United States Patent

Freedman

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[45] **Feb. 8, 1972**

[54] **METHOD AND APPARATUS FOR CLEANING FILM**

[72] Inventor: **Myron L. Freedman,** c/o Comprehensive Service Corporation, 250 West 64th St., New York, N.Y. 10023

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[21] Appl. No.: **800,116**

[52] **U.S. Cl.** **134/9,** 15/100, 134/15, 274/47, 352/56, 352/130

[51] **Int. Cl.** **B08b 1/02,** B08b 7/04

[58] **Field of Search**.....134/9, 15; 15/100, 306 A; 274/47; 352/56, 130

[56] **References Cited**

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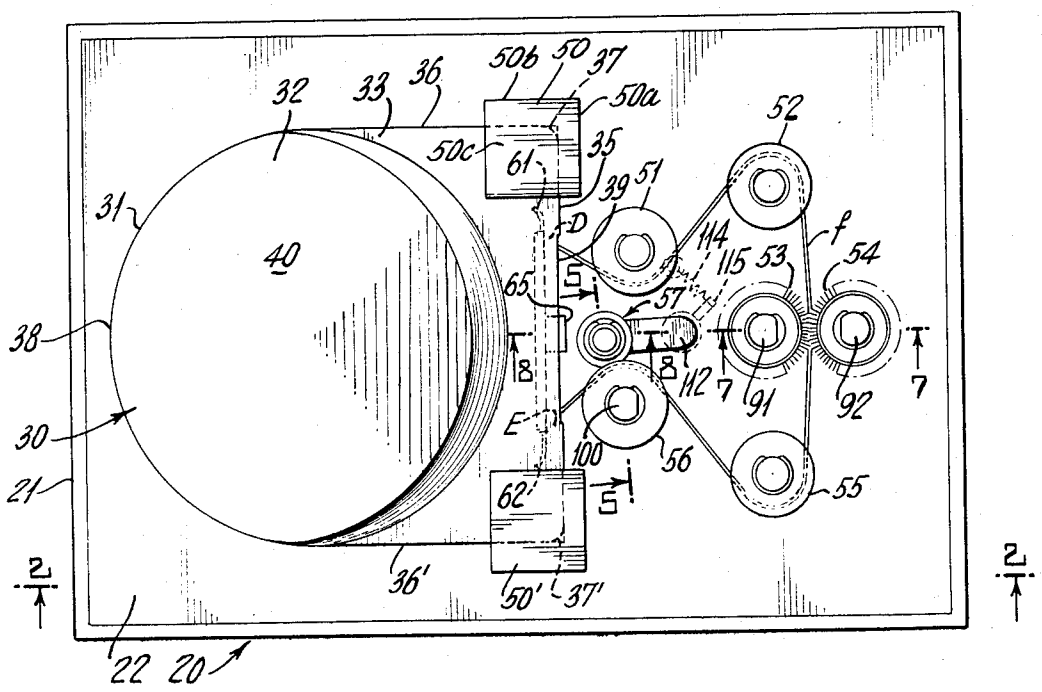
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Primary Examiner—Morris O. Wolk
Assistant Examiner—Barry S. Richman
Attorney—Brooks, Haffner, Haidt & Delahunty

[57] **ABSTRACT**

A method and apparatus for cleaning films of the continuous strip type housed in cartridges. Rotary brushes of a portable cleaning apparatus which receives a film cartridge are turned by the same drive which advances film withdrawn in a loop from the cartridge. Cleaning is accomplished without opening the cartridge to remove the film, so any user of such film cartridges may easily clean his own films.

11 Claims, 14 Drawing Figures

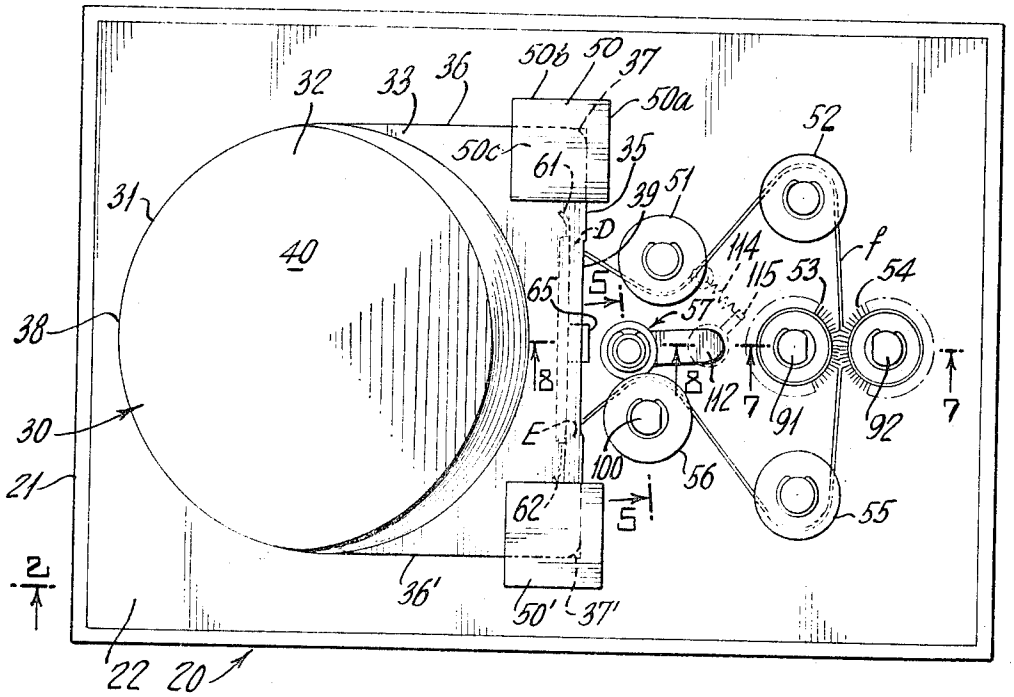


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Fig. 1.



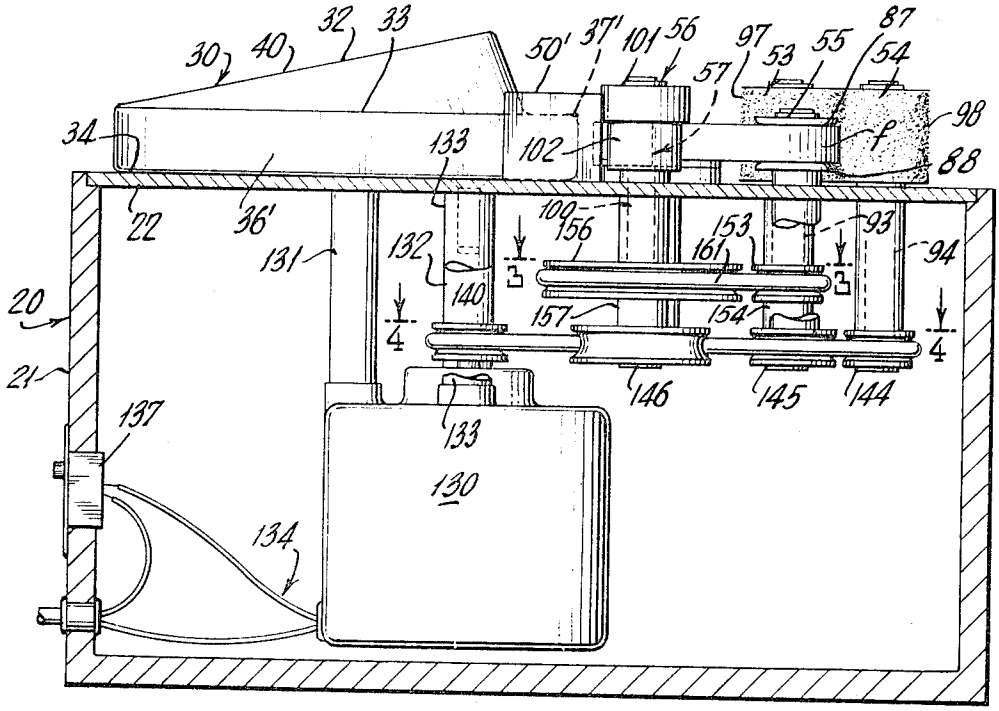


Fig. 2.

INVENTOR
MYRON L. FREEDMAN
BY Albert M. Parker
ATTORNEY

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Fig. 3.

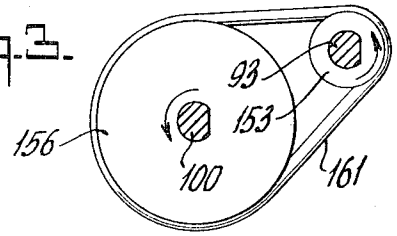


Fig. 4.

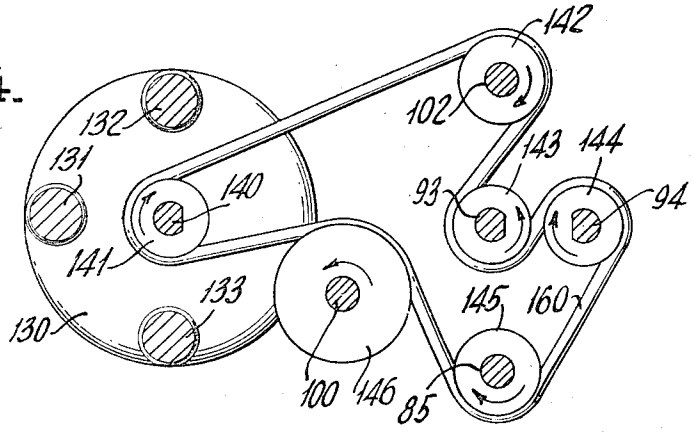


Fig. 5.

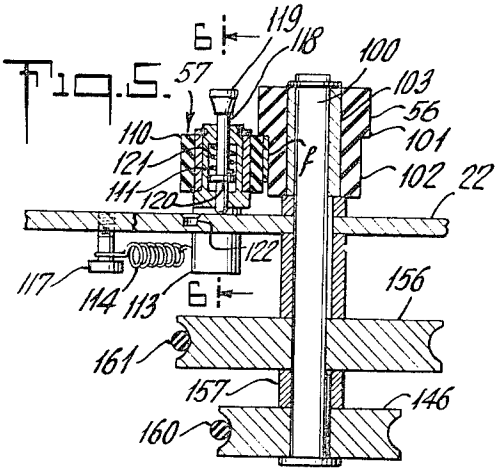
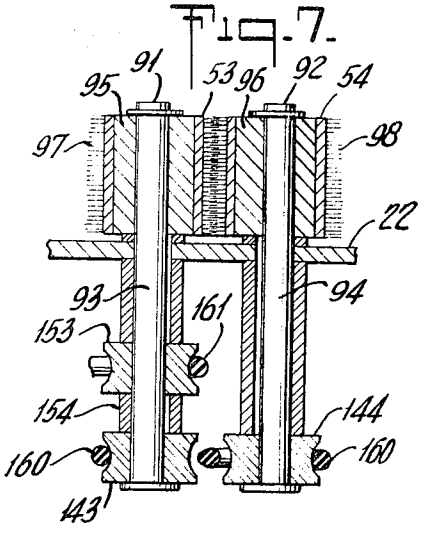


Fig. 7.



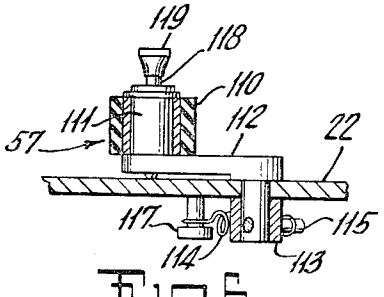
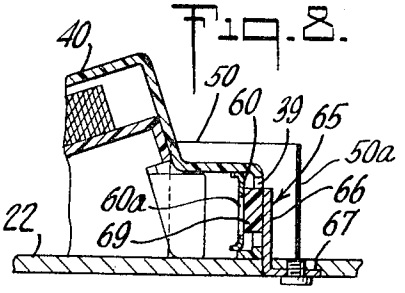


Fig. 6.

Fig. 8.



INVENTOR
MYRON L. FREEDMAN
BY Albert M. Gaffney
ATTORNEY

Fig. 9.

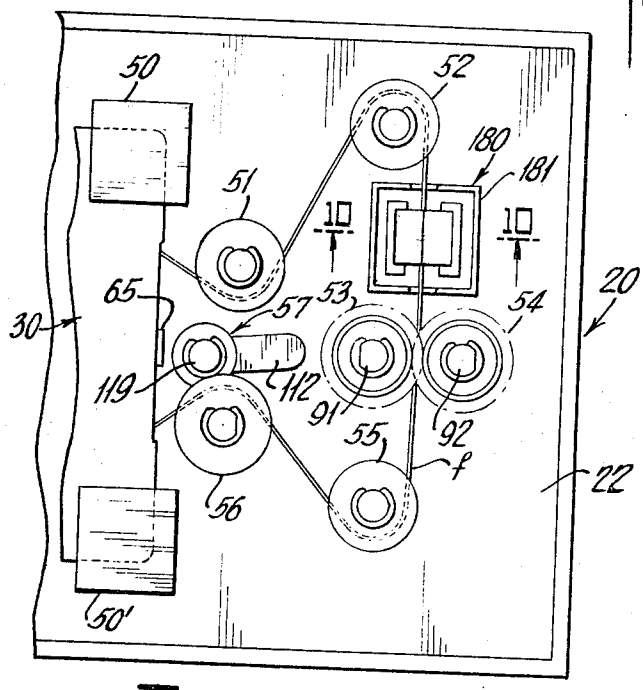


Fig. 10.

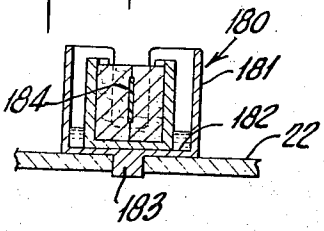


Fig. 13.

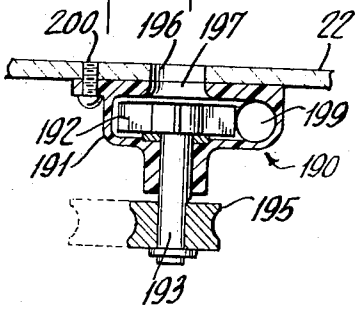


Fig. 11.

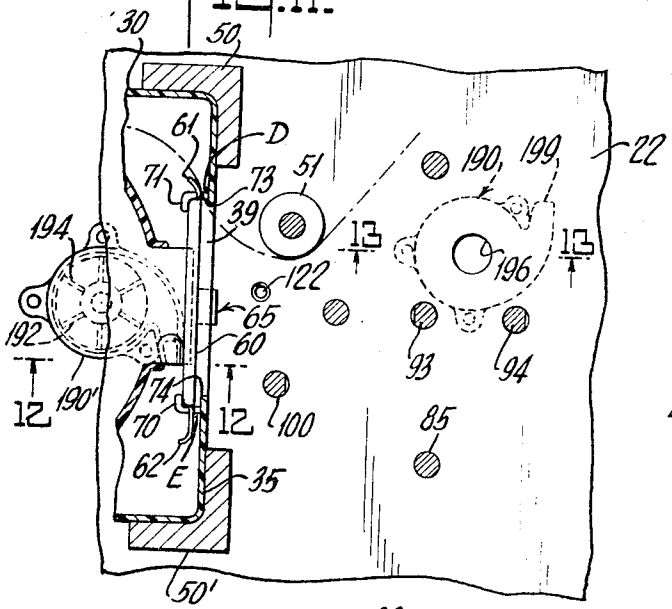


Fig. 14.

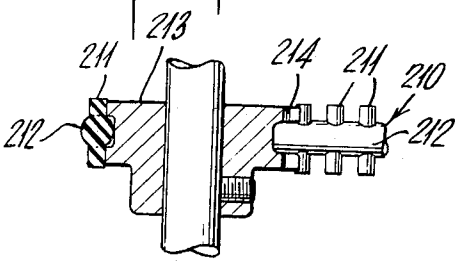
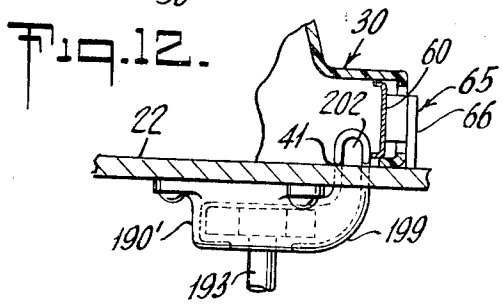


Fig. 12.



INVENTOR
MYRON L. FREEDMAN
BY Albert M. Gatlin
ATTORNEY

METHOD AND APPARATUS FOR CLEANING FILM

BACKGROUND OF THE INVENTION

Through ordinary use motion picture films tend to become soiled and dusty. Small pieces worn from the surface of the film itself, dust particles caught by static electric charges and soil from the projection apparatus adhere to the film and may accumulate to such an extent as to absorb some of the light needed for good projection and becloud the projected images. Methods are known for cleaning soiled discontinuous motion picture film, such as is normally wound on a reel, either in the course of the use thereof or as a separate operation. In recent years motion picture films in the form of continuous, endless strip contained in a cartridge have become increasingly popular, especially for educational and advertising purposes. The known film cleaning techniques are not suitable for such film housed in such cartridges because the film does not extend out of the cartridge under normal use. Eventually due to the lack of inexpensive and simple provision for cleaning, the users of these continuous films housed in cartridges often discarded the film and purchased new film and cartridge assemblies.

SUMMARY OF THE INVENTION

The motion picture film cleaning method and device of the invention provide for a portable unit adapted to readily receive a film containing cartridge. A loop of film drawn out of the cartridge at the normal exposure area is threaded around guide rollers and between a pair of motor driven cleaning brushes which rotate against the film as it passes between them. The film is advanced by a driving roller which pushes film back into the cartridge at one end of the exposure opening while at the same time withdrawing film from the other end of the opening. Other cleaning components may be provided in the unit to cooperate with the brushes.

An object of this invention is to provide a method and apparatus for cleaning continuous motion picture film housed in cartridges.

Another object of the invention is to provide a simple and inexpensive cleaning apparatus with which one can easily clean his own continuous motion picture films.

A further object of the invention is to provide a method and apparatus for removing dust and dirt from a film cartridge while cleaning the film contained therein.

Other objects and advantages of the invention will be apparent from the following detailed description of a preferred embodiment of the invention when read in conjunction with the accompanying drawings in which like reference characters indicate like parts throughout.

FIG. 1 is a top plan view of the film-cleaning apparatus of the invention, with a film cartridge mounted thereon, showing a portion of the film pulled out therefrom and positioned for cleaning, and with some concealed parts shown by dotted lines.

FIG. 2 is a vertical section taken along line 2—2 of FIG. 1 and looking in the direction of the arrows.

FIG. 3 is a detail section taken along line 3—3 of FIG. 2 and looking in the direction of the arrows.

FIG. 4 is a detail section taken along line 4—4 of FIG. 2 and looking in the direction of the arrows.

FIG. 5 is an enlarged detail section taken along line 5—5 of FIG. 1 and looking in the direction of the arrows.

FIG. 6 is a detail section taken along line 6—6 of FIG. 5 and looking in the direction of the arrows.

FIG. 7 is an enlarged detail section taken on line 7—7 of FIG. 1 and looking in the direction of the arrows.

FIG. 8 is an enlarged detail section taken on line 8—8 of FIG. 1 and looking in the direction of the arrows.

FIG. 9 is a view similar to FIG. 1, partly cut away, of a modification of the cleaning apparatus.

FIG. 10 is a somewhat enlarged detail section taken on line 10—10 of FIG. 9.

FIG. 11 is a horizontal section, partly cut away, of a modification of the apparatus with some parts removed and concealed parts indicated by dotted lines.

FIG. 12 is an enlarged detail section taken on line 12—12 of FIG. 11 and looking in the direction of the arrows.

FIG. 13 is an enlarged section taken on line 13—13 of FIG. 11 and looking in the direction of the arrows and

FIG. 14 is a part sectional part elevational detail view of a modified drive mechanism.

In the drawings, an embodiment of the film-cleaning apparatus is generally designated by reference numeral 20 and, as here illustrated without limitation thereto, comprises a boxlike housing 21, having a removably mounted rectangular cover plate 22, preferably of sheet metal. The removable cover plate 22 permits access to working parts enclosed within housing 21.

Referring now to FIG. 1, showing a film cartridge generally indicated at 30 in position for cleaning, it can be seen that the cartridge rests on the cover plate 22 of the apparatus. To assist in an appreciation of the apparatus and method of the invention, their purpose and effectiveness, an understanding of the film cartridge and its functioning are pertinent. Although the film-cleaning device is adapted to clean continuous films of various types and sizes housed in cartridges, in the illustration a standard commercial continuous 8 mm. film cartridge is shown. The cartridge 30 comprises a casing 31 (FIGS. 1 and 2), within which a continuous, endless strip of motion picture film 40 is coiled. A generally cylindrical portion 32 of the casing 31 accommodates the coil of film. The cylindrical portion 32 rises at an angle from a flat boxlike base portion 33 as best seen in FIG. 2. The base portion 33 has a flat bottom 34, an upstanding front wall 35, and two parallel upstanding sidewalls 36 and 36′ which meet the front wall 35 to form corners 37, 37′. The rear portion of the casing and the lower part of the cylinder 32 are the same, as shown at 38, and form a smooth continuation of the sidewalls 36, 36′. There is an elongated opening or aperture 39 in the front wall 35 of the casing (FIG. 11) and the casing bottom immediately beneath and to the rear of aperture 39 has a U-shaped opening 41 with the legs of the U extending towards front wall 35.

As shown in FIG. 1, corner locators 50 and 50′ are provided on cover plate 22 to aid in positioning and holding a cartridge on the plate 22 for cleaning. The corner locator 50 is simply a receiving pocket having two vertically extending sides 50*a* and 50*b* meeting at a right angle and a top 50c closing that angle. The pocket 50 snugly receives the corner 37 of the casing 31. Corner locator 50′ similarly receives the opposite corner 37′ of the cartridge 30. The corner locators 50, 50′ may be formed of plastic or other suitable material and be glued or otherwise suitably secured to cover plate 22. Thus to position a film cartridge 30 for cleaning, it is seated on the plate 22 and slid forward to seat its squared corners 37, 37′ in the pockets 50, 50′.

The film forwarding and cleaning elements of the apparatus are positioned on the plate 22 in front of the position occupied by the aperture 39 of the cartridge 30. Two rotary brushes 53 and 54 mounted for rotation on shafts journaled in and extending through the cover plate 22 are adjacent each other at a spaced location in front of cartridge opening 39. Brush 53 is located inwardly at brush 54, that is closer to the film cartridge 30. At spaced positions on opposite sides of brush 53 are two identical guide rollers 52 and 55 mounted on shafts extending through cover plate 22. Rollers 52 and 55 are so aligned as to guide a strip of film passing around them between brushes 53 and 54.

An idler roller 51 is mounted for rotation on a shaft journaled in and extending through the cover plate 22 close to the front wall 35 of film cartridge 30. A drive roller 56 on a shaft extending through the cover plate 22 is positioned near the front wall 35 of cartridge 30 and cooperates with a follower assembly 57 having a roller 110 to advance film.

The positions and functions of the rollers and brushes can be more readily understood in their relationships to a strip of film *f* shown in its position for cleaning in FIG. 1. The strip of film *f*, which is a loop of the continuous strip 40 withdrawn through aperture 39 of the front wall 35 of cartridge 30, emerges from the cartridge at point D of FIGS. 1 and 11 and

passes inwardly around idler roller 51, then outwardly and around guide roller 52. After passing around guide roller 52 the film passes between brushes 53 and 54, around guide roller 55, and inwardly to drive roller 56 against which the film is held by roller 110. Drive roller 56 pushes the film *f* back into the cartridge at E. The guide rollers 52 and 55 are positioned in such a way as to lead the film evenly between brushes 53 and 54 tangentially to the brush surfaces.

The purpose of the opening or aperture 39 in ordinary use of the magazine or cartridge is to allow film to be brought out to lie across the front of a plate 60 to be held flat there while light is passed through the small aperture 60*a* in the plate 60 from the rear to project images from the overlying film *f* onto a screen. The plate 60 lies in back of cartridge casing 31. It is a spring-biased metal strip having curved ends 61 and 62 extending beyond the ends of the rectangular opening 39.

When a cartridge is inserted into the film cleaning apparatus between the corner locators 50, 50' a pressure pad member 65, to be described later, depresses guide plate 60 to widen the openings at the ends of the plate, allowing a loop *f* of film which has been withdrawn and threaded through the cleaning device as described above to move freely into and out of the body of the cartridge. The film passing out at point D and in at point E should be kept out of contact with the edges of the opening 39 and the ends of the guide plate 60 to avoid wearing and scraping of the film. Therefore the idler roller 51 is positioned directly in front of one end of opening 39 to allow the film to move out of the cartridge in a smooth curve as shown by the dotted lines in FIG. 11. Similarly, drive roller 56 is positioned directly in front of the other end of aperture 39 so as to push film *f* at point E into the casing without the film's rubbing against the edges of opening 39 or against end 62 of the plate 60.

Referring now to FIG. 2, the guide roller 55 is seen as mounted on an axial shaft 85 journaled in and extending through cover plate 22. This roller has the usual end flanges 87 and 88 to keep the film centered on the roller. The roller 55 is preferably of hard plastic material and has a smooth bearing surface to prevent damage to the film through friction. Idler roller 51 and guide roller 52 are similar in construction and mounting to guide roller 55.

The brushes 53 and 54, best shown in FIG. 7, are mounted on parallel shafts 93 and 94 respectively. The term "brush" as used throughout this specification and in the appended claims is defined to include woven fabric wiping elements of pile or plush as well as monofilament bristles set in a base. In the drawings pile or plush brushes or wipers 97, 98 on cylindrical collars 95, 96 are shown pressing against each other to engage opposite sides of a strip pressed between them. The brushes 53 and 54 are removably mounted on their shafts by bolts 91 and 92 to permit replacement when desired.

FIG. 5 shows in detail the structure of drive roller 56 and follower assembly 57. The drive roller 56 is mounted on a shaft 100 which extends through cover plate 22. It has an upper part 101 of one circumference and lower part 102 relatively smaller circumference. The larger circumference of upper part 101 prevents the film from riding upward on the drive roller 56. The roller 56 is secured to a sleeve 103 which in turn is press fitted onto or otherwise secured to rotate with the shaft 100.

The follower assembly 57, shown in FIGS. 5 and 6, comprises a small roller 110 rotatably mounted on an upstanding stud 111 secured to one end of horizontally extending arm 112. The other end of arm 112 is pivotally mounted on cover plate 22 by means of a stud 113 extending therethrough. A spring 114 is secured at one end to a pin 115 extending radially from the stud 113 and has its other end secured to a bolt 117 extending downwardly from cover plate 22. Tension in the spring 114 biases the follower arm 112 toward a position in which roller 110 will press film against the portion 102 of drive roller 56.

For holding follower assembly 57 in position to space the roller 110 from drive roller 56, a spring-loaded pin 118 extends through the stud 111. The pin has an enlarged head 119, and a flange 120 extending out from its shank engaged by spring 121. When it is desired to thread film between the follower roller 110 and drive roller 56, the roller 110 is moved away from the roller 56 by rotating the arm 112 away from the position of FIGS. 5 and 6 until the lower end of the pin 118 drops into a hole 122 in cover plate 22. The spring 121 anchors the arm 112 in that position. To return the roller 110 to its operative position, the pin 118 is pulled up out of the hole 122, and the follower arm 112 is allowed to return under the tension of spring 114 to its operative position. Alternatively the follower arm assembly 57 may be solenoid actuated to move roller 110 automatically toward and against drive roller 56 whenever the apparatus is activated.

Referring now to FIG. 8, it can be seen that the carrying leg 66 of the pressure pad member 65 also extends through cover plate 22 being secured by a short leg 67 seated in a recess in the under surface of the plate. As stated above, member 65 serves to depress plate 60 to allow film to move freely out of and into the cartridge 30. It is preferable that the securing of member 65 be by means positioned below cover plate 22 to avoid any unnecessary projections above the cover plate surface. A pressure pad 69, of metal or plastic is secured to the inner surface of leg 66 and extends inwardly to depress the metal strip 60. Of course the leg 66 and pad 69 can also be integrally formed of metal or be otherwise suitably formed.

Referring to FIG. 11 it can be seen that when cartridge 30 is inserted into its position between corner locators 50, 50', the plate 60 is brought into contact with the pressure pad 69. Due to its resilient mounting, the plate 60 is depressed inwardly by the pad 69.

Angle brackets 70, 71 extending inwardly at the ends of the opening 39 of cartridge 30 engage the plate 60 and stop its inward movement when it has reached the position of FIG. 12. When the plate 60 is in this position, adequate spaces are provided between the curved end portions 61, 62 of the aperture plate 60 and the vertical edges 73 and 74 of the wall 35 at the aperture 39 to allow film to pass through freely. As described above, idler roller 51 and drive roller 56 are positioned close to the ends of the aperture 39 to advance the film through these spaces while preventing its rubbing against the plate 60 or the edges 73 and 74.

Referring now to FIG. 2 showing an illustrative embodiment of a drive mechanism for the guiding and cleaning elements of the invention, an electric motor 130 in the housing 21 is carried on cover plate 22 by supporting posts 131, 132 and 133. It has a cord 134 with a switch 137 for connection to a power source. Alternatively the motor could be battery powered to provide a self contained unit. As described above in connection with the cleaning parts, the brushes 53, 54 and rollers 51, 52, 55 and 56 are all mounted on shafts which extend through cover plate 22 and terminate at a level somewhat above the top of motor 130. Cylindrical collars or sleeves of suitable material are carried by the shafts to properly space parts mounted thereon. As shown in FIG. 4, a pulley 141 is mounted on the upstanding drive shaft 140 of motor 130 and keyed to the shaft to turn with it. The pulley 141 and the other pulleys have their peripheries suitably formed for reception of round cross section belt. The pulleys are preferably formed of a hard plastic material with the shafts preferably of steel.

FIGS. 2 and 4 show five other pulleys positioned at the same level as pulley 141, all engaged by the same endless drive belt 160 which is preferably of rubber or elastic synthetic material and is stretched around the pulleys under tension. Belt 160 extends from pulley 141 on drive shaft 140 to engage idler pulley 142 mounted freely on the shaft 102 of guide roller 52. Next the belt 160 engages pulley 143 keyed to shaft 93 of the brush 53, then engages a similar pulley 144 keyed to the shaft 94 of the other brush 54. From there the belt 160 extends to an idler pulley 145 mounted freely on the shaft 85 of guide roller 55 and returns to engage pulley 141 on the drive shaft 140 of motor 130 after engaging a larger idler pulley 146 mounted to rotate freely on shaft 100 of drive roller 56. When motor drive

shaft 140 rotates clockwise as shown in FIG. 4 to turn its pulley 141, the belt 160 moves and rotates the other pulleys in the directions shown by the arrows in FIG. 4. Since only the pulley 141 and pulleys 143 and 144 are keyed to their shafts, the shafts 93 and 94 carrying brushes 53 and 54 are the only shafts driven.

FIGS. 2 and 3 show a second belt 161, similar to but shorter than belt 160, which engages only two pulleys 153 and 156. These pulleys 153 and 156 are mounted respectively on shafts 93 and 100 at positions above the pulleys 143 and 146 on these shafts, being positioned by suitable collars 154 and 157. Pulley 153, like the same sized pulley 143, is keyed to shaft 93 and rotates with that shaft to drive large pulley 156 through belt 161. Pulley 156 is keyed to shaft 100 at the same level as pulley 153 and is spaced above pulley 146 by collar 157. Thus shaft 100 rotates and turns drive roller 56 for advancing film held between drive roller 56 and follower roller 110. Pulley 156 is larger than pulleys 153 and 143, so that it rotates drive roller 56 at a slower speed than that of the brushes 53 and 54.

To recapitulate, drive shaft 140 turns pulley 141 and through connecting belt 160 causes the pulleys 143 and 144 which are keyed to their shafts and consequently the brushes 53 and 54 which are keyed to the same shafts, to rotate. Pulley 153 also keyed to the same shaft as pulley 143 acts through belt 161 to drive large pulley 156, keyed to the same shaft as roller 56, which thus advances the film. The direction of rotation of brushes 53 and 54 is opposite to the direction of movement of the film as it passes between the brushes. This opposed motion ensures effective cleaning of the film.

The method of cleaning film contained in a cartridge, by the use of apparatus functioning like that just detailed will now be described. In the use of the cartridge in a projector, the film is drawn from the outside of the reel near side 36 of the casing, then out of the opening D across the plate 60 and the projection opening 60*a*, (FIG. 8). Light directed into the cartridge is reflected through the aperture, 60*a*, through the film overlying that aperture and projects images carried by the film onto a suitable screen. The film then continues across the plate 60 and is returned to the center of the reel through the opening E. In the method of cleaning in accordance with this invention, the film is not removed from the casing 31. A loop of film is withdrawn by grasping the film overlying the plate 60 and pulling it out away from the cartridge. The cartridge is then pressed into position between corner locators 50, 50′ so that the pressure pad member 65 depresses the plate 60 inwardly to allow easy passage of the film. Then the loop of film is threaded around rollers 51, 52, 55 and 56 and between the cleaning brushes 53 and 54. The follower arm 112 is swung to move its roller 110 from its position against drive roller 56 and is held there by pin 118 while the film is being threaded around roller 56. Then the pin 118 is lifted the follower assembly 57 is released and the roller 110 returns to press the film against drive roller 56 under the urging of spring 114. The film is now positioned ready for cleaning.

When the drive is activated, the drive roller 56 turns and pushes film *f* into the casing at E, while at the same time pulling film over the rollers and out of the casing at point D. In the course of this, film *f* is pulled between the brushes 53 and 54 which rotate contrary to the film movement and which engage the sides of the film and brush off any dust or dirt. As the film is then pushed along between drive roller 56 and follower roller 110, it returns, cleaned, into the casing through the opening E and winds up in the center of the coil 40. The continuous film may be cycled through the cleaning apparatus several times if needed for the removal of all dust and dirt. It is important to note that the film *f* is both drawn out of the opening D and pushed back through the opening E without scraping the borders of that opening.

On completion of the cleaning, the film loop *f* is removed from the rollers manually and the film loop *f* is tucked back into the casing. The entire cleaning operation takes a very short time and is very worthwhile in the improved results obtained in projecting the pictures.

Additional cleaning components may be utilized to cooperate with the brushes 53 and 54 in cleaning film. FIGS. 9 and 10 show a film cleaning cell of the type in which a liquid cleaning solution contacts the surface of film passing through the cell. The cell 180 has a boxlike housing 181 with an open top and a flat bottom 182. The cell may be held in position by a tab or projection 183 extending from the cell bottom 182 and inserted in a receiving opening in the cover plate 22. Thus the cell 180 is readily removable and replaceable. When used it is advantageously positioned in advance of the brushes 53, 54. Film leaving roller 52 enters the cell 180 through a liquid-tight gland or slot 184. It is washed by cleaning fluid in the cell passes out through another slot and then runs between the rotating brushes 53 and 54 which serve to remove any excess cleaning fluid adhering to the film as well as dirt on the film surface.

If desired blower and suction devices may be added to enhance the cleaning. The structure and positioning of these devices is shown in FIGS. 11–13. There blowers 190 and 190′ are shown as mounted on the under side of the cover plate 22. From FIG. 13, it is seen that the blower 190 has a hollow cylindrical body 191 carrying a fan 192 on a shaft 193. A pulley 195 is secured to the lower end of shaft 193 to be driven by one of the drive belts already described and to thus drive the fan 192. An air intake or suction opening 196 is provided in the cover plate 22 adjacent to the brushes 53, 54 to suck dirt from the film at that position. An outlet or exhaust conduit 199 carries off air and any dirt exhausted from the blower by the action of the fan 192.

In FIGS. 11 and 12 a similar blower 190′ is shown as secured to the underside of the plate 22 at a position below the film cartridge 30. Here the air outlet 199 has an upward extension 202 which protrudes through a hole in cover plate 22 and into the U-shaped opening 41 in the bottom of cartridge 30. In operation the blower 190′ blows a stream of air into the cartridge casing 31, while the film is moving through the casing, and the plate 60 is depressed to blow any dust in the casing out through the openings D and E.

FIG. 14 shows at 210 a modified drive belt which may be substituted for the flexible belts 160, 161. The belt 210 is a flexible strip of plastic material and is provided with lugs 211 extending from spaced positions on opposite sides of a web 212. Instead of the pulleys described above, toothed wheels 213 are used with the lugs 211 of drivebelt 210 cooperating with teeth 214 of the wheels to provide a positive drive. In other respects a device utilizing the modified drive of FIG. 14 would be the same as shown in FIGS. 1–8.

It will be understood that the method of the invention and the apparatus disclosed for carrying out that method may be employed with minor changes in the apparatus for the cleaning of films of various sizes other than that herein illustrated. It will also be apparent that with slight modifications the film cleaner could be utilized for cleaning magnetic tapes contained in cassettes.

Though a particular apparatus with a particular drive arrangement has been described in the foregoing and illustrated in the accompanying drawing, it is to be understood that various modifications thereof and changes therein will be obvious to those of ordinary skill in the art without departing from the spirit and scope of this invention of which only preferred embodiments have been shown herein.

I claim:

1. A method for cleaning an endless strip of motion picture film, magnetic tape, magnetic film or the like housed in a casing of the type having film gate plate, comprising: withdrawing a portion of the strip from the casing in the form of a loop, feeding the loop around guide means, engaging the strip with brushing means and positioning the strip in operative contact with strip-advancing means; and advancing successive portions of the continuous strip into said loop, passing said strip in contact with said brushing means and returning preceding portions of said strip back into said casing by operating said advancing means; maintaining said strip free from frictional

contact with said casing, as said strip is fed into and out of said casing, by guiding said film into and out of openings, said openings being formed in the casing by pressing and holding said film gate plate of said casing inward after said strip has been formed into said loop.

2. The method of claim 1 including rotating said brushing means simultaneously with the operation of the advancing means.

3. The method of claim 2 wherein said advancing means has a rotating surface and said strip engages said rotating surface and is resiliently maintained in contact with said rotating surface.

4. The method of claim 2 including washing said strip by passing the same through a washing bath prior to said brushing.

5. The method of claim 2 including directing a stream of air against and past said strip to remove loose material from the same.

6. The method of claim 2 including advancing said strip in a direction contrary to the peripheral movement of said rotating brushing means.

7. The method of claim 6 wherein said brushing means include a pair of contrarotating brushes and brushing both sides of said strip by advancing said strip between said pair of brushes.

8. Apparatus for cleaning an endless strip of film like material housed in a casing and adapted to be withdrawn therefrom and returned thereinto when in use through openings formed by pressing inwardly on a resiliently mounted plate covering an aperture in the casing wall, comprising: a support for positioning and holding said casing, rotatable brushing means carried by said support and formed to remove dust and dirt from said strip; guide means carried by said support and formed to position and maintain a portion of the strip withdrawn from said casing in a loop, strip-advancing means formed to engage said strip for moving successive portions of said strip through said loop, around said guide means, and against said brushing means; and means carried by said support and adapted on the positioning of said casing on said support to press said resiliently mounted plate inwardly to free said strip for free movement into and out of said casing.

9. Apparatus as in claim 8 said brushing means comprising two adjacent cylindrical brushes positioned to brush opposite sides of the strip; and said apparatus including a common drive means for rotating said brushes and for operating said strip-advancing means.

10. Apparatus as in claim 8, said strip advancing means comprising a driven cylindrical roller, a member positioned to press said strip against said driven roller and resilient means operatively associated with said member for effecting said pressing.

11. Apparatus of claim 8 and including roller means cooperating with said strip freeing means and positioned to guide said strip out of the casing free from frictional contact with the casing and said driven roller being positioned to push said strip back into said casing without frictional contact with the casing.

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