjacent the junction between the licker-in and main cylinder and a body portion extending upwardly therefrom about the periphery of the main cylinder forming a bounding wall of said first suction chamber, said body portion having screen means therein defining openings therethrough for escape of air and fibrous material from adjacent the periphery of the main cylinder into said first suction chamber.

4. Apparatus as defined in claim 2, including a back knife plate having a lower knife edge upwardly adjacent the junction between the licker-in and main cylinder and a body portion extending upwardly therefrom about the periphery of the main cylinder forming a bounding wall of said first suction chamber, said body portion having screen means therein defining openings therethrough for escape of air and fibrous material from adjacent the periphery of the main cylinder into said first suction chamber.

5. Apparatus as defined in claim 3, wherein the carding machine includes a flats chain upwardly adjacent the perphery of the main cylinder having a curved bight portion spaced above said licker-in and said back knife plate has an upper edge adjacent the junction between the bight portion and main cylinder, the accumulated area of the openings defined by said screen means being sufficient to permit such escape of air into said first suction chamber from the region between the confronting surfaces of the back knife plate and main cylinder as to substantially completely eliminate any blowout air flow at the junction between said bight and the upper edge of said knife plate.

6. Apparatus as defined in claim 4, wherein the carding machine includes a flats chain upwardly adjacent the periphery of the main cylinder having a curved bight portion spaced above said licker-in and said back knife plate has an upper edge adjacent the junction between the bight portion and main cylinder, the accumulated area of the openings defined by said screen means being sufficient to permit such escape of air into said first suction chamber from the region between the confronting surfaces of the back knife plate and main cylinder as to substantially completely eliminate any blowout air flow at the junction between said bight and the upper edge of said back knife plate.

7. In a carding machine having a main cylinder, a licker-in for conveying fibers to the main cylinder, a flats chain upwardly adjacent the periphery of the main cylinder having a curved bight portion spaced above said licker-in, a back knife plate having a lower knife edge upwardly adjacent the junction between the licker-in and main cylinder and an upper knife edge adjacent the junction between said bight portion and main cylinder, and a feed roll and underlying feed plate for feeding a fiber lap along a lap feed path to said feed roll and onto said licker-in, said licker-in defining first and second junction orifices with said feed roll and back knife plate respectively through which fly can discharge; a suction manifold assembly transversely spanning the carding machine for capturing the fly discharged through said junction orifices comprising end walls and upper wall means defining a first suction chamber bounded at one side by said back knife plate and along part of its bottom by said licker-in and said feed roll wall means defining a second suction chamber immediately beneath said lap feed path having a perforate top wall covered by a lap portion feeding to the feed roll and communicating with said first suction chamber through said perforate top wall and covering lap portion whereby the latter forms an air-pervious web separating said chambers, and means applying suction directly to said second suction chamber and thereby applying suction through said perforate top wall and covering lap portion to said first suction chamber to draw air and entrained fiber and dust blowout into the latter from the region of said junction orifices and effect suction conveyance of the same through said covering lap portion to said second suction chamber to extract usable fibers from the entrained blowout for collection in the lap portion and pass dust into said second suction chamber.

8. Apparatus as defined in claim 7, wherein said upper wall means includes an upright wall extending from a location spaced above said feed roll alongside said bight portion, a substantially planar sheet extending from the lowermost edge of said upright wall beneath said bight portion at a location adjacent the junction of said bight and upper edge of said back knife plate, and a movable cover plate extending from the lowermost edge of said upright wall over said perforate top wall and having a free edge portion upwardly adjacent said lap portion, and means supporting said cover plate on said upright wall for angular and vertical movement of the cover plate to a substantially vertical position spacing the free edge portion thereof above said feed roll.

9. Apparatus as defined in claim 7, wherein said upper wall means includes a shroud outwardly surrounding the bight portion of said flats chain in substantially concentric relation thereto and terminating in selectively spaced relation adjacent the upper knife edge of said back knife plate defining an opening therewith for passage of discharge from the bight portion therethrough into said first suction chamber.

10. Apparatus as defined in claim 8, wherein said upper wall means includes a shroud outwardly surrounding the bight portion of said flats chain in substantially concentric relation thereto and terminating in selectively spaced relation adjacent the upper knife edge of said back knife plate defining an opening therewith for passage of discharge from the bight portion therethrough into said first suction chamber.

11. Apparatus as defined in claim 7, wherein said first suction chamber is in open communication throughout with the upper portion of said licker-in extending between said feed roll and said back knife plate.

12. Apparatus as defined in claim 7, wherein said back knife plate includes screen means intermediate the upper and lower edges thereof defining openings there-

through for escape of air and fibrous material from adjacent the periphery of the main cylinder into said first suction chamber.

13. Apparatus as defined in claim 7, wherein said first suction chamber is in open communication throughout with the upper portion of said licker-in extending between said feed roll and said back knife plate.

14. Apparatus as defined in claim 7, wherein said back knife plate includes screen means intermediate the upper and lower edges thereof defining openings therethrough for escape of air and fibrous material from adjacent the periphery of the main cylinder into said first suction chamber.

References Cited

FOREIGN PATENTS

1,098,949 1/1968 Great Britain.

DORSEY NEWTON, Primary Examiner

U.S. Cl. X.R.

19—105