March 5, 1935. B. BURNS 1,992,989

FILM ROLLER AND DRIVING MECHANISM

Filed Nov. 3, 1930

Fig. 1.

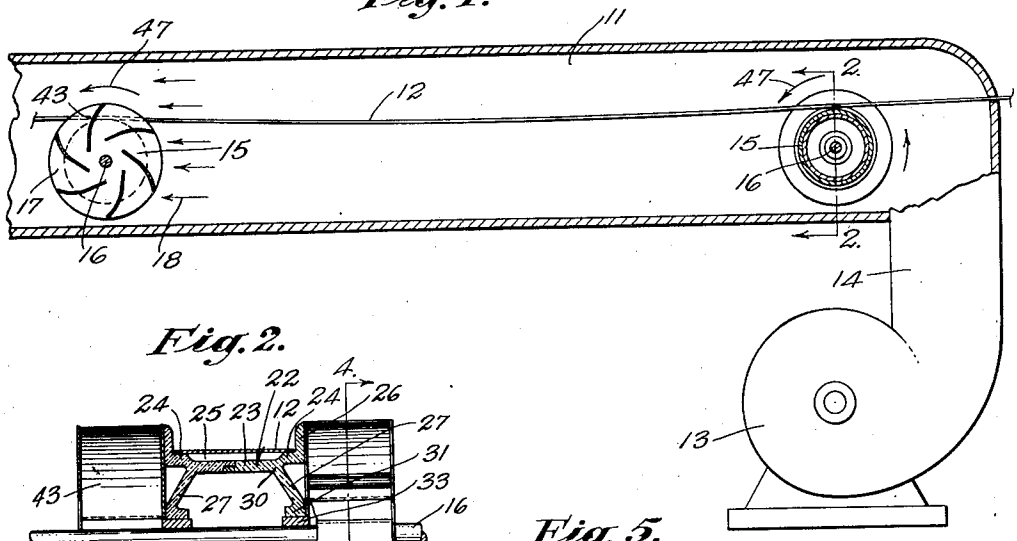


Fig. 2.

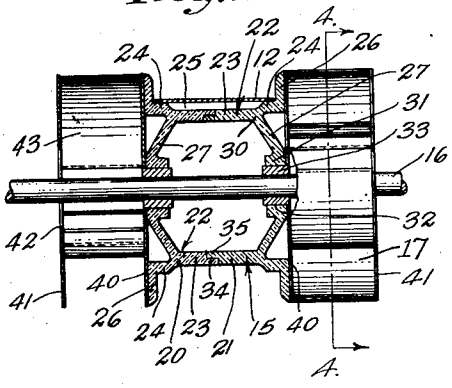


Fig. 5.

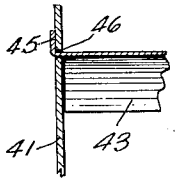


Fig. 4.

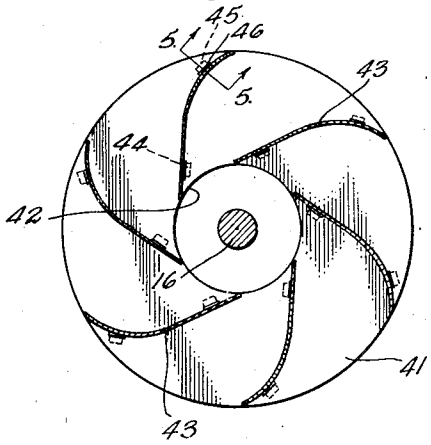
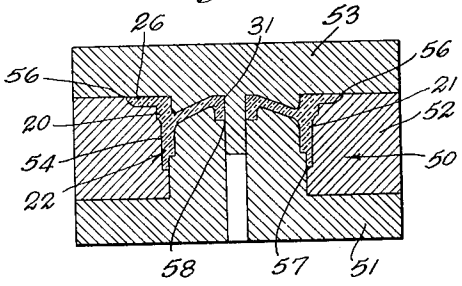


Fig. 3.



INVENTOR:
BRUCE BURNS,
BY Fad W Kunis

ATTORNEY.

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FILM ROLLER AND DRIVING MECHANISM

Bruce Burns, Los Angeles, Calif., assignor, by mesne assignments, to Hughes Industries Co., Ltd., Los Angeles, Calif., a corporation of Delaware

Application November 3, 1930, Serial No. 492,921

5 Claims. (Cl. 271—2.3)

My invention relates to film handling mechanism and relates to a simple form of film supporting roller and a simple driving means therefor.

Although my invention may be employed advantageously in other arts, I believe that its principal utility is in film handling devices, such as developing, drying, and coloring machines for motion picture film, in which the film to be treated is carried continuously over rollers which guide the film through the various fluids and atmospheres comprising the film treating process employed.

It is an object of my invention to provide a simple form of film supporting and guiding roller made from non-corrodible material which will be sturdy, simple, light-weight, and of much less cost than the film rollers now employed in the motion picture industry.

It is also an object of the invention to provide a film roller comprised of cooperating molded parts so formed that they can be made and secured together without formation of an external flash which would mark the film if not removed by an additional finishing operation.

It is a further object of the invention to provide a film spool made from cooperating parts having cylindrical walls supported and reinforced by conical walls, the film roller being of hollow construction and having thin walls throughout but of ample strength to prevent warpage during use of the film roller.

It is a further object of the invention to provide a film roller comprised of cooperating cup-shaped members joined together by simple and effective means to form a complete roller.

It is a further object of the invention to provide in a film handling device a simple means for applying driving force to the rollers thereof, thereby reducing tension in the film during its movement through the film handling machine.

Further objects and advantages of the invention will be made evident throughout the following part of the specification.

Referring to the drawing, which is for illustrative purposes only,

Fig. 1 is a diagrammatic view showing a portion of a film handling machine embodying my invention, this view having the right-hand portion thereof sectioned on a central longitudinal plane so that the section extends through the center of the right-hand roller, and having the left-hand portion thereof sectioned on a plane forward from the central longitudinal plane of the device so that the section extends through one of the driving members forming part of my invention.

Fig. 2 is an enlarged cross section on a plane represented by the line 2—2 of Fig. 1.

Fig. 3 is a diagrammatic sectional view showing the manner of molding one of the cooperating parts of my new film roller.

Fig. 4 is an enlarged cross section on a plane represented by the line 4—4 of Fig. 2.

Fig. 5 is an enlarged fragmentary section on a plane represented by the line 5—5 of Fig. 4 showing the manner in which the blades of the impelling means are secured to the flanges thereof.

In Fig. 1 I show a treating chamber 11 forming a part of a film handling mechanism, such as a continuous developing machine, the part 11 being a drying chamber through which a film 12 is carried and wherein it is subjected to a flow of air, preferably heated, from a blower 13 which is connected to the chamber 11 by means of a duct 14. The film 12 is supported on rollers 15 which are carried on shafts 16 and are either fully or partly driven by impelling means 17 so constructed as to be actuated by the flow of air or other fluid through the chamber or passage 11 as indicated by arrows 18. The use of this simple impelling means relieves from the film the tension which would be produced therein should the rotation of the rollers be derived from movement of the film, and further relieves the necessity of applying power means, such as motors and shafts, for driving the rollers 15.

My simple film roller 15 is comprised of cooperating parts respectively designated as primary part 20 and secondary part 21, each of which parts is of cup-shaped form and has cooperating means of simple character for joining it to the other part. Each part includes a cylindrical wall structure 22 comprised of an inner cylindrical wall 23 and an outer cylindrical wall 24, the outer cylindrical wall 24 being of larger external diameter than the wall 23, so that a shallow groove or depression 25 is formed in the outer cylindrical face of the roller beneath the central portion of the film 12 which extends thereover or partly therearound. At or near the end of each outer wall 24 is a radial flange 26 for guiding the film 12, and extending across the internal space of each cylindrical wall structure 22 is a conical web or wall 27 which converges outwardly. The periphery of the conical wall 27 preferably joins the wall structure 22 at the end 30 of the inner cylindrical wall 23. Inwardly from the central portion of each conical wall 27

a hub 31 extends, this hub 31 having a bore 32 through which the shaft 16 extends and which may be of sufficient size to receive a hub or boss 33 projecting inwardly from the impeller 17. The walls 23, 24, and 27 are relatively thin and are therefore of minimum weight. The conical wall 27, however, reinforces the cylindrical wall structure 22 so that a cup-shaped part is formed having ample rigidity for the use to which it is adapted. On the inner edge of the cylindrical wall 23 of the primary part 20 a cylindrical flange 34 is formed, the thickness of this flange being less than the thickness of the wall 23, and on the inner end of the cylindrical wall 23 of the secondary part 21 a cylindrical flange 35 is formed, the outer face of the cylindrical flange 35 being of slightly greater diameter than the inner face of the flange 34 to provide a shrink fit between these two faces. The primary and secondary parts 20 and 21 are joined together by heating the part 20, or at least the inner portion thereof, and cooling the part 21, or at least its inner portion, so that the flange 35 may be inserted within the flange 34 and thereby gripped by the flange 34 when the parts return to an equal temperature. A small amount of cement may be employed between the flanges 34 and 35 during the joining thereof so as to assist in the formation of a permanent joint.

In Fig. 3 I show the primary part 20 in a mold 50 of the general character adapted to the forming of the parts 20 and 21. This mold is shown as consisting of a base 51, an intermediate part 52, and a cap 53. The intermediate part 52 provides a continuous cylindrical wall 54 in which there are no axially extending joints or parting lines which would produce a flash or flashes in the outer cylindrical face of the cylindrical wall structures 22. Therefore, there is no finishing work to be done on the outer face of the wall structure 22 after molding to place the parts in condition to receive a film. The mold 50 is parted in such a manner that flashes are formed only at 56, 57, and 58, and these flashes are all circular in extension and do not extend across the area of the roller 15 which is engaged by the film 12.

My simple impelling means 17 may be placed on one or both sides of the roller 15, as shown in Fig. 2, and consists of a plate 40 secured to the outer end of the boss 33 and a second plate 41 having an opening 42 therein secured to the plate 40 by blades or vanes 43 which extend between the plates 40 and 41. The vanes 43 are spirally curved as shown in Fig. 4, and on the lateral edges thereof have inner and outer tongues 44 and 45 which extend through openings 46 in the plates 40 and 41. In assembling the impellers 17 the tongues 44 and 45 are projected through holes 46, the tongues 44 being bent inwardly and the tongues 45 being bent outwardly so as to lie flat against the outer faces of the members 40 and 41. The vanes 43 are so formed that a flow of fluid, such as air or liquid, in the direction of the arrows 18 in Fig. 1 will exert on said impellers a resultant rotational force tending to turn the impellers in the direction of arrows 47, this rotational force varying with the size and design of the impellers 17 and supplying part or all of the force necessary to produce rotation of the rollers 15, thus relieving the film of a greater part or all of the strain of turning the rollers. Where used in the type of film handling apparatus in which the end of a film leaving the handling equipment is engaged by a pulling sprocket to supply the motive force for moving the film through the treating chambers of the device, such as the developing, fixing, washing, and drying compartments, my simple driving means is particularly advantageous as it greatly reduces the pull which must be placed on the film in order to cause it to move through the device, thereby avoiding possibility of film breakage due to excessive strain placed therein.

Although I have herein shown and described my invention in practical form, it is recognized that certain parts and elements thereof are representative of other parts, elements, and mechanisms which may be employed in substantially the same manner to accomplish substantially the same results; therefore, it is to be understood that my invention is not to be limited to the details disclosed herein but is to be accorded the full scope of the following claims.

I claim as my invention:

1. A film handling device of the character described, including: a roller over which a film is carried through a fluid moving along the direction of travel of said film; and a fluid actuated impeller connected to said roller, said impeller having members engaged by said moving fluid and producing rotation of said roller in consequence of such engagement to move said film.

2. A film handling device of the character described, including: walls forming a passage for containing a fluid adapted to treat a film; a roller in said passage for supporting said film so that it may be moved through the passage and in contact with the treating fluid; means for causing said fluid to flow within said passage; and vanes connected to said roller in said passage, said vanes being adapted to be moved by the moving fluid in said passage and to thereby rotate said roller in the direction of movement of said film.

3. A film handling device of the character described, including: walls forming a passage for containing a fluid adapted to treat a film; a roller in said passage for supporting said film so that it may be moved through the passage and in contact with the treating fluid therein; means for causing said fluid to flow within said passage the same direction as the film travel; and vanes secured to said roller in spiral position in said passage, said vanes being adapted to be moved by the moving fluid in said passage and to thereby rotate said roller in the direction of movement of said film.

4. A film handling device of the character described including: walls forming a fluid channel; a roller in said channel for supporting a film tape; an impeller attached to said roller adapted to rotate said roller by reason of the impact of fluid flowing along said channel; and means for causing fluid to flow along said channel.

5. A film handling device of the character described including: walls forming an elongated fluid channel; a roller mounted in said channel for supporting a film tape; means for causing a flow of fluid along said channel; and spirally curved vanes fastened to said roller positioned in said fluid stream to be rotated by the flow of said fluid along said channel.

BRUCE BURNS.