June 11, 1929. A. S. DWORSKY 1,716,878

FILM CLEANING MACHINE

Original Filed Oct. 6, 1924 2 Sheets-Sheet 1

Fig. 1

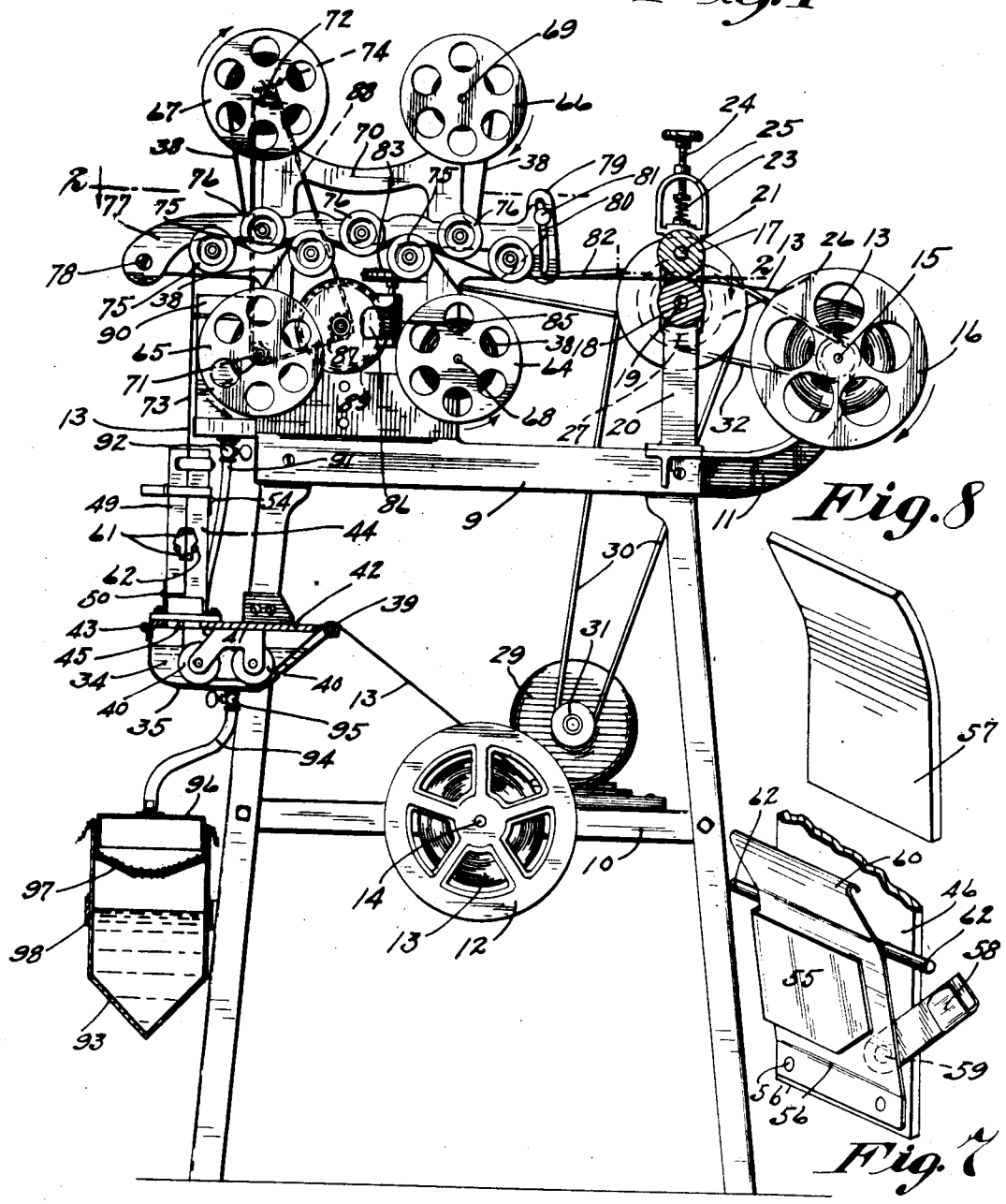


Fig. 8

Fig. 7

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Fig. 2

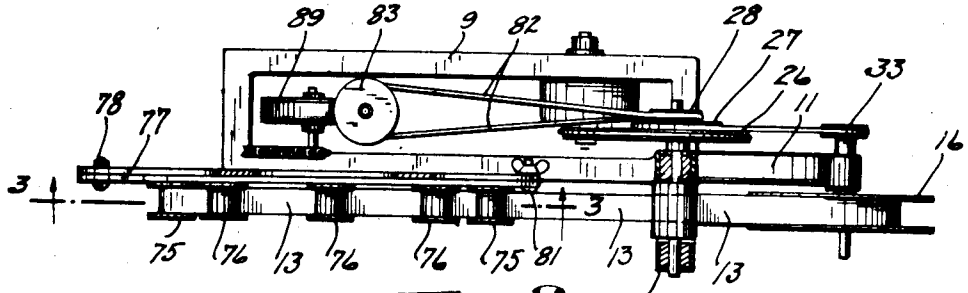


Fig. 3

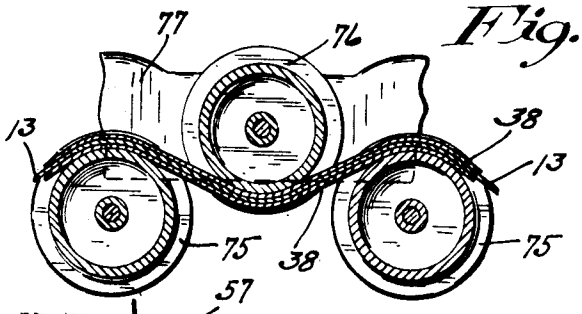


Fig. 4

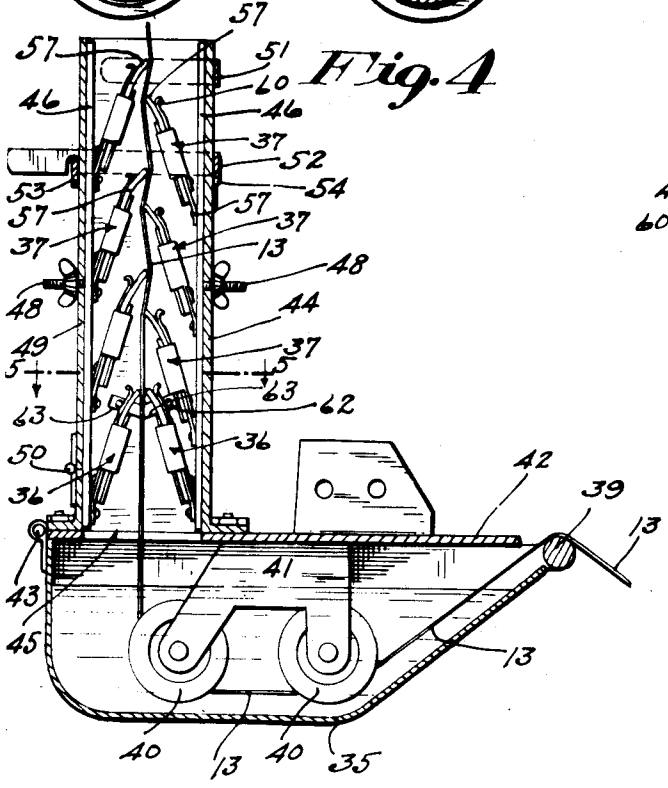


Fig. 5

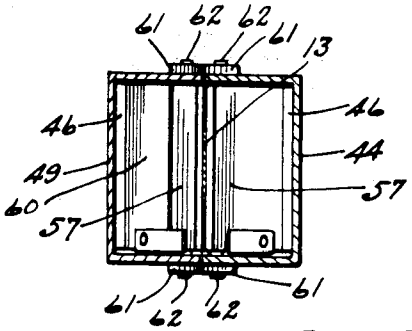
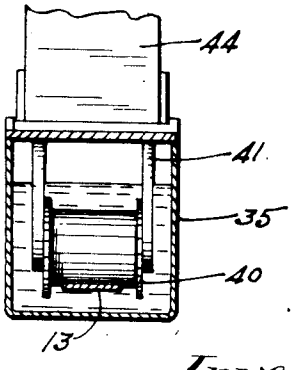


Fig. 6



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UNITED STATES PATENT OFFICE.

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FILM-CLEANING MACHINE.

Application filed October 6, 1924, Serial No. 741,978. Renewed November 9, 1928.

My present invention has for its object to provide a simple and highly efficient film-cleaning machine, and to this end it consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a view of the film-cleaning machine principally in left side elevation with some parts sectioned;

Fig. 2 is a view partly in plan and partly in section taken on the irregular line 2—2 of Fig. 1;

Fig. 3 is a fragmentary detail view in section taken on the line 3—3 of Fig. 2, on an enlarged scale;

Fig. 4 is a detail view principally in section taken vertically through the central portion of the film bath pan and casing containing the wipers, on an enlarged scale;

Fig. 5 is a detail view in horizontal section taken on the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary detail view with some parts in vertical section on the line 6—6 of Fig. 4;

Fig. 7 is a fragmentary view of one of the wiper holders and attached wiper with its pliable blade removed; and

Fig. 8 is a perspective view of the wiper blade removed from the wiper shown in Fig. 7.

The numeral 9 indicates a frame having an intermediate shelf 10 and a forwardly and upwardly projecting arm 11. An idle reel 12, on which is wound a moving picture film 13 to be cleaned, will be hereafter referred to as a loaded reel. This reel 12 is removably mounted on a fixed trunnion 14 projecting from the left-hand side of the shelf 10. Projecting from the left side of the arm 11 is a trunnion 15 on which is removably mounted a rewinding driven reel 16 on which is partly wound a portion of the film 13 that has been unwound from the reel 12.

The film 13 is frictionally drawn from the reel 12 by a pair of upper and lower rubber rolls 17 and 18, respectively, between which it is fed, the latter of which is driven and the former of which is idle. The driven roll 18 has its shaft 19 journaled in fixed bearings held in guides on a pedestal 20 on the frame 9, just back of the rewinding reel 16, and the idle roll 17 has its shaft 21 journaled in a pair of movable bearings 22 mounted in said guides with freedom for raising and lowering movements. A pair of coiled springs 23, interposed between the movable bearings 22 and a pair of hand screws 24 mounted in upright yokes 25 on the guides on the pedestal 20 yieldingly press the idle roll 17 onto the driven roll 18 and frictionally hold the film 13 therebetween.

Keyed to the projecting right-hand end of the shaft 19 are connected inner, intermediate and outer grooved pulleys 26, 27 and 28, respectively, and which pulleys are of progressively smaller diameter. The lower roll 18 is driven, in the direction of the arrow marked thereon in Fig. 1, from an electric motor 29 mounted on the shelf 10 by a belt 30 which runs over a relatively small grooved pulley 31 on the armature shaft of said motor and the inner pulley 26. The reel 16 is driven, in the direction of the arrow marked thereon in Fig. 1, by a belt 32 which runs over the intermediate pulley 27 and a relatively small grooved pulley 33 on the trunnion 15. It may be here stated that there is a slip connection between the reel 16 and pulley 33 to compensate for the different diameters of the film 13 as the same is wound onto said reel, but for the purpose of this case, it is not thought necessary to illustrate the same. Furthermore this compensation may be accomplished by the belt 32 which will slip when the tension on the film 13 becomes too great under the winding action of the reel 16. The reel 16 is driven at such a speed as to take up the slack in the film 13 as the same passes from between the cooperating rolls 17 and 18, but will not pull the same.

During the travel of the film 13, from the time the same is unwound from the reel 12 until the same is wound onto the reel 16, the same passes through a cleaning liquid compound 34 held in a film bath pan 35, between a pair of co-operating wipers 36, a plurality of staggered wipers 37, and a pair of travelling drier belts 38, preferably of cotton flannel.

The film bath pan 35 is attached to the frame 9 rearward of the reel 12 and above the same and has journaled at its front upper edge an idle guide roller 39 over which the film 13 travels from the reel 12. From this guide roller 39 the film 13 is guided downward into the cleaning liquid compound 34 and through the same by flanged front and rear idle guide wheels 40 which are journaled

on a depending bracket 41 secured to the under side of a cover plate 42 for the film bath pan 35. This cover plate 42 is hinged at 43 to the rear upper edge of the film bath pan 35. During the travel of the film 13 through the film bath pan 35, the oil, grease, dust, and dirt collected thereon during its use in the projecting machine is loosened and removed. From the film bath pan 35, the film 13 is drawn upward first between the wipers 36 and then zigzag between the staggered overlying wipers 37. The wipers 36 and 37 are all mounted within a rectangular upright casing 44 that is open at both ends, rests upon the cover 42 and is permanently secured thereto. Said cover 42 has an opening 45 which affords communication between the film bath pan 35 and casing 44. The wipers 36 and 37 are arranged in front and rear sets between which the film 13 passes and is wiped thereby to remove the cleaning liquid compound, which is drained back into the film bath pan 35, and also any foreign matter adhering thereto. Each set of wipers 36 and 37 are permanently secured to a holder 46 in the form of a flat plate, and which holders are detachably secured within the casing 44, the one to the front wall and the other to the back wall thereof.

Each holder 46 is detachably secured to the casing 44 by a nut-equipped stud 48 which projects through an aperture in the respective wall of said casing. In starting a film to be cleaned through the machine, the cover 42 is raised on its hinge joint 43 and said film placed under the guide wheels 40, and when said cover is closed the film will be held thereby in the cleaning liquid compound 34. To insert the film 13 between the two sets of wipers 36 and 37, the casing 44 is provided with a displaceable section 49 which is substantially the entire rear half thereof, and to which section the rear holder 46 is secured. This displaceable casing section 49 is secured at its lower end to the fixed section of said casing by a hinge 50 and is held aligned therewith by the spring prongs of a yoke-like member 51 secured to the upper end of said fixed casing section. The displaceable casing section 49 is held closed by the notched arms of a yoke-like member 52 which interlock with a transverse bar 53 on said section. The yoke-like member 52 has its transverse portion secured to the fixed section of the casing 44 by a hinge 54.

Obviously, by lifting the arms of the yoke-like member 52, to release the bar 53, the displaceable casing section 49 may be turned down to separate the two sets of wipers 36 and 37 and the film 13 placed therebetween, and when said displaceable casing section 49 is closed, the two sets of wipers 36 and 37 will engage opposite faces of the film 13. It will be noted that the two wipers 36 engage the film 13 directly opposite each other and that the staggered wipers 37 engage the film 13 at longitudinally spaced points and slightly bend the same so as to cause the film 13 to travel in a zig-zag course therebetween. The purpose of staggering the wipers 37 is to reduce the friction on the film 13 which would be too great if the wipers 37 were arranged the same as the wipers 36.

Each wiper 36 and 37 comprises an inner body member 55, an outer body member 56, and a pliable wiper blade 57 of rubber or other suitable material. The body members 55 and 56 are integrally formed at one of their vertical edges and are U-shaped in cross section. The body member 56 extends both above and below the body member 55 and has its lower end secured by rivets 56′ to the respective holder 46. The wiper blade 57 is held between the body members 55 and 56, extends thereabove and is held against edgewise removal therefrom through the open side by a U-shaped clip 58 pivoted at 59 to the body member 56 below the body member 55 and arranged to embrace the free vertical edge portions of said body members. The body members 55 and 56 diverge from the respective holder 47, and the body member 56 above the body member 55 has a considerably greater divergence and correspondingly holds the operative upper end portion of the wiper blade 57. The top edge of the body member 56 is rolled backward at 60 so as to not cut the wiper blade 57.

To properly position the two wipers 36 and cause the same to engage the film 13 at directly opposite points, as shown in Fig. 4, during the closing movement of the displaceable section 49, there is pivoted to each side of the casing 44 a pair of depending spacing arms 61 carried one on each of the casing sections and arranged to engage the projecting ends of a pair of transverse rods 62 secured one to the back of each body member 56 at the top of the body member 55. These rods 62 extend through notches 63 in the adjacent vertical edges of the casing sections. During the closing movement of the displaceable casing section 49, the free ends of the arm 61 of each pair engage each other and also engage the rod 62 between which they project and thereby separate the same against the spring tension of the wiper 57 and hold said wipers properly spaced. If it were not for these spacing arms 61, the wiper 36 in the fixed casing section 44 would project rearward under its spring tension, and as the displaceable section of said casing is closed, the respective wiper 36 would project above and overlap the first noted wiper and thereby engage the film 13 at different longitudinally spaced points and bend the same. The spacing action produced by the arms 61 is such that the wiper blades 57 are free to yieldingly engage the contacting faces of the film 13.

The travelling drier belts 38 are arranged,

the one above the other, and the lower drier belt 38 is wound on an idle spool 64 and partly unwound therefrom onto a driven spool 65, and the upper drier belt 38 is wound on an idle spool 66 and partly unwound onto a driven spool 67. The spools 64 and 65 and the spools 66 and 67 are horizontally spaced, with the driven spools 65 and 67 located rearward of the idle spools 64 and 66 so that the drier belts 38 travel in a reverse direction from the travel of the film 13. The two idle spools 64 and 66 are each loosely journaled on fixed trunnions 68 and 69, respectively, and which trunnions are secured to and project horizontally from the left side of a supplemental frame 70 on top of the frame 9. The two driven spools 65 and 67 are mounted on shafts 71 and 72, respectively, journaled in bearings on the supplemental frame 70 and have on their right-hand ends sprocket wheels 73 and 74, respectively.

The film 13, during its travel from the wipers 37 to the drawing rolls 17 and 18, travels between a set of four horizontally spaced lower flanged guide rollers 75 and a set of three horizontally spaced upper flanged guide rollers 76, and the rollers of these two sets are in staggered arrangement and arranged to cause the film 13 to travel a zigzag course. The intermediate portion of the lower wiper belt 38 runs over the two intermediate guide rollers 75 and under the intermediate upper guide rollers 76 and the intermediate portion of the upper drier belt 38 runs under all of the upper guide rollers 76 and over the two intermediate lower guide rollers 75 with the film 13 extended therebetween. The set of lower guide rollers 75 is loosely journaled on the supplemental frame 70, and the set of upper guide rollers 76 is loosely journaled on a horizontal arm 77, the rear end of which is pivoted at 78 to the supplemental frame 70 and the front end thereof is provided with a head 79 having a segmental vertical slot 80 through which projects a set screw 81 that has screw-threaded engagement with the supplemental frame 70. This set screw is adapted to frictionally clamp the head 79 onto the supplemental frame 70 and hold the arm 77 with the upper guide rollers 76 in different staggered relation to the lower guide rollers 75, whereby the frictional engagement between the drier belts 38 and the film 13 may be varied at will.

The following connections are provided for driving the driven spools 65 and 67 from the groove pulley 28, to wit: a twisted belt 82 runs over said pulley 28 and a grooved pulley 83 on the upper end of a vertical shaft 84 having on its lower end a worm 85 which meshes with a worm gear 86 having on its shaft a sprocket wheel 87 aligned with the sprocket wheels 73 and 74, and over which sprocket wheels runs a link belt 88 that drives the spools 65 and 67 in the direction of the arrows marked on Fig. 1. The shaft 84 and the shaft of the worm gear 85 are journaled in a casing 89 on the supplemental frame 70, and in which casing is located the worm 85 and worm gear 86. These driving connections from the grooved wheel 28 to the sprocket wheels 73 and 74 are operated at such a speed that the drier belts 38 travel at a considerably less speed than that of the film 13 and hence, produce a wiping action thereon to take up any moisture on the film 13, and at the same time polish and remove from the surfaces thereof all blurred or cloudy spots.

Mounted at the rear of the supplemental frame 70 is a tank 90 which holds a supply of the cleaning liquid compound 34. Leading from the bottom of this tank 90 to the film bath pan 35 is a hose connection or conduit 91 that is normally closed by a valve 92, and through which connection the film bath pan 35 may be supplied with the cleaning liquid compound. From time to time the liquid cleaning compound 34 may be drained from the film bath pan 35 into a receptacle 93, secured to the frame 9 under said bath pan, through a hose or conduit 94 normally closed by a valve 95 and leading from the bottom of the film bath pan 35 to an opening in a capping cover 96 for the receptacle 93. In the top of the receptacle 93 just under the cover 96 is a filter 97 for removing foreign matter from the liquid cleaning compound as it is drained from the film bath pan 35 into the receptacle 93. The receptacle 93 is removably secured to the frame 9 by a holder 98 so that the cleaning liquid compound collected therein can be poured into the film bath pan 35 and used over again.

The length of the drier belts 38 and the speed at which they are driven are such that said belts will dry an entire film being cleaned. After a film has been cleaned, the driven spools and the idle spools are interchanged so that said idle spools become driven spools and the driven spools the idle spools.

What I claim is:

1. In a film cleaning machine, the combination with a film bath pan, of yieldingly pressed wipers, in which two of the wipers are arranged to engage a film directly opposite each other and in which others of said wipers are staggered and arranged to engage alternate sides of the film at longitudinally spaced points, a pair of traveling driers and means for drawing the film through the bath pan and between the wipers and driers.

2. A film cleaning machine having a pair of wipers, each of said wipers comprising a fixed spring member having an intermediate body portion that is U-shaped in cross-section, a pliable blade removably mounted in said body, and means for closing the open side of said body.

3. A film cleaning machine having a pair of wipers, each of said wipers comprising a fixed spring member having an intermediate body portion that is U-shaped in cross-section, a pliable blade removably mounted in said body, and a pivoted U-shaped clip for closing the open side of the body member.

4. A film cleaning machine having a casing with a displaceable section, a pair of spring-pressed film wipers in the casing, one of which is carried by the displaceable section, said wipers having a pair of projecting pins, and a pair of co-operating spacing arms pivoted one to the casing and the other to its displaceable section and extended between said pins and arranged to engage each other during the closing movement of said displaceable section to space and align the wipers.

5. A film cleaning machine having two pairs of spools, one spool of each pair being idle and the other driven, two drying belts wound one on each of the idle spools and arranged to be wound onto the respective driven spools, upper and lower sets of guide rollers in staggered arrangement and between which the drying belts travel, the one upon the other, and means for drawing a film longitudinally between the drying belts.

6. The structure defined in claim 5, in which means are provided for causing the film to travel at a greater speed than that of the drying belts.

7. The structure defined in claim 5 in which one of the sets of guide rollers is adjustable with respect to the other to vary the pressure of the drying belts on the film.

In testimony whereof I affix my signature.

ABRAHAM S. DWORSKY.