

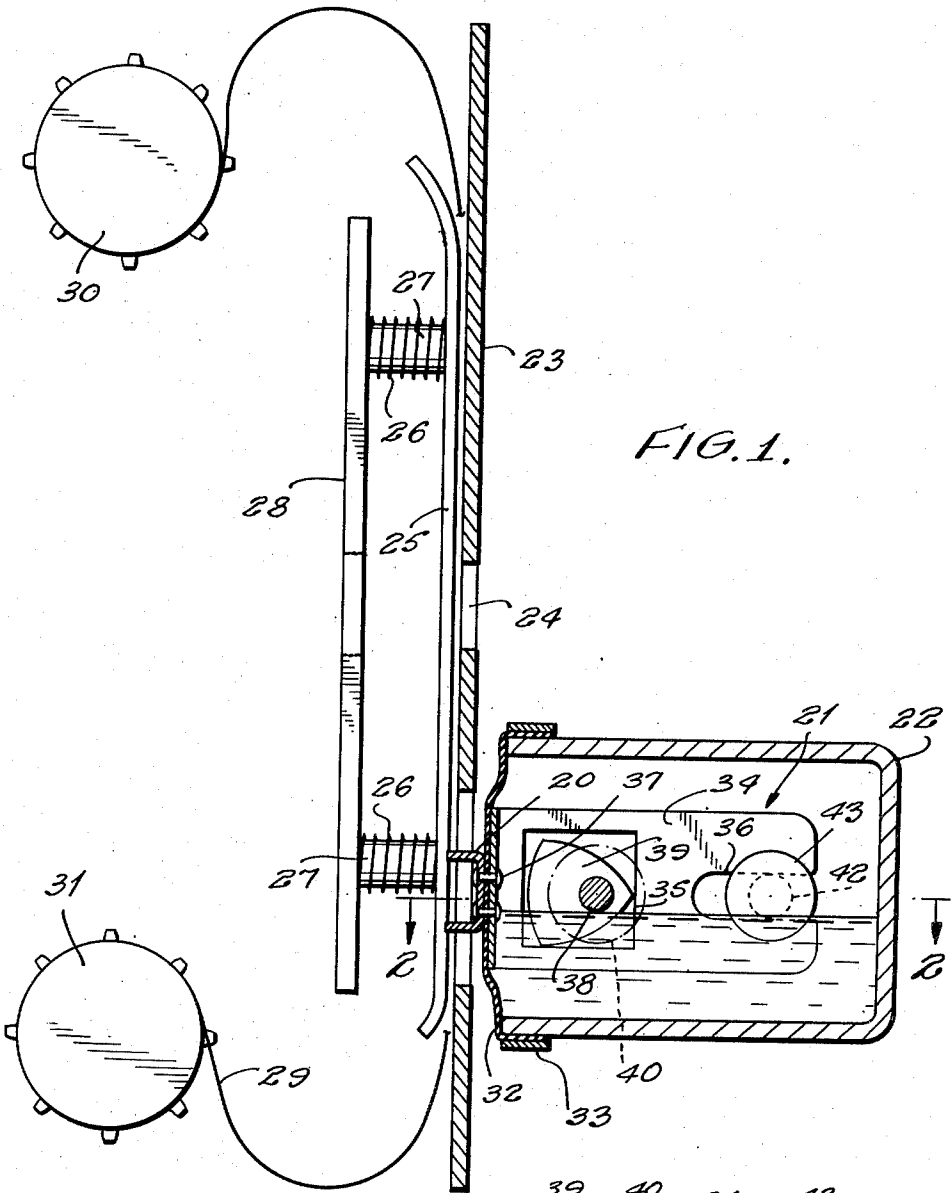
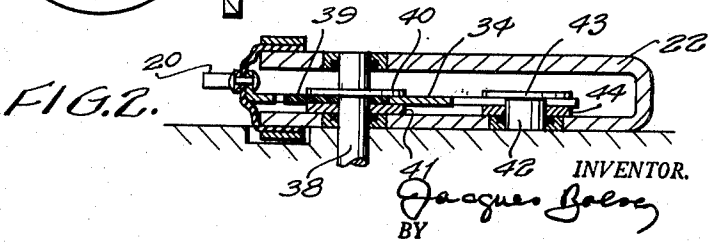
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PULL-DOWN MECHANISM

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PULL-DOWN MECHANISM

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9 Claims. (Cl. 88—18.4)

This application is a continuation-in-part of U. S. application Serial No. 58,559, entitled "Cinematographic Projector," filed November 5, 1948, which is in turn a continuation of U. S. patent application Serial No. 759,258, entitled "Cinematographic Projector," filed July 5, 1947, a continuation of U. S. application Serial No. 331,492, entitled "Cinematographic Projectors," filed April 25, 1940, and a continuation of U. S. application Serial No. 571,691, entitled "Cinematographic Projector," filed January 6, 1945, all now abandoned.

The present invention relates to a film transporting arrangement for projectors, and more particularly to a structure for actuating the film engaging claw of a projector.

It is generally most desirable to mount the claw driving mechanism in a bath of oil, and problems are encountered in confining this oil to a sealed chamber while at the same time permitting the proper movement of the claw. Usually, exceedingly complicated constructions are employed to attain this latter result.

One of the objects of the present invention is to enable the claw driving mechanism to be located in a bath of oil while permitting proper operation of the claw.

An additional object of the present invention is to provide a construction which ensures that the oil in which the claw driving mechanism is located will not leak.

A further object of the present invention is to provide an exceedingly simple and inexpensive structure for confining the oil bath to an enclosed chamber while at the same time permitting the desired movement of the claw.

A still further object of the present invention is to provide an exceedingly simple driving mechanism for actuating the film transporting claw.

With the above objects in view, the present invention mainly consists of a claw having a moving member connected thereto for moving the same and a mechanism associated with the moving member for imparting through the same the desired movement to the claw. Between the claw and moving member, which are fixedly connected to each other, there is located a flexible diaphragm which forms one wall of a sealed chamber, so that the diaphragm may move with the claw and moving member while still being capable of confining an oil bath to the interior of the chamber. The flexible diaphragm is mounted on the chamber in a simple manner, and the moving member is formed with a substantially square aperture passing therethrough and a cutaway portion extending along the length of the moving member. Within the sealed chamber is a rotatably and eccentrically mounted cam having three arcuate edge portions and being located within the aperture of the moving member so that when this cam is rotated it moves the moving member through the proper motions for imparting to the claw member a movement through a substantially rectangular path. A flexible diaphragm moves with the moving member and the claw, and a bath of oil may thereby be maintained in the chamber. Also, a stationary pin is located within the chamber

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and in engagement with the cut away portion of the moving member to guide the same.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 shows a side view, partially in section, of the film transporting arrangement of the present invention with the associated projector structure diagrammatically illustrated; and

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1 in the direction of the arrows.

Referring to the drawings, there is shown in Fig. 1 the film transporting claw 20 associated with the claw driving mechanism 21 located within the chamber 22. This claw 20 is located in an aperture of the front plate 23 of the projector which has an exposure aperture 24 located above the claw 20. Associated with the front plate 23 is the pressure plate 25 which is urged toward the front plate 23 by the springs 26 mounted on the pins 27 which are connected to the support member 28 which is stationary. The pins 26 are hollow and respectively support for sliding movement therein two pins which are fixedly connected to the pressure plate 25. These latter pins are not shown in the drawings. The film 29, which is diagrammatically illustrated in Fig. 1, moves in a downward direction, as viewed in Fig. 1, between the pressure plate 25 and the front plate 23, and this film travels from the toothed feed roller 30 to the toothed takeup roller 31. The teeth of the rollers 30 and 31 engage the perforations in the sides of the film 29 in a conventional manner. The claw 20 has a pair of opposite upper and lower legs which also engage the perforations of the film to move the same, and these legs are interconnected by the vertically extending arm of the claw, as shown in Fig. 1.

The chamber 22 is sealed by the membrane 32 which is made of any flexible material capable of preventing the leakage of oil or the like, such as rubber for example. The flexible membrane 32 is located about the left open end of chamber 22, as viewed in Figs. 1 and 2, and is removably mounted on the chamber 22 by means of the ring 33 which may be forced in a pressed fit over the edge portion of the membrane or which may fixedly and removably mount the membrane 32 on the chamber 22 in any other known manner.

A flexible membrane 32 of rubber is preferred not only because of its capability of acting as a seal to keep the oil in the chamber, but also because of its resiliency. The rubber diaphragm is of particular advantage because it absorbs shocks arising from the changes in the direction of movement of the claw, because it aids in the pull down of the film due to the fact that it is stretched just before the film is pulled down, so that it acts as an auxiliary spring, and the stretching of the diaphragm provokes a certain resistance of braking action which dynamically helps to balance out the up and down movement of the claw. There are many types of rubber which will not be dissolved or disintegrated by oil. For example, among several known types of rubber which are stretchable and resilient and yet have a high resistance to any deterioration by reaction with oil are butadiene rubbers and polysulfide rubbers.

The driving mechanism 21 comprises the elongated moving member 34, which is provided with a substantially square aperture 35 and with an elongated cut away portion 36 extending along the length of the member 34 and being open at the right hand end thereof, as viewed

in Figs. 1 and 2. The moving member 34 is laterally bent at its left end, as is shown in the drawings, so as to form a flange portion which serves to receive the rivets 37, which fixedly connect the claw 20 to the moving member 34 and which pass through the membrane 32 located between the claw 20 and moving member 34. The membrane 32 is tightly gripped between the moving member 34 and claw 20 so that no oil can leak through the membrane at its connection to the claw 20 and moving member 34. Extending into the chamber 22, and being mounted for rotation therein, is the shaft 38 upon which the cam 39 is fixedly and eccentrically mounted. As is apparent from Fig. 2, washers 40 and 41 are located on opposite sides of the cam 39, and the shaft 38 passes through bearings mounted on the chamber 22 and provided with stuffing boxes of any known construction to prevent leakage of oil from the chamber 22. As is apparent from the drawings, the cam 39 is located within the square aperture 35 and is provided with three identical arcuate edge portions adapted to engage and move the moving member 34 upon rotation of the shaft 38, which may be driven by any suitable means, such as a motor or the like. Fixed within the interior of the chamber 22 is the pin 42 which engages the cut away portion 36 of the moving member 34 to guide the latter and which has the large end portion 43 located on one side of the moving member 34 and the washer 44 located on the other side thereof and supported on pin 42. As is apparent from the drawings, Fig. 1 is a view taken just above the moving member 34 as shown in Fig. 2.

The above-described mechanism 21 is adapted to move the claw 20 through a substantially rectangular path. Thus, assuming that the parts are in the position shown in Fig. 1 and that the cam 39 is rotating in a counter-clockwise direction, it is apparent that the claw 20 will move in a vertically downward direction, as viewed in Fig. 1, until the lowermost point of cam 39 shown in Fig. 1 reaches the lowermost part of its movement. During this movement of the cam 39, the film 29 will be transported by the claw 20 in a vertically downward direction as viewed in Fig. 1. The cam 39 will then move the claw 20 to the right, as viewed in Fig. 1, then in an upwardly vertical direction, as viewed in Fig. 1, and then to the left, as viewed in Fig. 1, until the claw 20 again contacts perforations of the film 29. The continued rotation of the cam 39 causes the moving member 34 to then move the claw 20 in a vertically downward direction so as to transport the film in the same direction, as viewed in Fig. 1. The above cycle is repeated and synchronized with the other parts of the projector so as to periodically move the film 29 at the proper rate and by the proper amounts.

What I claim as new is:

1. A film transporting arrangement for projectors comprising in combination, claw means for engaging and periodically moving the film to be transported; moving means operatively connected to said claw means for moving the same; and a fixedly mounted chamber in which said moving means is located, said chamber having one wall thereof formed by a flexible diaphragm located between said claw means and moving means and being fixed to said claw means and moving means for movement together with said claw means and said moving means, said diaphragm having an outer face located at the exterior of said chamber and engaging said claw means and an inner face directed toward the interior of said chamber and engaging said moving means so that said claw means is located entirely outside of said chamber and said diaphragm being held fluid-tightly between said claw means and moving means to prevent leakage of a fluid from said chamber, said chamber being adapted to be at least partially filled with oil and said diaphragm preventing leakage thereof.

2. A film transporting arrangement for a photographic apparatus, comprising in combination, claw means for

engaging and periodically moving the film to be transported; an elongated movably mounted member connected to said claw means; a flexible diaphragm fixedly connected to said claw means and movably mounted member and being clamped therebetween; a sealed chamber enclosing said movably mounted member and having one wall thereof formed by said flexible diaphragm; and moving means located within said chamber and operatively connected to said movably mounted member for moving the same so as to thereby actuate said claw means, said chamber being adapted to be at least partially filled with oil and said diaphragm preventing leakage thereof.

3. A film transporting arrangement for projectors, comprising in combination, claw means for engaging and periodically moving the film to be transported; an elongated movably mounted member connected to said claw means and being formed with an aperture passing therethrough; a flexible diaphragm fixedly connected to said claw means and movably mounted member being located therebetween, and having opposite faces respectively engaging said claw means and movably mounted member so that said claw means is located in its entirety on one side of said diaphragm and said movably mounted member is located in its entirety on the other side of said diaphragm and said diaphragm being held fluid-tightly between said claw means and moving means to prevent leakage of a fluid from said chamber; a sealed chamber enclosing said movably mounted member and having one wall thereof formed by said flexible diaphragm; and moving means located within said chamber and operatively connected to said movably mounted member for moving the same so as to thereby actuate said claw means, said chamber being adapted to be at least partially filled with oil and said diaphragm preventing leakage thereof, said moving means comprising an eccentrically and rotatably mounted cam located within said aperture and abutting against said movably mounted member.

4. A film transporting arrangement for a photographic apparatus, comprising in combination, claw means for engaging and periodically moving the film to be transported; an elongated movably mounted member connected to said claw means and being formed with an aperture passing therethrough; a flexible diaphragm fixedly connected to said claw means and movably mounted member and being clamped therebetween; a sealed chamber enclosing said movably mounted member and having one wall thereof formed by said flexible diaphragm; and moving means located within said chamber and operatively connected to said movably mounted member for moving the same so as to thereby actuate said claw means, said chamber being adapted to be at least partially filled with oil and said diaphragm preventing leakage thereof, said moving means comprising an eccentrically and rotatably mounted cam located within said aperture and abutting against said movably mounted member and guide means located within said chamber and operatively connected to said movably mounted member for guiding the same.

5. A film transporting arrangement for projectors, comprising in combination, a claw means for engaging and periodically moving the film to be transported; an elongated movably mounted member connected to said claw means and being formed with a substantially square aperture passing therethrough; a flexible rubber diaphragm clamped between said claw means and movably mounted member; a sealed chamber enclosing said movably mounted member and having one wall thereof formed by said flexible diaphragm, said diaphragm being chemically inert with respect to a fluid in said chamber; and moving means located within said chamber and operatively connected to said movably mounted member for moving the same so as to thereby actuate said claw means, said chamber being adapted to be at least partially filled with oil and said diaphragm preventing leakage thereof, said moving means comprising an eccentrically and rotatably mounted cam having three arcuate edge portions

and being located within said aperture and abutting against said movably mounted member and guide means located within said chamber and operatively connected to said movably mounted member for guiding the same.

6. A film transporting arrangement for projectors, comprising in combination, a claw means for engaging and periodically moving the film to be transported; an elongated movably mounted member connected to said claw means and being formed with a substantially square aperture passing therethrough and with an elongated cut away portion extending along the length of said movably mounted member; a flexible elastic diaphragm clamped between said claw means and movably mounted member; a sealed chamber enclosing said movably mounted member and having one wall thereof formed by said flexible diaphragm; and moving means located within said chamber and operatively connected to said movably mounted member for moving the same so as to thereby actuate said claw means, said chamber being adapted to be at least partially filled with oil and said diaphragm preventing leakage thereof, said moving means comprising an eccentrically and rotatably mounted cam having three arcuate edge portions and being located within said aperture and abutting against said movably mounted member and guide means located within said chamber and operatively connected to said movably mounted member for guiding the same, said guide means comprising a pin member fixedly mounted within said chamber and engaging said elongated cut away portion of said movably mounted member.

7. A film transporting arrangement for projectors, comprising in combination, claw means for engaging and periodically moving the film to be transported; moving means operatively connected to said claw means for moving the same in one direction about a substantially rectangular path; and a sealed chamber in which said moving means is located, said chamber comprising a flexible diaphragm forming one part thereof and being fixedly connected to said claw means so as to move with the same, said diaphragm being held fluid-tightly between said claw means and moving means, said chamber being adapted to be at least partially filled with oil and said diaphragm preventing leakage thereof.

8. A film transporting arrangement, comprising in

combination, a claw member having a pair of opposite film-engaging legs interconnected by an arm of said claw member; an elongated moving member fixedly connected to said arm of said claw member and being formed with a substantially square aperture passing therethrough and an elongated cut away portion extending along the length of said moving member; a sealed chamber enclosing said moving member and having one wall thereof formed by a flexible elastic diaphragm clamped between said claw member and moving member; a rotatably and eccentrically mounted cam member located within said chamber and within said aperture of said moving member and having three arcuate edge portions for engaging said moving member and moving said claw member connected thereto through a substantially rectangular path, said flexible diaphragm moving with said claw member and moving member; and a pin member fixedly mounted in said chamber and engaging said cut away portion of said moving member for guiding the latter, said chamber being adapted to be at least partially filled with oil and said flexible diaphragm preventing leakage thereof.

9. A film transporting arrangement for a photographic apparatus, comprising, in combination, an elongated container having an open end; a flexible diaphragm fixed at its periphery to said container over said open end thereof so as to close said container and form a chamber therewith; claw means for engaging and periodically moving film to be transported, said claw means engaging an outer face of said diaphragm located on the outside of said chamber; and moving means located within said chamber, engaging an inner face of said diaphragm directed toward the interior of said chamber, and being connected through said diaphragm to said claw means for moving the latter, said diaphragm being held fluid-tightly between said claw means and said moving means, whereby said diaphragm prevents leakage of oil in said chamber while participating in the movement of said moving means and claw means.

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