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WEB CLEANER

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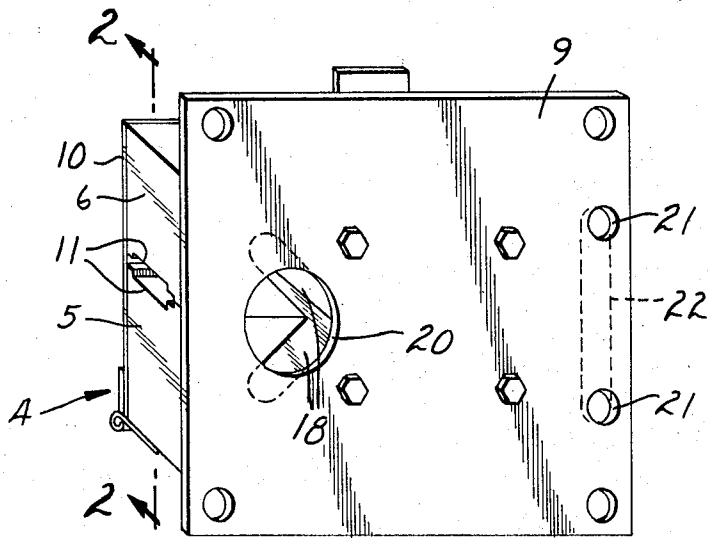


FIG. 1

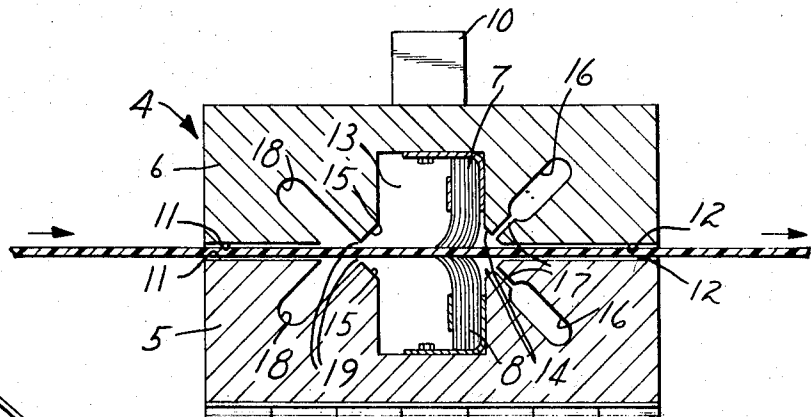


FIG. 2

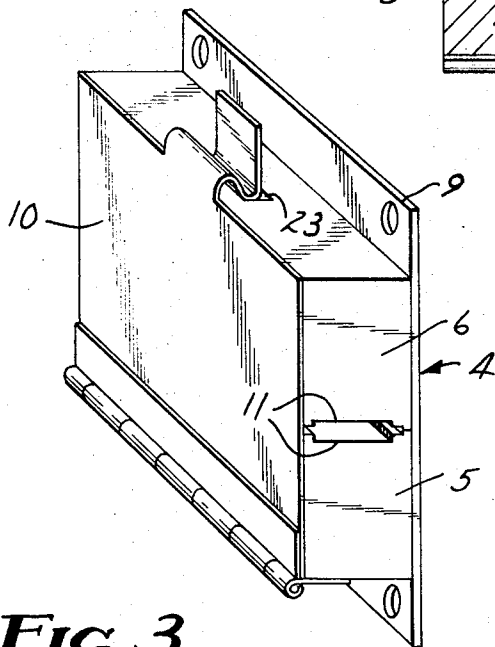


FIG. 3

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WEB CLEANER

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6 Claims

ABSTRACT OF THE DISCLOSURE

A web cleaner having a chamber through which a web is to pass and in which the web is brushed under the action of opposed brushes, one above and one below the plane of the web path forming a curtain across the chamber between areas of negative and positive pressure.

This invention relates to an improved web cleaner for removing dust and lint from a web.

In many applications it is important that a web be free of dust and lint before it is used. Thus, it may be necessary to clean a web before a recording is made on it or to protect the equipment in which it is used. One particular application is in microfilm recording in which case a particle of dust on the surface of the film may obliterate one or more characters. Further, dust carried by the film into the recording area may remain there to partially block the projected image or deflect an imaging particle thereby obliterating or decreasing the resolution of a portion of the recorded image or information. Presently, a flow of air is often used to clean a web but tiny dust particles or pieces of lint may lie flat on the web and be unaffected by the flow of air. Alternatively, brushes have been used to sweep the web, however, the brushes must have soft bristles so that the web will not be scratched. The soft bristles will allow some dust to pass through them while the tips of the bristles become filled with dust and cannot thereafter effectively clean the web.

It is, therefore, an object of the present invention to provide a web cleaner which will effectively sweep loose dust particles and pieces of lint from a web without scratching the surface of the web. It is a further object of the present invention to provide a web cleaner which cleans the brushes and prevents dust and lint from leaving the cleaner through the web entrance or web exit of the cleaner.

The present invention has the advantages desired of a web cleaner and comprises a chamber, aligned entrance and exit slots communicating with the chamber, means creating a negative pressure adjacent the entrance slot, means creating a positive pressure adjacent the exit slot and brush means disposed within the chamber above and below the plane of the entrance and exit slots to define a curtain transverse to the path of a web moving through the slots. When used herein "positive pressure" and "negative pressure" refer to pressures relative to atmospheric pressure. "Positive pressure" referring to a pressure above atmospheric pressure and "negative pressure" referring to a pressure below atmospheric pressure.

The novel features and advantages of the present invention will become apparent after reading the following description which refers to the accompanying drawing wherein:

FIG. 1 is a frontal perspective view of a web cleaner made in accordance with the present invention;

FIG. 2 is a vertical sectional view taken along line 2—2 of FIG. 1; and

FIG. 3 is an end perspective view.

The web cleaner, generally designated 4, of the present invention comprises a pair of rectangular allochiral

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blocks 5 and 6; a pair of brushes 7 and 8; a back-up plate 9; and a hinged cover 10.

The rectangular blocks 5 and 6 have opposed spaced surfaces defining a web path between the blocks. As illustrated, the blocks 5 and 6 are formed with milled channels extending longitudinally defining the web path by aligned web entrance slot 11 and web exit slot 12 through which a web may enter and leave a chamber between the slots without contacting the blocks. The slots 11 and 12 have a greater depth in the center portion than at the longitudinal edges to protect the image area of the web. The width of the deeper central portion is the same as the width of the image area on a film and the edges of the film may slide and be guided by the shallower portions of the slots 11 and 12. Thus, if the film is not properly aligned and contacts either of the blocks 5 or 6 only the edges of the film will make contact and the image area of the film will not be scratched. The blocks 5 and 6 contact each other adjacent the plate 9 but are spaced by the milled slots 11 and 12 along the opposite edge near cover 10.

A deep slot 13 is cut across each of the blocks 5 and 6 generally centrally of their lengths. At least a portion of the sidewalls 14 and 15 defining the deep slot 13, are inclined at a 45° angle to the face of the block to converge toward the base of the deep slot 13.

A brush is secured in the deep slot 13 in each block adjacent the sidewall 14 nearest the web exit slot 12. The bristles of the brushes 7 and 8 are of a length to extend slightly above the surface of the associated block to intermesh with each other thereby forming a curtain across the web path through which a web must move and the brushes 7 and 8 extend transverse to the blocks to assure that the entire width of a web will be swept. The bristles of the brushes 7 and 8 are of a soft material such as camel hair so that they will not scratch a web moving between the brushes 7 and 8.

A transverse passageway 16 in which a positive pressure is created is made through each of the blocks 5 and 6 at the web exit end of the cleaner. Each passageway is positioned such that a narrow air discharge slot 17 which is transverse of a block and extending into the block perpendicular to the inclined sidewall 14 nearest the web exit communicates between the passageway 16 and the deep slot 13. The narrow air discharge slot 17 serves to direct the flow of air from the passageway obliquely to the web path through the cleaner 4 generally toward and against the tips of the brush bristles 7 and 8 causing the bristles to vibrate and sweep the web. The directed flow of air also serves to clean the brushes 7 and 8 so that they continue to effectively sweep the moving web.

A transverse groove 18 is made in each of the blocks 5 and 6 extending into a block perpendicular to the inclined sidewall 15 nearest the web entrance slot 11. Each groove 18 is positioned so as to decrease the inclined sidewall 15 to which it is perpendicular thereby creating a narrow opening 19 connecting a deep slot 13 and a groove 18 when a web is in the cleaner 4 as illustrated in FIG. 2. When a negative pressure is created in the grooves 18 and a web is in the cleaner 4 dust and lint travel from the deep slots 13 to the grooves 18 through the narrow openings 19. The narrow openings 19 increase the velocity of the air near the web thereby picking loose particles from the web and decreasing the possibility that dust removed from the web by the brushes 7 and 8 will be redeposited on the web.

The blocks 5 and 6 are secured to a mounting or back-up plate 9 which positions the blocks and seals mating edges of the blocks along one side of the cleaner 4. The back-up plate 9 has a large vacuum port 20 which aligns with portions of the grooves 18 in the blocks 5 and 6 and smaller inlet air ports 21 which align with the pas-

sageways 16 in the blocks. A channel 22 formed in the face side of the back-up plate 9 connects the ports 21 and passageway 16 to equalize the pressure in these passageways.

A hinged cover 10 completely covering one face of each block is used to seal the mating edges of the blocks and to enclose the deep slots 13, passageways 16, and grooves 18 along the side of the cleaner opposite the side having the back-up plate 9. A chamber between the blocks 5 and 6 is then defined by the deep slots 13, the back-up plate 9, and the cover 10. The hinge of the cover 10 is secured to the face of one of the blocks 5 opposite the face in which the web entrance 11 and web exit 12 slots are located and the face of the other block 6 opposite the face in which it has web entrance 11 and web exit 12 slots has a recess 23 into which an S-shaped springy extension of the cover 10 snaps. Thus, the cover 10 is secured to the blocks 5 and 6 so that it may be unsnapped and pivoted about its hinge to permit easy threading of the web and maintenance of the cleaner 4.

In use a source of vacuum, e.g., an air pump (not shown) is connected by suitable conduits to the vacuum port 20 in the back-up plate 9 and a supply of compressed air from a suitable source is connected to the air inlet ports 21 in the back-up plate 9. A web is threaded through the cleaner 4 and on movement through the entrance slots 11 is subjected to a partial vacuum and the air flowing through the narrow opening 19 cleans loose dust and lint from the surface of the web and draws it into the grooves 18. The web then moves through the curtain formed by the brushes 7 and 8 which are being vibrated by the flow of air from the air discharge slots 17 and which sweep the web to loosen dirt and lint. The dirt and lint loosened by the brushes 7 and 8 are carried by the flowing air into the deep slots 13, through the narrow openings 19 and into the grooves 18 rather than remaining on the brushes 7 and 8. The clean web then moves through the exit slots 12 out of the cleaner 4.

In a typical apparatus of the type described the air discharge slots 17 have a transverse dimension of about 0.0015 inch (.38 millimeter) and an air flow through the discharge slots of approximately .5 c.f.m. when the blocks 5 and 6 are formed to accommodate 16 mm. film.

Having thus described the present invention with reference to a preferred embodiment, it will be understood that minor modifications may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. Apparatus for cleaning a web which comprises:

means defining a chamber,
means defining an entrance slot through which a said web may be moved into said chamber,
means defining an exit slot aligned with said entrance slot through which a said web may be moved out of said chamber,
means creating a negative pressure within said chamber adjacent said entrance slot,
means creating a positive pressure within said chamber adjacent said exit slot,

brush means disposed within said chamber above and below the plane of said aligned slots to define a curtain in said chamber transverse to the path of a web moving through said slots,

whereby as a web is moved through said entrance slot it is subjected to a negative pressure and passes between said brush means forming said curtain toward said exit slot, said positive pressure on the exit side of said brush means causing the same to vibrate and sweep opposite faces of the web to remove any dust therefrom and said negative pressure preventing the dust from leaving said chamber through said inlet or said exit slot.

2. Apparatus for cleaning a web which comprises:

a pair of rectangular blocks positioned with allochiral portions facing each other, each of said blocks hav-

ing wall means defining a central rectangular recess in said portions,

means spacing opposed faces of said blocks to define a narrow longitudinal web path with a rectangular cross section between said blocks and extending across said recesses,

means creating a negative pressure within each of said recesses adjacent one of said wall means which is transverse to said block,

means creating a positive pressure within each of said recesses adjacent said wall means opposite said means creating a negative pressure,

brush means disposed within each of said recesses between said negative pressure and said positive pressure to define a curtain transverse to said web path,

means directing a flow of fluid from said positive pressure oblique to said web path generally along the parting line of said curtain formed by said brush means,

whereby a web moving along said web path from the area of negative pressure to the area of positive pressure is cleaned by the sweeping action of said brush means vibrated by said flow of fluid, said negative pressure preventing dust removed from the web from leaving said recess through said web path.

3. Apparatus as recited in claim 2, wherein said wall means forming a said recess which are transverse to said web path are inclined adjacent the face of said block to converge toward the base of said recess and said means directing a flow of fluid from said positive pressure comprises a passageway in which said positive pressure is created transverse to said web path in the inclined portion of said wall means opposite said means creating a negative pressure and air discharge means connecting said passageway and said recess for directing air generally along the parting line of said curtain formed by said brush means.

4. Apparatus as recited in claim 3, wherein said means communicating with said recess from said passageway comprises a slot transverse to said block in said inclined portion of said wall means.

5. Apparatus as recited in claim 2, wherein said means defining said web path comprises a longitudinal channel in the opposed face of at least one of said blocks.

6. Apparatus for cleaning a web which comprises:

a pair of rectangular allochiral blocks with allochiral portions facing each other, each of said blocks having a central transverse slot and longitudinally aligned web inlet and web exit slots defining a web path between opposed faces of said blocks, transverse wall means forming a said central transverse slot being inclined adjacent the face of a said block to converge toward the base of said transverse slot, the inclined wall means nearest said web inlet slot having a groove transverse to said block and the inclined wall means nearest said web exit slot having a passageway transverse to said block and an air discharge slot connecting said passageway and said transverse slot,

a pair of brushes having soft bristles,

means for securing said brushes one in each of said transverse slots in said blocks adjacent said inclined portion of said wall means having said passageway so that the bristles of said brushes form a curtain transversely of said exit slots and air flowing from said air discharge slot strikes said brushes generally along the parting line between said brushes,

a back-up plate having ports spaced so as to align with said grooves and said passageways in said blocks,

means for securing said back-up plate to aligned side-walls of said blocks with said ports of said back-up plate in alignment with said grooves and said passageways in said blocks to retain said blocks in fixed relation to each other,

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a cover having dimensions to cover the sidewalls of said blocks opposite the sidewalls to which said back-up plate is secured,
 means for securing said cover to said blocks to fully cover the sidewalls of said blocks opposite the sidewalls to which said back-up plate is secured,
 means for creating a partial vacuum at said ports in said back-up plate aligned with said grooves, and
 means for supplying air to said ports in said back-up plate aligned with said passageways.

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