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2,586,014

DUST COLLECTOR FOR PAPER MACHINES

Filed June 18, 1947

2 SHEETS—SHEET 1

FIG. 1.

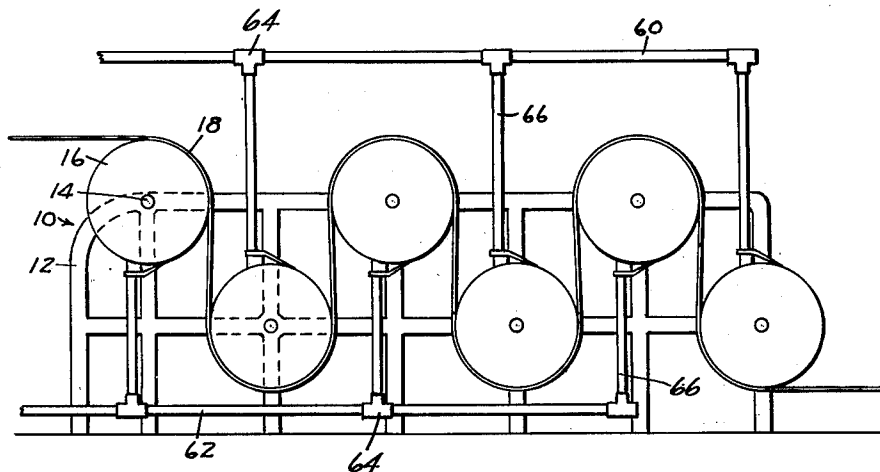
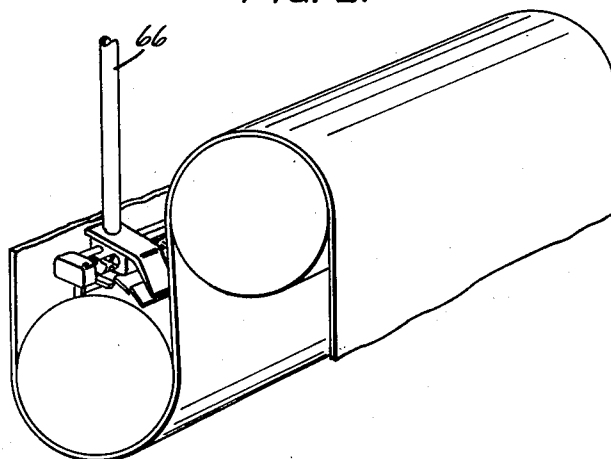


FIG. 2.



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2 SHEETS—SHEET 2

FIG. 3.

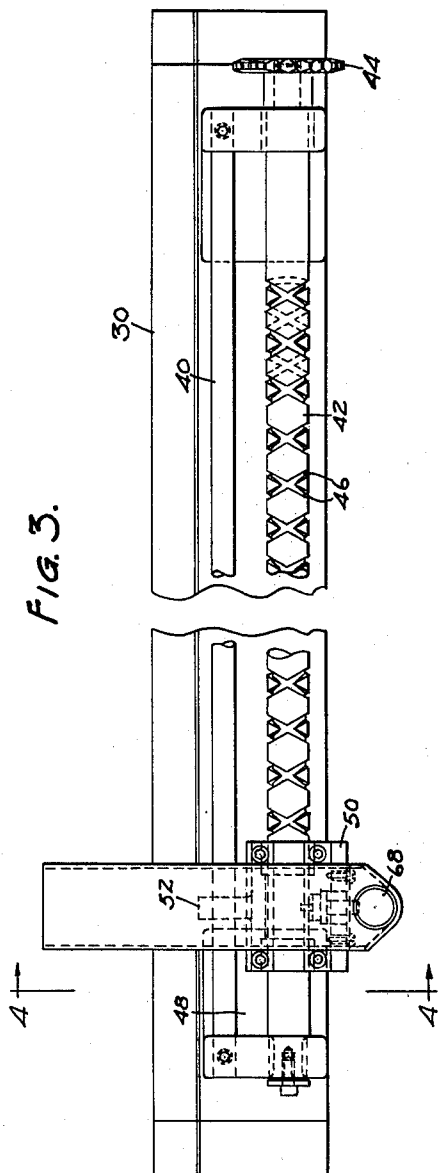
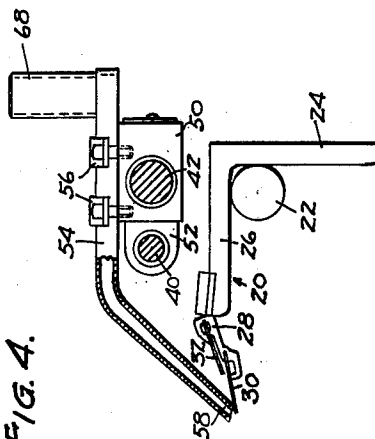


FIG. 4.



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DUST COLLECTOR FOR PAPER MACHINES

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5 Claims. (Cl. 92-74)

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This invention relates to dust collectors for paper machines.

It is common practice in the manufacture of paper to provide a doctor blade associated with each roll over which the web passes, such as the drying rolls, so arranged as to contact the roll for the purpose of removing the fine dust, lint and fibers which are deposited on the roll by the paper web. This prevents accumulation of such lint and insures the production of a paper web of uniform weight, thickness and texture. The doctor blades so used are commonly referred to as high angle or Vickery blades. These blades serve their intended function satisfactorily unless a substantial quantity of paper dust or lint accumulates thereon. If that condition is permitted to occur, the lint or dust forms in dense or compact bunches which may be released or transferred from the blade to the roll to be carried thereby under the paper web, with the result that the paper web may have the dust bunch pressed thereagainst, thus producing a paper web which is defective at that point. Of even greater seriousness, however, is the fact that the engagement of the dust bunch between the roll and the paper web may tear or break the web. If the web tears or is broken, the machine must be stopped, cleared and re-threaded, which entails a substantial loss of production and requires a considerable amount of labor.

To the best of my knowledge, no satisfactory method or means has been provided to remedy this situation, and therefore the machine operator must observe the operation of the machine and the collection of dust. Where accumulations are observed, the operator must remove them manually, taking care not to permit their re-adhesion to the roll in so doing. Despite such observance and care by the operator, the proper removal of the dust bunches is often impossible, and damage to the web of the character mentioned above occurs frequently.

Therefore, it is the primary object of this invention to provide a novel, simple, inexpensive and effective means for continuously removing dust collected on the doctor blade.

A further object is to provide a paper machine having roll-engaging doctor blades, with suction means for removing dust and lint which collects on the blades.

A further object is to provide a paper machine having an elongated roll-engaging doctor blade, with a guide positioned alongside and adjacent to the blade and means for shifting a suction device, having a small nozzle to facilitate high ve-

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locity air passage therethrough, along the guide in a continuous reciprocating path in which the nozzle intake is juxtaposed to the edge or margin of the blade on which the dust accumulates.

Other objects will be apparent from the following specification.

In the drawings:

Fig. 1 is a side view of a portion of a paper drying machine having my dust collector applied thereto, parts being shown in section.

Fig. 2 is a fragmentary perspective view illustrating the manner in which my collector cooperates with a roll and a doctor blade of a paper machine.

Fig. 3 is an enlarged detail plan view of my dust collecting device.

Fig. 4 is a transverse sectional view taken on line 4-4 of Fig. 3.

Referring to the drawings, which illustrate the preferred embodiment of the invention, the numeral 10 designates a portion of a paper drying machine. The machine 10 has longitudinal rigid upright frames 12 mounting suitable bearings (not shown) for journaling the axial hubs or stub shafts 14 projecting longitudinally from opposite ends of each of a plurality of rolls 16. The rollers 16 extend transversely of and between opposite side frame portions 12, and are arranged at different elevations. As here shown, the rolls are arranged to provide an upper set and a lower set, the rolls of the two sets being arranged alternatively. A paper web 18, having been formed previously, is threaded through the machine to pass over the rolls of the upper set and under the rolls of the lower set alternatively. Suitable drive means (not shown) is provided to drive the rolls 16 at constant predetermined speed in the proper direction, here shown as clockwise as to the upper rolls and counter-clockwise as to the lower rolls, for the purpose of advancing the paper web 18 continuously through the machine from its feed end to its discharge end and to maintain the paper web at constant selected tension at all times. In the case of a drying machine, it will be obvious that suitable heating means (not shown) may be provided to facilitate the drying of the paper web as it progresses through the machine.

The machine 10 is provided with a doctor blade unit 20 of any suitable type and construction associated with each of the rolls 16 thereof and located at a radial position spaced from the radii at which the web 18 engages each roll. One form of such blade unit is shown herein and comprises a rigid transverse bar 22

extending transversely of and fixedly secured to the frame 12 at its opposite ends. The bar 22 spans the frame in parallel relation to the axis of the adjacent roll 16 and spaced from the peripheral surface of said roll. A rigid carrier member 24, here illustrated as an angle iron, is securely mounted upon the bar 22 in selected position. The carrier member 24 may be secured to the bar by welding or bolting thereof to said bar, or may be clamped or otherwise anchored in selected position or altitude, with a portion thereof, such as the flange 26, projecting toward the roll 16 but terminating spaced therefrom. The flange 26 mounts a plurality of brackets 28 spaced along its length and projecting laterally therefrom and toward the roll 16. An elongated doctor blade 30 is anchored at one longitudinal margin thereof by the brackets 28 and projects into engagement with the peripheral surface of the roll at its outer edge which is parallel to the axis of the roll. The brackets 28 mount resilient means 32, here shown as a leaf spring, for pressing the blade 30 firmly against the surface of the roll 16. The blade 30 is positioned at a proper pitch or angle to collect thereon any dust, lint or fiber which has been transferred to the roll from the paper web, thus assuring removal of such dust, lint or fiber before the portion of the roll to which the same adheres rotates through the angle at which it is again engaged by the paper web.

My new dust collector construction is mounted alongside each doctor blade unit. Each collector unit includes a rigid cross bar 40 which is anchored at its opposite ends to the frame 12. Each bar 40 extends parallel to the axis of the adjacent roller and to the adjacent blade 30. A rotatable shaft 42 is journaled in the frame in adjacent parallel relation to the bar 40. One end of the shaft 42 mounts a drive element 44, such as a sprocket, a gear, or the like. Shaft 42 is provided with a double helical reversing groove 46 extending for substantially the full length thereof. Suitable spacers 48 may interconnect the opposite end portions of the bar 40 and the shaft 42. Suitable chain, gear or other means (not shown) driven by any suitable means, serves to rotate shaft 42.

A carrier block 50 is journaled on the shaft 42, being provided with a suitable internal radial pin or projection (not shown) which projects into the groove 46. The block 50 has a projection 52 provided with an aperture which is preferably lined by a bearing having a snug slide fit on the bar 40. The arrangement is such that the carrier block 50 will be advanced along the shaft 42 and bar 40 from end to end thereof and of the blade 30 in a reciprocating movement when the shaft 42 is rotated, under control of the groove 46. The block is maintained against tilting by the sliding guided engagement of apertured projection 52 with the bar 40.

An elongated nozzle member 54 is mounted upon the carrier block 50 in predetermined position, as by means of the clamping member 56 with its mouth portion 58 terminating and overlying the margin of the blade 30 at which dust collects. The nozzle is preferably of tubular form, with its mouth portion 58 flattened to have its major transverse axis parallel to the length of the blade 30. As best seen in Figs. 2 and 3, the major transverse dimension of the mouth portion of the nozzle is small compared to the length of the blade and equals only a

small fraction of the length of said blade. It will be observed from Fig. 1 that the doctor blades and the dust collectors for each of the upper rolls are located therebelow, and that those for the lower rolls are located above said rolls. All of the blades and dust collectors are properly oriented to the position and direction of rotation of the roll with which the same respectively cooperate, to insure proper functioning for the purpose of collecting and removing dust from said rolls.

An upper conduit 60 extends longitudinally of and above the machine 10, being supported in any desired manner, as by means of suspension brackets or the like (not shown) mounted on the ceiling of the room in which the machine 10 is located. A similar conduit 62 extends longitudinally of the machine 10 below the lower rolls 16 thereof, being supported in this position in any suitable manner. The conduits 60 and 62 are connected to the intake of a suitable air turbine or fan (not shown) which is adapted to create a high suction in the conduits 60 and 62. Each of the conduits has a plurality of branch fittings 64 connected therein at longitudinally spaced points adjacent to the various rolls 16. The fittings of the conduit 60 will be located directly above each roll of the lower set and the fittings of the conduit 62 will be located directly below the rolls of the upper set. The two conduits are located substantially centrally relative to the transverse dimension of the machine 10, that is, directly above or below the longitudinal center portions of the rolls 16. Each of the fittings 64 has one end of an elongated flexible hose or conduit 66 connected thereto. The opposite end of each hose 66 is connected to the outlet end portion 58 of the adjacent nozzle. Each hose 66 is of sufficient length to permit free swinging thereof as the carrier block mounting the nozzle to which it is connected reciprocates from end to end of its path, i. e., from end to end of the associated doctor blade 30.

It will be apparent that this arrangement permits continuous operation of the suction means traversing the doctor blade to remove therefrom the dust, lint and fiber collected thereon. The speed of movement of the nozzle carrier 50 may be slow compared to the linear speed of the paper web 20, and will be determined by the lead of the helical groove 46 and by the speed of rotation of the shaft 42. The constant travel of the carrier will cause frequent suction actions upon each linear portion of the margin of the blade, the frequency being such that dust, lint and fiber is not permitted to collect in large quantities or to become compacted.

The provision of a traveling suction nozzle permits the cross-sectional size of the nozzle to be small. This in turn insures a high air velocity therethrough which is essential for efficient concentrated suction action. In other words, the air turbine or fan is loaded at only a few working points or nozzle mouths, each of limited cross-sectional area, thereby holding to a minimum, dependent on the number of nozzles, the capacity of the air turbine or fan required for the device. At the same time, sufficient suction force is effective at each nozzle mouth to insure complete cleaning or removal of all dust, lint and fiber which has been collected on the doctor blade. The operation of the device may be correlated with the machine 10 by driving the machine, the shaft 42 and the air turbine or fan

from a common source to provide a unitary control insuring operation of the collector whenever the machine 10 operates. This is not required, and the shaft 42 and the air turbine or fan may be driven from a source or sources independent of the drive means for the machine 10. In either case, as long as the collector operates, the effective collection and removal of dust continues automatically and uniformly, and the attendant of the machine 10 is sure of the effective safe disposition of dust, lint and fiber. The device thus cuts down the danger of mishap in the operation of the machine 10, and specifically serves to guarantee uniformity of the properties of the paper produced and to minimize the danger of breakage of the paper web within the machine.

While the form of the invention herein described and illustrated is preferred, changes may be made therein within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. The combination with a paper machine having a plurality of spaced rolls around which a paper web passes and a doctor blade parallel to and engaging each roll between the paper-engaging radii of said rolls of a suction device associated with each blade and having an intake nozzle whose mouth is positioned adjacent to said roll and to the edge of said blade, and means for reciprocating said nozzle longitudinally of said blade the mouth portion of said nozzle being of small cross-sectional size and of elongated and narrow cross-sectional shape, the major cross-sectional dimension of said mouth portion extending parallel to said blade and being small compared to the length of said blade.

2. The combination with a paper machine having a paper-guiding roll and a doctor blade extending alongside and engaging said roll, of a guide adjacent and parallel to said blade, a suction unit including a nozzle whose open end is juxtaposed to said roll and to the edge of said blade and shiftable along said guide, and means for shifting said nozzle from end to end of said guide, said nozzle having a flattened mouth portion whose major transverse dimension is substantially parallel to the edge of said blade and is only a small fraction of the length of said blade.

3. The combination with a paper machine having a paper-guiding roll and a doctor blade having an edge portion engaging said roll, of a rotating shaft juxtaposed and parallel to said roll and blade, said shaft having a helical reverse lead groove, and a suction nozzle having an intake adjacent to said roll and to the edge of said blade, said nozzle being shiftable carried by said shaft and advanced in a reciprocating path by engagement of a portion thereof within said groove, the intake portion of said nozzle

being flattened with its major transverse dimension parallel to the edge of the blade but short compared to the length of the blade so that said intake is of small size and provides for high velocity flow therethrough.

4. The combination with a paper machine having a paper-guiding roll and a doctor blade having an edge portion longitudinally engaging said roll, of a pair of parallel guides mounted on said machine parallel to said roll and blade edge, a suction nozzle slidable on said guides with its mouth of restricted size and positioned adjacent to the edge of said blade and to said roll, one of said guides constituting a rotating shaft, and cooperating interengaging means on said shaft and nozzle for advancing said nozzle in a reciprocating path along said guides upon rotation of said shaft, the mouth portion of said nozzle being long and narrow in cross-section with its greatest transverse dimension positioned lengthwise of said blade but extending for only a small part of the length of said blade.

5. The combination with a paper machine having a plurality of spaced staggered rolls around which a paper web is threaded and a scraping blade having an edge longitudinally engaging each roll, of guide means adjacent and parallel to each blade and including a rotating shaft having a reverse lead helical groove, a nozzle carried by each guide means and having a part fitting in said groove to reciprocate said nozzle along said guide when said shaft rotates, longitudinal suction lines above and below the center of said machine, and a flexible hose connecting each nozzle with one of said lines, alternate nozzles being connected to different lines, the mouth portion of said nozzle being flattened with its major transverse dimension parallel to and short compared to the blade, said nozzle extending at an angle to the plane of said blade and opening adjacent to the edge of said blade and to said roll.

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