Oct. 9, 1934. E. C. FRITTS 1,976,338

MOTION PICTURE PULL DOWN MECHANISM

Filed July 29, 1932

Fig. 1.

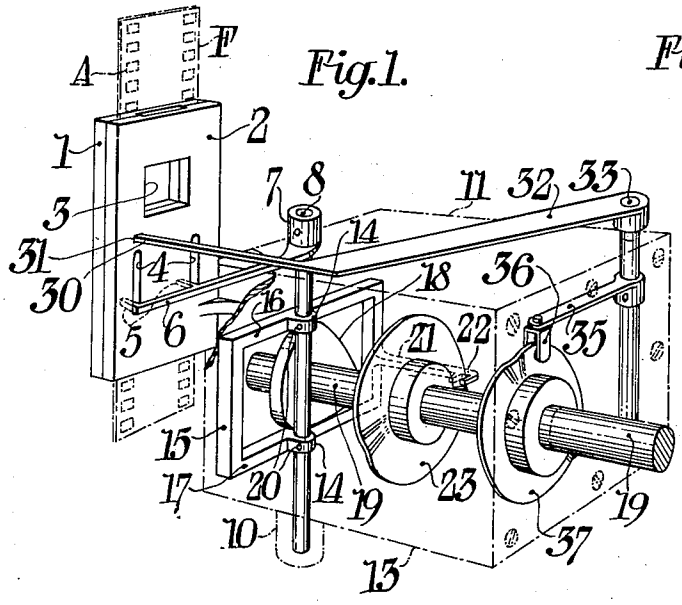


Fig. 6.

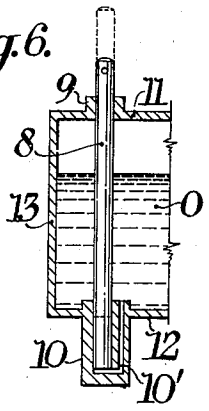


Fig. 2.

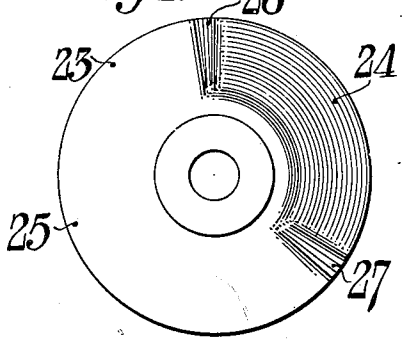


Fig. 3.

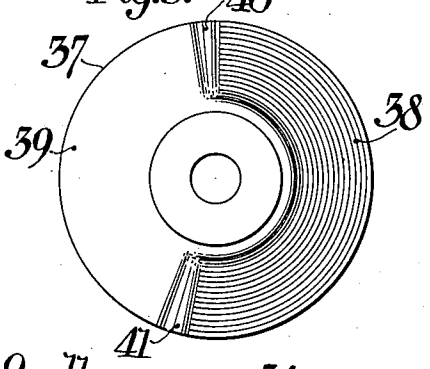


Fig. 4.

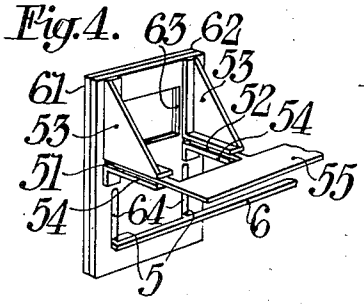
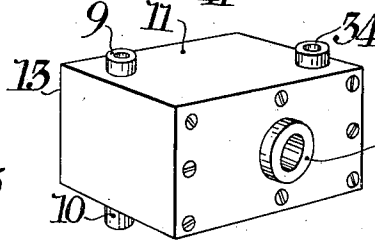


Fig. 5.



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Patented Oct. 9, 1934 1,976,338

UNITED STATES PATENT OFFICE

1,976,338

MOTION PICTURE PULL DOWN MECHANISM

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Application July 29, 1932, Serial No. 625,711

5 Claims. (Cl. 88—18.4)

This invention relates to photography and more particularly to mechanisms for intermittently advancing a motion picture film. One object of my invention is to provide a motion picture pull down mechanism which is simple in construction and which will accurately advance a motion picture film a predetermined amount at each operation. Another object of my invention is to provide a simple type of mechanism in which a single shaft is reciprocated and oscillated to obtain the necessary movements. Another object of my invention is to provide a motion picture pull down mechanism which is especially suited for enclosing the operating or wearing parts in an oil bath. Another object of my invention is to provide a motion picture pull down mechanism which is guided in its operation. Still another object of my invention is to provide a motion picture pull down for film which may be driven by a single power-operated shaft, and other objects will appear from the following specification, the novel features being particularly pointed out in the claims at the end thereof.

Coming now to the drawing wherein like reference characters denote like parts throughout:

Fig. 1 is a perspective view of a pull down mechanism constructed in accordance with and embodying a preferred form of my invention.

Fig. 2 is a plan view of a cam used in the mechanism shown in Fig. 1.

Fig. 3 is a similar view of another cam used in the pull down shown in Fig. 1.

Fig. 4 shows a second embodiment of a guide which may be used in connection with the pull down mechanism shown in Fig. 1.

Fig. 5 is a perspective view of a preferred form of oil-tight housing in which the pull down mechanism may be enclosed.

Fig. 6 is a fragmentary, sectional view showing the bearings supporting the pull down operating shaft.

In motion picture pull down mechanisms there are a number of parts which are constantly operated and some of which move at a comparatively high speed. Consequently, it is necessary to provide a means for securing adequate lubrication if the machine is to be operated successfully.

It is also difficult with motion picture pull down mechanisms to obtain adequate lubrication and to prevent the lubricating material—usually oil—from coming in contact with the film. This is particularly necessary in photographic printing machines because the oil spots and ruins film particularly where it comes in contact with the film before processing.

My invention is particularly directed to overcoming these and other difficulties.

In accordance with my invention a film F having apertures A may be drawn down between a film gate which may consist of cooperating gate sections 1 and 2 which may be apertured at 3 to receive an image. This gate is also provided with a pair of similar slots 4 through which pull down claws 5 may pass, these claws being carried by a single arm 6 which is affixed to a bearing 7 which is pinned to the shaft 8. This shaft transmits both an in and out and an up and down movement to the pull down claws.

The shaft 8 is adapted to slide freely in bearings 9 and 10 which are on the upper and lower faces 11 and 12 of the housing 13 in which the operating mechanism of the pull down is enclosed. From Fig. 6 it should be noted that bearing 10 is a closed bearing; that is, it does not open through a wall of the oil-tight casing. If desirable, an oil hole 10' may be provided to prevent compression of the oil O in the bottom of the bearing as the shaft 8 is moved vertically.

Shaft 8 passes through a pair of bearings 14 carried by a frame 15, the upper and lower edges of which, 16 and 17, engage the periphery of a Lumière cam 18. This cam is attached to a shaft 19 and as this shaft is rotated the Lumiere cam drives the frame up and down and with it the shaft 8. The shaft 8 is provided with a pair of pins 20 passing through the bearings 14 so that movement of the frame will be transmitted to the shaft and so that an oscillating movement of the bearing 14 on the shaft 8 is caused by oscillation of frame 15.

This oscillating movement is necessary to obtain the in and out movement of the claws 5. An arm 21 extends from the frame 15 and is provided with a fork 22 which engages a disk cam 23. This cam, as best shown in Fig. 2, is provided with an offset portion 24 and a plane portion 25, these two portions being connected by the tapered walls 26 and 27.

When the fork 22 engages portion 25 of the cam, the claws will be held out of the film perforations A. When the fork 22 engages portion 24 of the cam, the claws will be engaged with the apertures A.

The cams 18 and 23 are so positioned relative to each other that the pull down claws 5 move into the film just as the Lumiere cam 8 starts to

move the claws downwardly, and when the Lumiere cam has moved the claws 5 to their lowermost extent of movement the shaft 8 is oscillated so that the claws move out of engagement with the film.

Such a pull down can be successfully operated without having a holding or locating pin for the film. Where, however, extreme accuracy of registration is desired, it is sometimes necessary or desirable to employ a film locating pin or pins. In accordance with Fig. 1, I may provide a holding pin 30 adapted to slide through an aperture 31 in the gate member 2 into an aperture A in the film F. This arm is carried by a second arm 32 pinned to a shaft 33 which is mounted to turn in the bearing 34. The shaft 33 carries an arm 35 which is pinned to the shaft and carries fork 36 which engages the disk cam 37. As indicated in Fig. 3, this cam has an offset portion 38 and a plane portion 39 connected by the tapered walls 40 and 41. The cam is attached to the shaft 19 and turns with it. As the shaft is rotated by power the holding or locating pin 31 is oscillated in timed relation to the movement of the pull down claws, entering a perforation A in the film just after the pull down claws 5 leave the film and moving from an aperture A in the film just in advance of the movement of claws 5 into the film.

While I have shown only a single locating pin in Fig. 1, in Fig. 4, I show a preferable construction in which a pair of locating pins 51 and 52 are used, these locating pins being guided by the guiding plates 53 and 54. The locating pins 51 and 52 may be carried by an arm 55 which may be attached to the shaft 33 so that the shaft may be oscillated thereby.

In this form of invention the gate member consists of two sections 61 and 62 apertured at 63. The locating pins are located just beneath this aperture and beneath the locating pins are a pair of parallel slots 64 through which the pull down claws 5 may operate, these pull down claws being carried as before by the arm 6 which is attached to the shaft 8.

As best shown in Fig. 5 the driving shaft 19 passes through a bearing 59 in one wall of the housing and may be turned by a suitable source of power. The cams 18, 23 and 39 are all carried by this single shaft. As the frame 15 and the forks 22 and 36 are also mounted in the housing it can readily be partially filled with oil so as to insure the proper lubrication. It is only necessary to provide a stuffing box in the bearing 59 to prevent the lubrication from leaving the housing and the oil which accumulates on the shafts 8 and 33 will adequately lubricate these shafts as they pass through bearings 9 and 34 without any tendency to distribute the oil in undesirable places.

Moreover, both of these shafts are removed some distance from the gate member 1—2 in which the film is mounted so that the chance of oil getting on the film with this mechanism is extremely slight.

It should be noted that the pull down claws 5 are totally carried by a single shaft 8 and that the movements necessary for moving the claws through a fixed up and down and in and out path are obtained through this single shaft. This makes an extremely simple structure to properly lubricate the mechanism because the operating elements for the shaft 8 may be all contained in an oil-tight housing and it is only necessary to bring a single shaft through that housing to operate the pull down claws.

In cases where a locating or positioning claw is required, a single shaft may be added to the casing so that the problem of proper lubrication is not materially increased.

It is obvious that many modifications may be made in the structure of the pull down mechanism which has been described above without departing from my invention. I contemplate as within the scope of my invention all such forms as may come within the terms of the appended claims.

What I claim as my invention and desire to be secured by Letters Patent of the United States is:

1. In a pull down for motion picture apparatus, the combination with a toothed film-engaging member, of a shaft mounted to move in two directions, connections between said toothed member and said shaft, and mechanism for imparting movement in two directions to the shaft including cams and cam followers, one cam being adapted to move said shaft axially and another being adapted to oscillate said shaft, an oil tight casing enclosing all of said mechanism except said toothed member and shaft, and a single bearing projecting through said casing in which said shaft may move under the influence of the cams and cam followers said shaft projecting outside of the casing through said bearing and carrying the toothed member outside of said casing.

2. In a pull down for motion picture apparatus, the combination with a toothed film-engaging member, of a shaft mounted to move in two directions, connections between said toothed member and said shaft, and mechanism for imparting movement in two directions to the shaft including cams and cam followers, one cam being adapted to move said shaft axially and another being adapted to oscillate said shaft, an oil tight casing in which the shaft is supported, and a single vertical bearing projecting through the casing for movably supporting said shaft in a vertical position whereby one end of the shaft may pass out of the casing, and a closed guiding bearing inside of the casing adapted to support the other end of said shaft inside of the casing.

3. In a pull down for motion picture apparatus, the combination with a toothed film engaging member, a single vertical shaft movably mounted and carrying said film engaging member, an oil tight casing, a single bearing projecting through the casing through which said vertical shaft projects, mechanism mounted inside the casing for moving the shaft axially and about the axis, said toothed member being carried by the shaft outside of said casing, whereby said toothed member may be given an up-and-down and an in-and-out movement by the shaft.

4. In a pull down for motion picture apparatus, the combination with a toothed film engaging member, a single vertical shaft carrying said film engaging member, means for moving the shaft up and down including a frame movably mounted on the shaft but held against axial movement relative thereto and a Lumiere cam engaging said frame, means for oscillating said frame including a cam and cam follower carried by the frame, the width of the frame being such that the Lumiere cam may continue to engage said frame throughout the complete movement of the latter and an enclosure containing said mechanism and a single bearing carried by the

enclosure through which the vertical shaft projects, said film engaging member being carried by the shaft outside of the enclosure.

5. In a pull down for motion picture apparatus, the combination with a toothed film engaging member, a single vertical shaft carrying said film engaging member, means for moving the shaft up and down including a frame movably mounted on the shaft but held against axial movement relative thereto and a Lumiere cam engaging said frame, means for oscillating said frame including a cam and cam follower carried by the frame, a single power driven shaft driving the cam and Lumiere cam, and an oil tight enclosure for the cams, frame and cam follower, a pair of bearings in said enclosure only one of which extends through a wall thereof for supporting portions of the single vertical shaft, whereby said vertical shaft may operate said toothed film engaging means through oscillating and sliding through said bearing extending through the wall of said enclosure.

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