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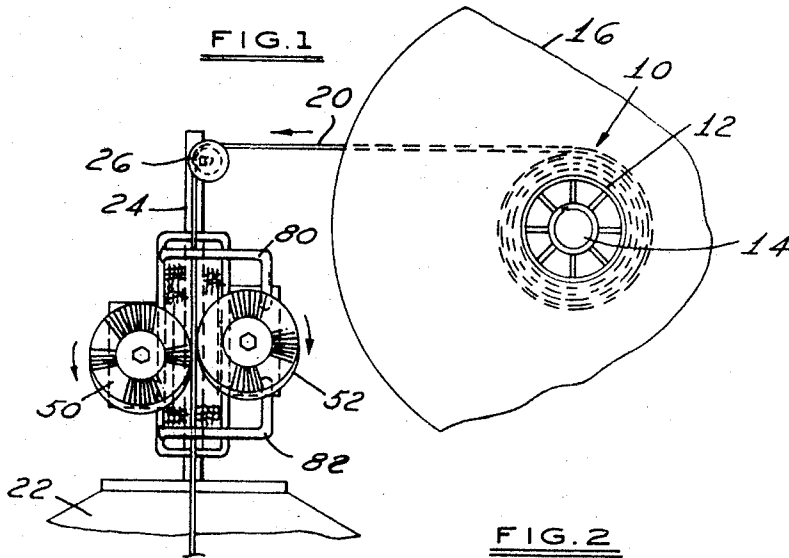
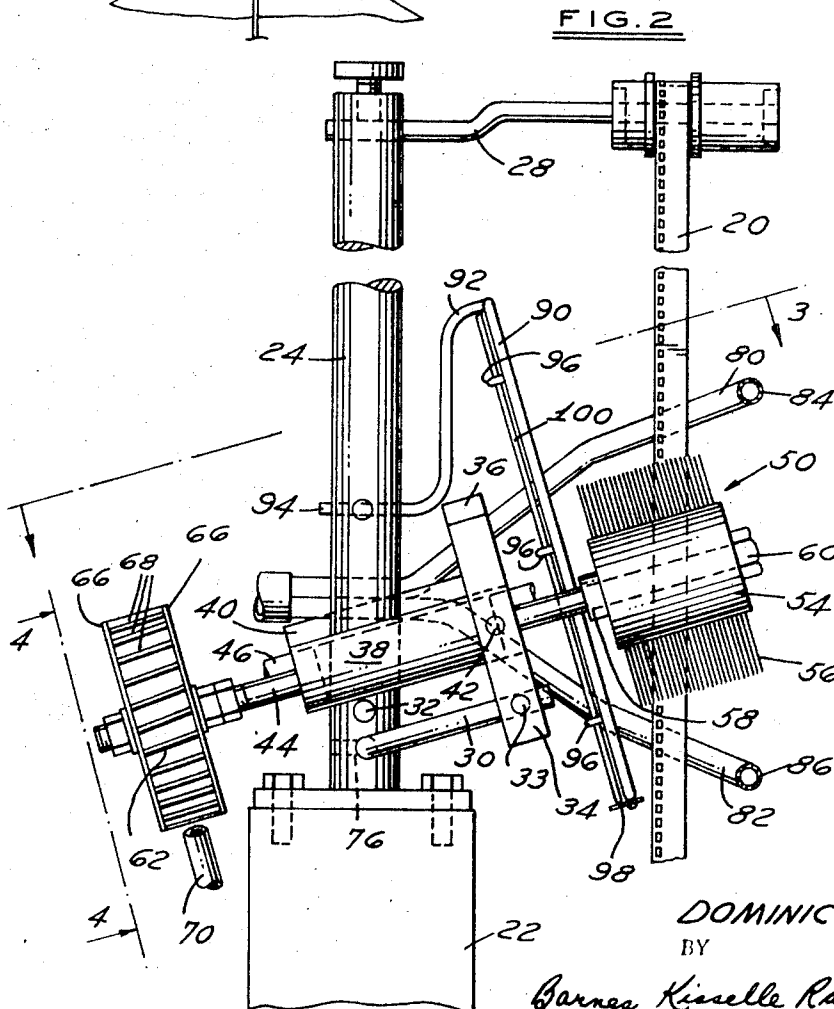
D. T. TROIA

3,470,576

FILM CLEANING DEVICE

Filed June 26, 1967

2 Sheets-Sheet 1



INVENTOR.

DOMINIC T. TROIA

BY

Barnes, Kisselle, Raich & Chote

ATTORNEYS

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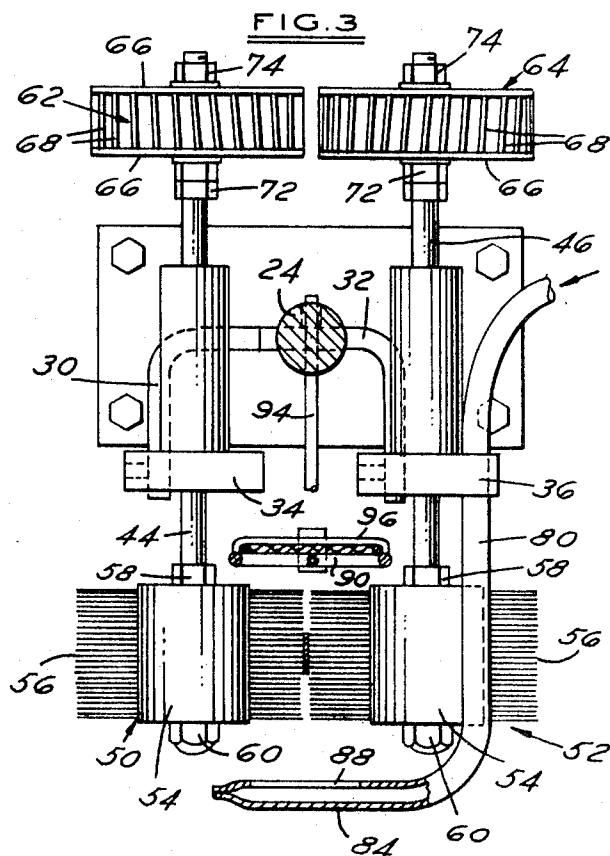
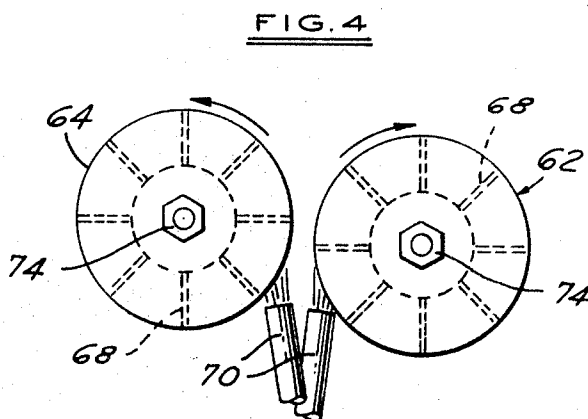
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FILM CLEANING DEVICE

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8 Claims

ABSTRACT OF THE DISCLOSURE

A film cleaning system comprising rotating brushes having a soft bristle spaced to permit free passage of the film and combined with a plurality of air jets which cooperate in the area of the brushes to flutter the film to cause light contact with the brushes and effect an effective cleaning action incorporated into an apparatus particularly adaptable to installations of existing machines with adjustments to permit this adaptation.

This invention relates to a film cleaning device and more particularly to a device for cleaning film as it is entering a film handling machine. Moving picture film is quite frequently reproduced by running it through a copying machine. Sometimes the same film is run through the machine many times to obtain a plurality of copies and it is important that the film be clean as it reaches the exposure areas of the machine to eliminate defects. There are presently a number of ways of cleaning film. One is by the use of a cloth and a liquid cleaner with a manual contact but this has a disadvantage that it may cause scratches and if the cloth catches a loose perforation in the film, it may tear the film. There are also liquid film baths and ultrasonic film cleaners which are rather expensive and time consuming, since they interrupt production and require removal of film from film handling equipment.

It is, therefore, an object of the present invention to provide a film cleaning device which will reduce or eliminate frequent off machine cleaning and at the same time provide continuous cleaning action.

The invention contemplates the combination of a light rotating brush contact in combination with an air brush, together with a vibratory fluttering action which accompanies the passage of the air brush, to cause light contact with moving brushes. This shakes loose any particles and causes a light brush pressure which reduces any danger of scratching. There is also no binding action on the film so that it may pass freely through the cleaning system. An air drive of the brushes is both economical, simple, and provides a clutching action which permits the brushes to stop easily if there is any accidental contact.

The system thus contemplates an apparatus in which rotating brushes are powered by air turbines and the device is mounted directly on a film handling machine to clean the film as it enters the critical area. The device is so constructed that it may be adapted to a number of different machines and adjusted to the particular positions required for any particular machine.

The cleaning device can be readily used on standard film sizes from 8 to 70 mms. and adapted to the machines for handling the various sizes desired as well as other continuous tape or film media. The system to be described also has the advantage that due to the free running character of the device, the static electricity created by the action is minimal. In addition, the machine needs no supervision so that one man can tend a copying machine where two men were previously required.

Other objects and features of the invention will be apparent in the following description and claims in which the principles of the invention and the operation are set

2

forth together with the best mode contemplated for carrying out the invention.

Drawings accompany the disclosure and the various views thereof may be briefly described as:

FIGURE 1, an elevation of the complete assembly illustrating the film path.

FIGURE 2, a side elevation enlarged to show the various parts of the apparatus.

FIGURE 3, a top view on line 3—3 of FIGURE 2.

FIGURE 4, a rear view on line 4—4 of FIGURE 2.

Referring to FIGURE 1, a portion of a film copying machine is shown such as illustrated and described in a U.S. patent to De Brayer, No. 1,432,676, dated Oct. 17, 1922. A supply reel 10 having a core 12 mounted on a suitable shaft 14 has a supporting flange 16 and this reel feeds film 20 through a portion of the machine. The particular apparatus of the present invention is mounted on a base 22 which is a part of the machine and has an upright supporting post 24. On the top of the post 24 is a guide roll 26 of a standard type mounted on suitable bearings on a substantially horizontal shaft 28 shown in FIGURE 2. Also mounted in the post 24 are two L-shaped arms 30 and 32 each having a section passing through a hole in the post and locked there with a suitable screw 33 and each having a section extending forwardly of the post on each side thereof.

On these forward sections are mounted bracket blocks 34 and 36. The bracket blocks each carry a bearing journal in the form of a tube 38 and 40, these tubes being held in the bracket blocks by a screw 42. Passing through these bearing journals are shafts 44 and 46 which extend forward and rearward from the journal cylinders.

On the projecting end of these shafts, forwardly, are mounted rotary brushes 50 and 52 each having a wooden core member 54 in which are mounted suitable bristles 56 in tufted arrangement. The tufts are preferably alternately spaced in each reel to make a continuous brushing surface and the material from which the tufts are formed is preferably a relatively soft material such as goat's hair or soft camel hair. These bristles or tufts should be of a material which will not scratch the sensitive surfaces of the moving picture film. The wood cores of the brushes, which reduce accumulation of static electricity, are mounted between nuts 58 and 60. At the rearward end of the shafts 44 and 46 are mounted air turbine wheels 62 and 64, each having spaced disc-like side plates 66 between which are mounted spaced blades 68 which form pocket recesses therebetween. Thus, suitable air jets 70 shown in FIGURE 4, directed to the inside peripheries of the turbines will rotate the turbines in opposite directions as illustrated. The turbines are held on the shafts 44 and 46 by suitable nuts 72 and 74.

It will be seen that by reason of the mounting of the arms 30 and 32 in the post 24 by a locking screw 76, the angle of the arms 30 and 32 can be changed and thus the angle of the entire assembly of each particular shaft.

The shafts are shown at a relatively high angle in FIGURE 2 and it will be readily appreciated that this angle may be altered at will. Bracket block 36 also serves to mount two air tubes 80 and 82 each of which has a nozzle portion 84 and 86 respectively which passes forward of the apparatus respectively above and below the brushes and overlying the path of the film 20. Each of these nozzle portions has a long narrow opening 88 as shown best in FIGURE 3 which is essentially bisected by the film plane.

Directly behind the brushes 50 and 52 is a small rectangular frame 90 mounted on an arm 92 which has a portion 94 adjustably positioned in a hole in post 24. This frame has spaced cross members 96 at the back portion thereof which serve to support, in cooperation

with a small tab 98 at the bottom, a sheet of tacky material 100. Thus, dirt which is blown off from the film at the brush stations will have to collect on the tacky sheet 100 to prevent its being distributed through the machine or to the surrounding area.

It will be noted that the brushes 50 and 52 are mounted in spaced horizontal relationship, the brush 52 being slightly higher than the brush 50. The bristles of these brushes are preferably not in contact with each other but spaced such that the film barely touches as it passes between them. When the device is operated with air jets 70 turning the turbines which in turn rotate the shafts 44 and 46 and the brushes 50 and 52, and when the air jets 80 and 82 are discharged air through the openings 88 edgewise of the film 20, there will be a cleaning action resulting not only from the air jet passing the film but also by reason of the fact that the air jets will cause a slight fluttering of the film out of the normal plane of travel and thus cause contact with the brushes which will remove additional particles or dirt from the film.

Thus, no pressure is required by the brushes on the film and yet adequate contact is obtained by reason of the air passage which serves not only to dislodge dirt particles but to flutter the film against the brushes. Dirt particles which pass rearwardly are caught by the tacky sheet 100. The rotation of the brushes is such that any dirt dislodged from the film by the brushes is thrown upwardly and into the jet stream of the air nozzles so that it passes rearwardly to the receiver 100.

It will be understood that this device may be utilized not only for moving picture film but also for other continuous strip material such as magnetic tapes, video tapes, continuous information data on punched paper or plastic strip or film, and data ribbons of all kinds where dirt and foreign matter might be a problem. As previously indicated, various widths of material can be handled by the apparatus.

What is claimed as new is as follows:

1. A cleaning apparatus for application to a machine in which continuous strip material is being handled which comprises:

- (a) a pair of soft rotary brushes,
- (b) means mounting said brushes for rotation on laterally spaced, substantially-parallel axes on opposite sides of a moving strip, said brushes being slightly spaced from each other,
- (c) a pair of spaced air nozzles having elongate openings positioned adjacent said brushes, one above and one below, each of said openings lying transversely of said strip which substantially bisects each opening, and
- (d) means for imparting a rotary motion to said brushes.

2. A cleaning apparatus for application to a machine in which a continuous strip material is traveling in a defined path which comprises:

- (a) a rotary brush positioned adjacent said path on an axis lying in a plane substantially parallel to the plane of said moving strip, the point of tangency of the path relative to said brush lying in free space such that said strip may move away from said brush at that point,
- (b) means to direct an air jet stream edgewise against a moving strip in the vicinity of said brush to cause a fluttering of said strip against said brush as the brush is rotated and simultaneously to remove dirt particles from said strip.

3. A device as defined in claim 2 in which a second brush is positioned in spaced relation to said first brush, the axes of said brushes being spaced in the direction of

travel of the strip, said brushes being on opposite sides of said strip, the adjacent peripheral sides of the brushes moving against the direction of said travel of said strip.

4. A device as defined in claim 1 in which the means mounting each of said brushes is an axle, and the means for imparting rotary motion to said brushes comprises an air turbine on each of said axles, and means to direct an air jet to said turbines.

5. A device as defined in claim 1 in which the brushes which are positioned in spaced relation laterally of the strip are also spaced longitudinally of the path to prevent squeezing pressure on said strip.

6. A device as defined in claim 1 in which a mounting for said device comprises a vertical post, a pair of spaced journal blocks mounted on said post, a journal bearing in each block, an axle in each bearing projecting from each end thereof, said brushes being mounted on one end of said axles, and the means for imparting a rotary motion to the brushes comprises an air turbine on the other end of each of said axles, and means to direct an air jet to said turbines to rotate said brushes in opposite directions.

7. A device as defined in claim 2 in which a means for collecting dirt and dust from said strip in the form of a tacky sheet is positioned on the opposite side of said path from said air jet stream.

8. A cleaning apparatus for application to a machine in which continuous strip material such as moving picture film is being handled which comprises:

- (a) a mounting post to be mounted in a vertical position on a machine for handling strip material,
- (b) a pair of L-shaped arms mounted in said post for adjustable positioning relative to said post, said L-shaped members having one leg extending in substantially parallel relationship and being movable in said post to and from said post and at varying angles to the axis of said post,
- (c) a mounting block on said parallel extending legs of said L-shaped members adjustably positioned thereon,
- (d) a bearing block on said mounting block,
- (e) an axle rotatably mounted in each of said bearing blocks, said axles being substantially parallel to each other,
- (f) a drive turbine at one end of said axles for actuation by an air jet stream,
- (g) a pair of brushes at the other end of said axles for rotating in proximity to the path of a moving strip on either side of said path, and
- (h) a pair of air jet tubes mounted in one of said blocks extending outwardly therefrom to a position outwardly of said brushes each having a jet opening extending transversely of a path of moving strip material to direct air across said strip of material as said brushes are rotating on either side thereof.

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U.S. Cl. X.R.

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