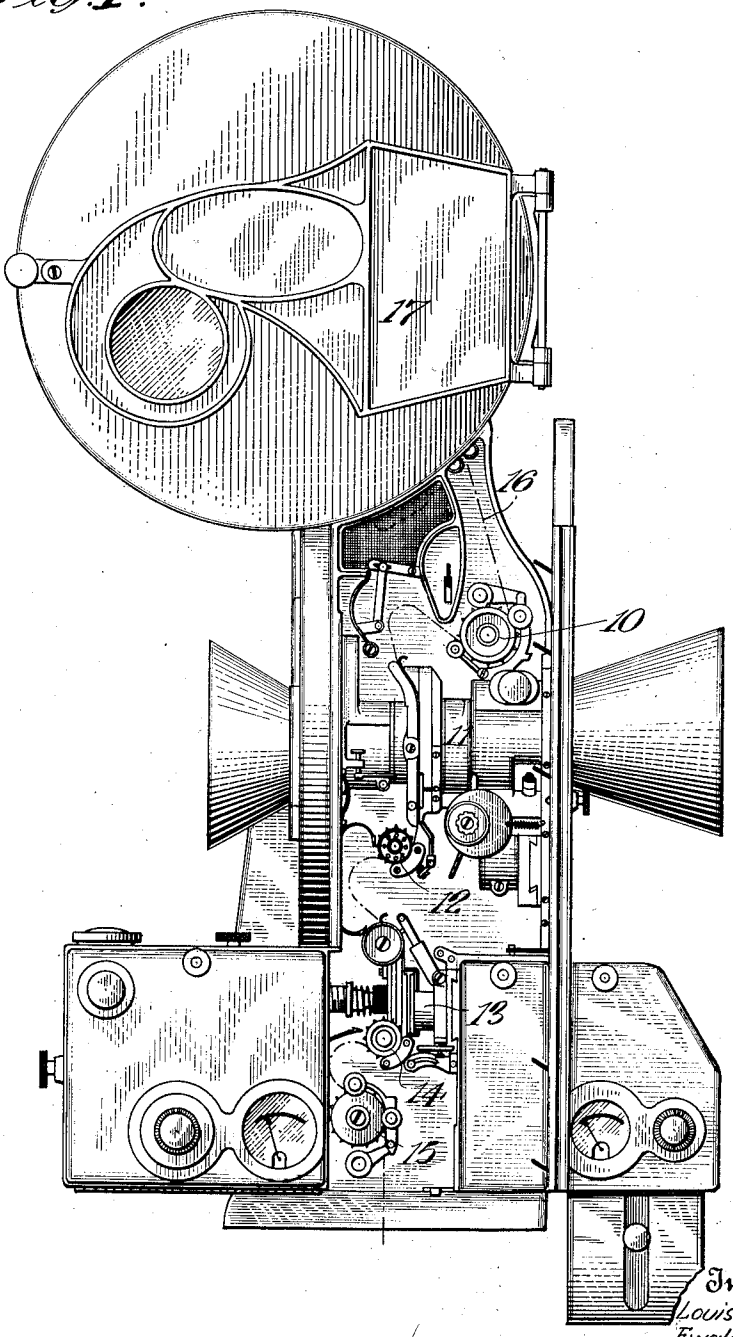
June 13, 1933. L. S. FRAPPIER ET AL 1,913,380

FILM GATE CONTROL

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Fig. 1.



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FILM GATE CONTROL

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Fig. 2.

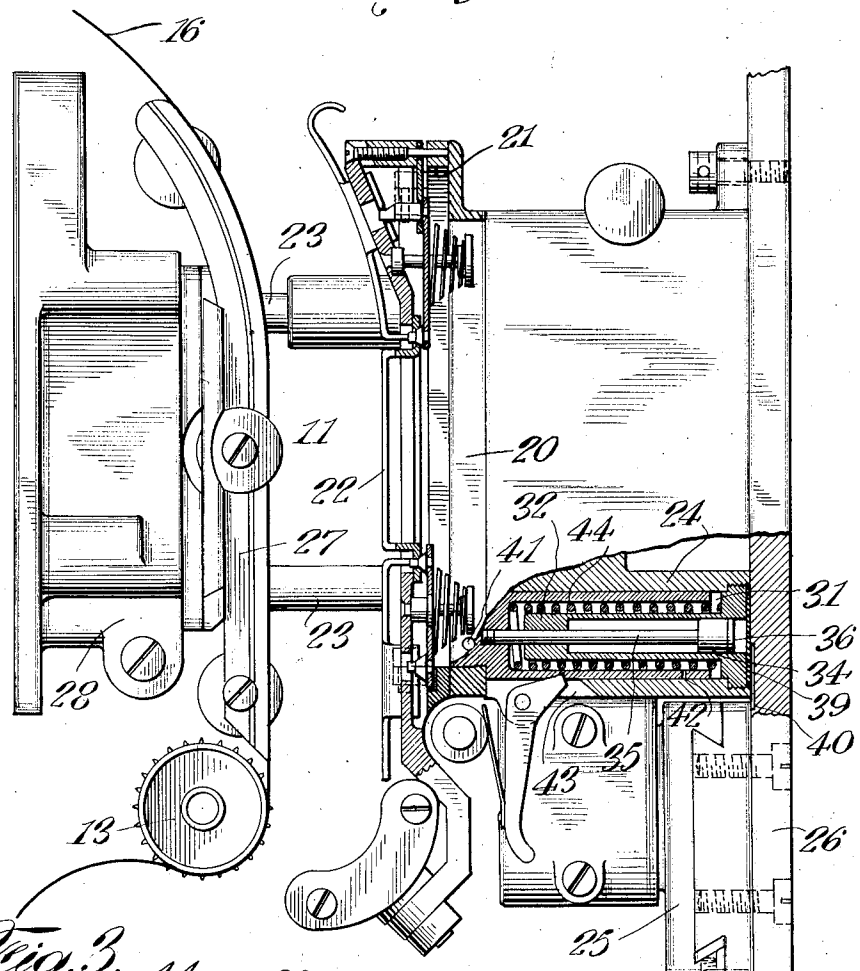
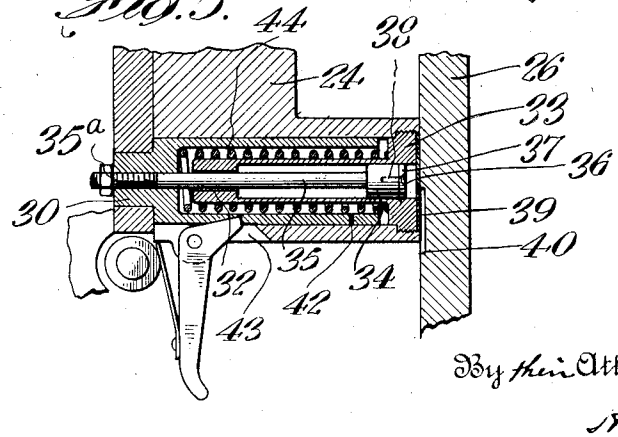


Fig. 3.



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Fig. 4.

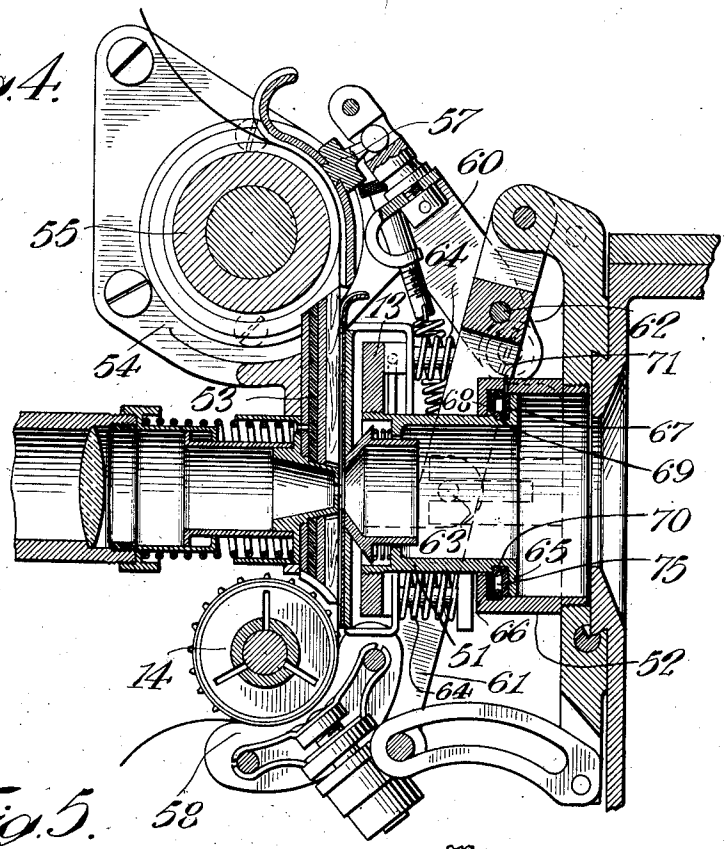
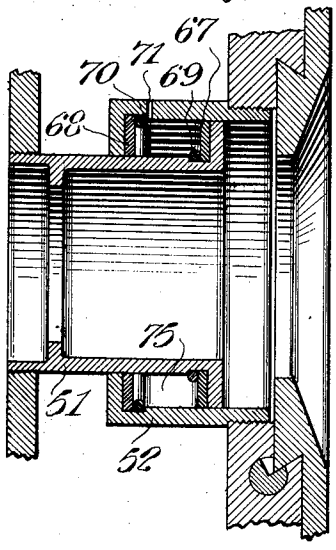


Fig. 5.



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UNITED STATES PATENT OFFICE

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FILM GATE CONTROL

Application filed June 5, 1929. Serial No. 368,529.

This invention relates to projection machines, and more particularly to a new and improved film gate control.

The invention provides specifically for the control of the film gate of a projection machine in such manner that the gate is prevented from closing against the film with an excessive force. For this purpose pneumatic means is employed for interrupting the closing action of the gate and for counteracting the force of the closing spring. After the gate is in closed position the pneumatic means is rendered inactive and the full force of the closing spring is exerted upon the gate for maintaining the same in closed position.

An object of the invention is to prevent damage to the film due to the closing action of the gate.

Another object is to prevent injury to the parts of the gate which might be caused by excessive impact when the gate is closed.

A further object is to provide a mechanism in which the film gate is firmly maintained in closed position while the impact of closing is reduced to a minimum.

The invention also consists in certain new and original features of construction and combinations of parts hereinafter set forth and claimed.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, the mode of its operation and the manner of its organization may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part thereof, in which

Fig. 1 is a side elevation of a projection head showing the location of the film gates;

Fig. 2 is a side elevation of the upper film gate partly broken away to show the pneumatic control;

Fig. 3 is an enlarged detail view of the pneumatic control with the gate in open position;

Fig. 4 is a longitudinal sectional view of the lower film gate showing the pneumatic control; and

Fig. 5 is an enlarged detail view of the air chamber of the lower film gate.

Like reference characters denote like parts in the several figures of the drawings.

In the following description and in the claims parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

The type of projection head to which this invention may be applied is shown in Fig. 1 as including an upper feed sprocket 10, upper film gate 11, intermittent sprocket 12, lower film gate 13, continuous sprocket 14, and lower feed sprocket 15. A film 16 is passed from upper film magazine 17 over the various sprockets and film gates in the order named and is fed into a lower film magazine (not shown). The particular form of projection head and film gates form no part of the present invention, and will accordingly not be described herein in detail. One form of projection head with which the invention may be employed including upper and lower film gates is shown and described in the copending application of Frappier and Boecking, Serial No. 303,162, filed August 31, 1928, for Improvements in Projection machine.

The upper film gate 11 (Fig. 2) includes a movable member which is formed of a casting 20 to which is secured a frame member 21 carrying pressure shoes 22. Said movable member is carried on tubes 23 which are secured in stationary housing 24 in any convenient manner. Said housing is mounted on bracket 25 which is slidably secured to frame 26 of the projection head. Aperture plate 27 is secured to housing 28 which is carried on tubes 23.

The pneumatic film gate control comprises a plunger 30 which is carried in casting 20 and slides in a recess 31 in housing 24. Air cylinder 32 is secured in recess 31 as by cap 33 which is threaded into housing 24. Piston 34 is mounted within cylinder 32 and is secured to a connecting rod 35 which passes loosely through said cylinder and is

threaded into plunger 30, being secured in position by lock nut 35a. Leather 36 may be secured to the end of piston 34 as by washer 37 which is held in place by a screw 38.

Flap 39 of flexible material is inserted between plug 33 and frame 26. The upper portion of said flap is rigidly secured between said plug and said frame in any convenient manner and the lower portion thereof is free to move in port 40 which connects cylinder 32 with the outer air. Set screw 41 may be inserted in casting 20 in a position to contact with the threads of connecting rod 35 for holding said connecting rod and plunger in position. An air port 42 is formed in plunger 30 in a position to register with opening 43 in housing 24 when the gate is in partly closed position. Closing spring 44 is seated between cap 33 and plunger 30 for normally holding the gate in closed position.

In the operation of the above described pneumatic control, when the gate is moved to closed position piston 34 compresses the air in cylinder 32 and forces said air around connecting rod 35 into the space between cylinder 32 and plunger 30. The air becomes compressed in said space and retards the closing action of the film gate until port 42 registers with space 43. The air pressure is then released and the gate is allowed to completely close. When the gate is again opened the back pressure of piston 34 causes movement of flap 39 whereby port 40 is opened and the air is allowed to escape.

It is to be noted that when the film gate is closed under the action of closing spring 44 it will first close under the full force of said spring until the air pressure in plunger 30 is built up to a sufficient value to retard the closing action. The closing will then be temporarily interrupted until port 42 registers with opening 43, after which the gate is allowed to come into full closed position. The air cushion is prevented from interfering with the opening of the gate inasmuch as flap 39 operates to relieve back pressure of piston 34 during the opening operation.

The invention is shown in Figs. 4 and 5 as applied to a film gate 13 formed with telescoping tubes 51 and 52. Aperture plate 53 is secured on casting 54 in a suitable position for cooperating with film gate 13. Idler roller 55 and drive sprocket 14 are mounted in any convenient manner and cooperate with pressure shoes 57 and 58 respectively which are mounted for operation in accordance with the position of said film gate. For this purpose pressure shoe 57 is mounted on pivoted arm 60 and pressure shoe 58 is mounted on pivoted arm 61, said arms being interconnected by pin 62 whereby said arms are caused to move as a unit. Arm 61 is connected as by pin 63 to telescoping member 51 whereby the position of arms 60 and 61 are both controlled by the position of said member 51. Closing springs 64 may be employed for normally holding gate 13 in closed position.

Members 51 and 52 are formed with flanges 65 and 66 respectively which extend at right angles to said members and form in connection therewith a closed chamber 75. Flexible washers 67 and 68 are secured adjacent flanges 65 and 66 as by retaining rings 69 and 70 which are held in suitable recesses in members 51 and 52 respectively. Air vent 71 is formed in member 52 to provide for the passage of air from said air chamber.

When film gate 13 is released and is being brought into closed position due to the action of springs 64, air pressure is built up in chamber 75 which retards the closing action until said air pressure is relieved by leakage through port 71. This prevents the film gate from being violently closed against the film and prevents injury to the film and to the aperture plate. When the gate is again brought into open position there will be sufficient air leakage past the outer surface of flexible members 67 and 68 to prevent sufficient pressure from being built up to interfere with the opening operation.

While certain novel features of the invention have been shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In combination with a film gate, resilient means for normally holding said gate in closed position and pneumatic means for opposing the operation of said resilient means, comprising a piston carried by said gate and cooperating with a stationary cylinder for building up air pressure as said gate is closed until sufficient pressure has been built up to temporarily interrupt the closing operation, and means for releasing said pressure when said gate is in partly closed position whereby the closing operation is completed under the influence of said resilient means.

2. In combination with a film gate, resilient means for closing said gate, pneumatic means for opposing the action of said resilient means, said pneumatic means comprising a hollow plunger carried by said gate and sliding in a suitable bore in a stationary member, a piston for building up pressure in said plunger as the gate is closed, said plunger having a vent adapted to align with an opening in said member when said gate is in partly closed position whereby the air within said plunger is released.

3. In combination with a film gate, resilient means for closing said gate, pneumatic means for opposing the action of said resilient means, said pneumatic means comprising a hollow plunger carried by said gate and sliding in a suitable bore in a stationary member, a piston for building up pressure in said plunger as the gate is closed, said plunger having a vent adapted to align with an opening in said member when said gate is in partly closed position whereby the air pressure within said plunger is released, and means for automatically relieving the back pressure on said piston when said gate is being opened whereby said pneumatic means is prevented from interfering with the opening operation.

4. In a projection head, a film gate having a plurality of telescoping members, means for normally closing said members, said members having flanges cooperating to produce a closed air space, and means whereby pressure is built up in said air space when said gate is brought into closed position, said pressure serving to retard the closing operation.

5. In a projection head, a film gate having a pair of telescoping members, flanges secured to said members and extending at right angles thereto to form a closed air space therebetween, a vent for said air space serving to control the escape of air when said gate is closed and means for admitting air to said space independently of said vent as said gate is opened.

6. In a projection machine, a film gate comprising a stationary and a movable member, resilient means normally urging said movable member into closed position with respect to said stationary member, an air chamber associated with one of said members, air compressing means associated with the other of said members and adapted to compress air within said chamber in response to closing movement of said movable member, whereby to retard and cushion said closing movement, and means to permit escape of the air so compressed within said chamber whereby to permit complete closing of said gate.

7. In a projection machine, a film gate comprising a stationary and a movable member, resilient means normally urging said movable member into closed position with respect to said stationary member, an air chamber associated with one of said members, air compressing means associated with the other of said members and adapted to compress air within said chamber in response to closing movement of said movable member, whereby to retard and cushion said closing movement, and means operable after said cushioning effect has been obtained, to release the air compressed within said chamber, whereby to thereafter permit said gate to completely close in response to the action of said resilient means.

8. In a projection machine, a film gate comprising a stationary and a movable member, resilient means normally urging said movable member into closed position with respect to said stationary member, means retarding the closing movement of said movable member prior to complete closing thereof, and means releasing said retarding means when said gate is partially closed, whereby to permit complete closing of said gate in response to the action of said resilient means.

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