

March 24, 1953

R. P. SMITH
PROJECTING MACHINE FOR PROJECTING FROM
STACKS OF INDIVIDUALLY FRAMED FILMS

2,632,362

Filed Dec. 30, 1950

6 Sheets-Sheet 1

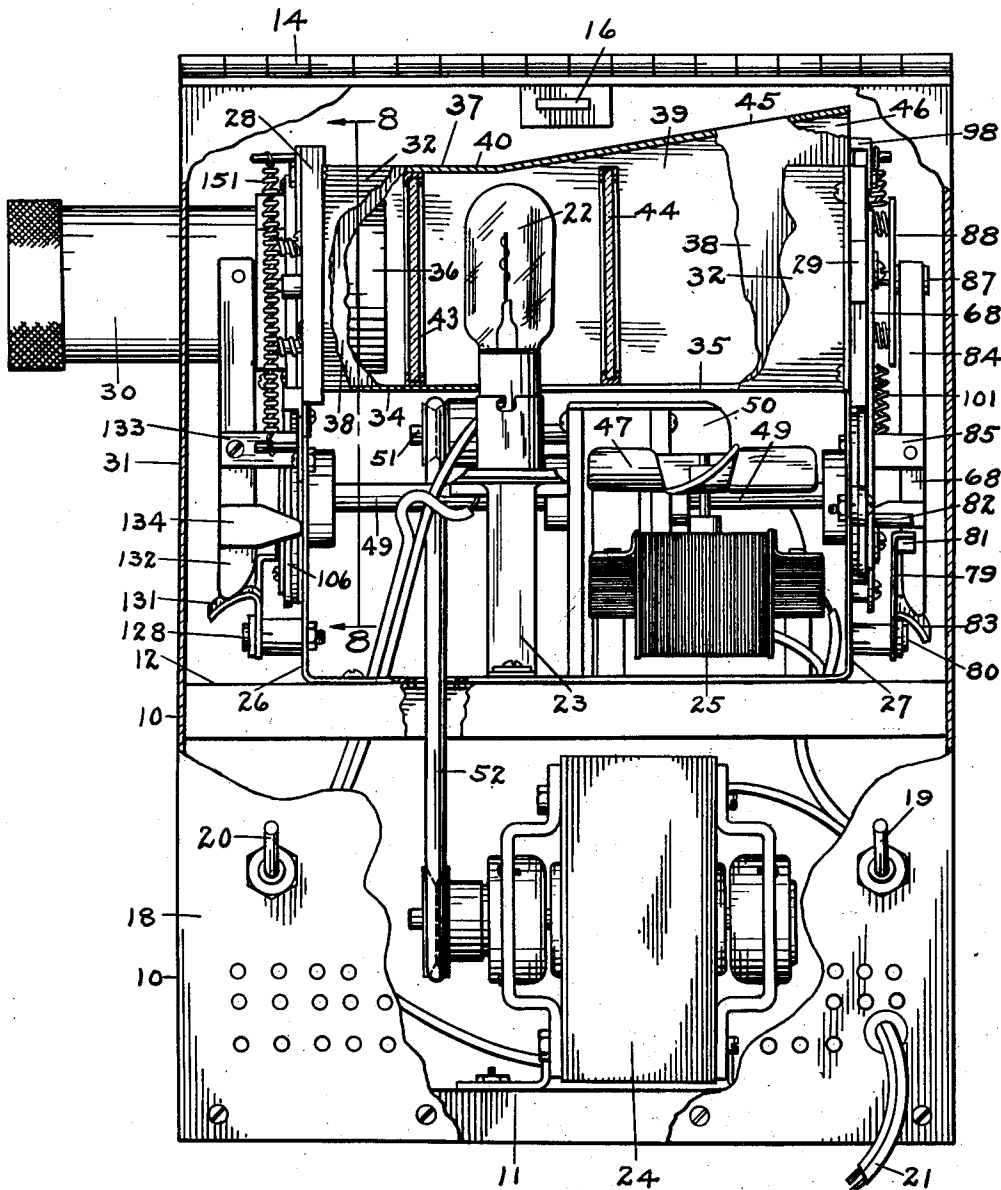


Fig. 1

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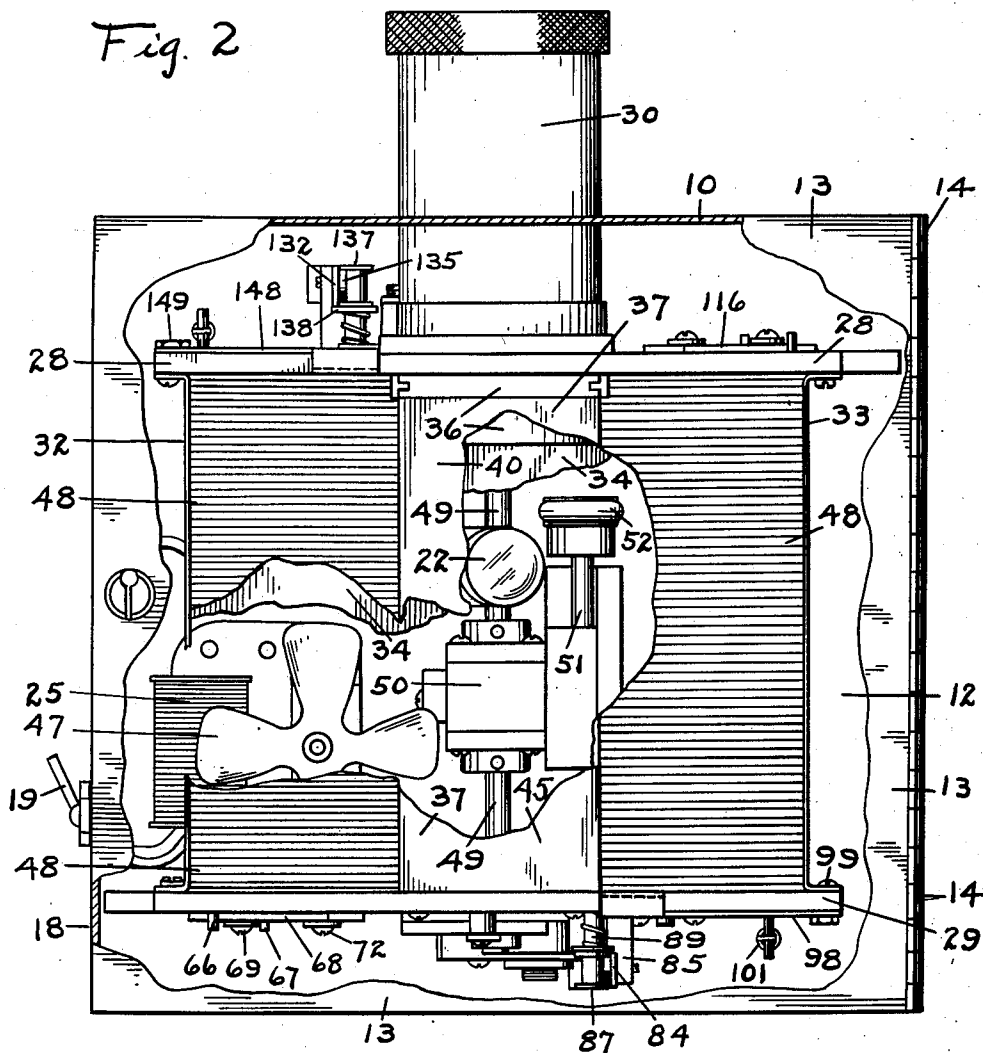
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Fig. 2



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Fig. 3

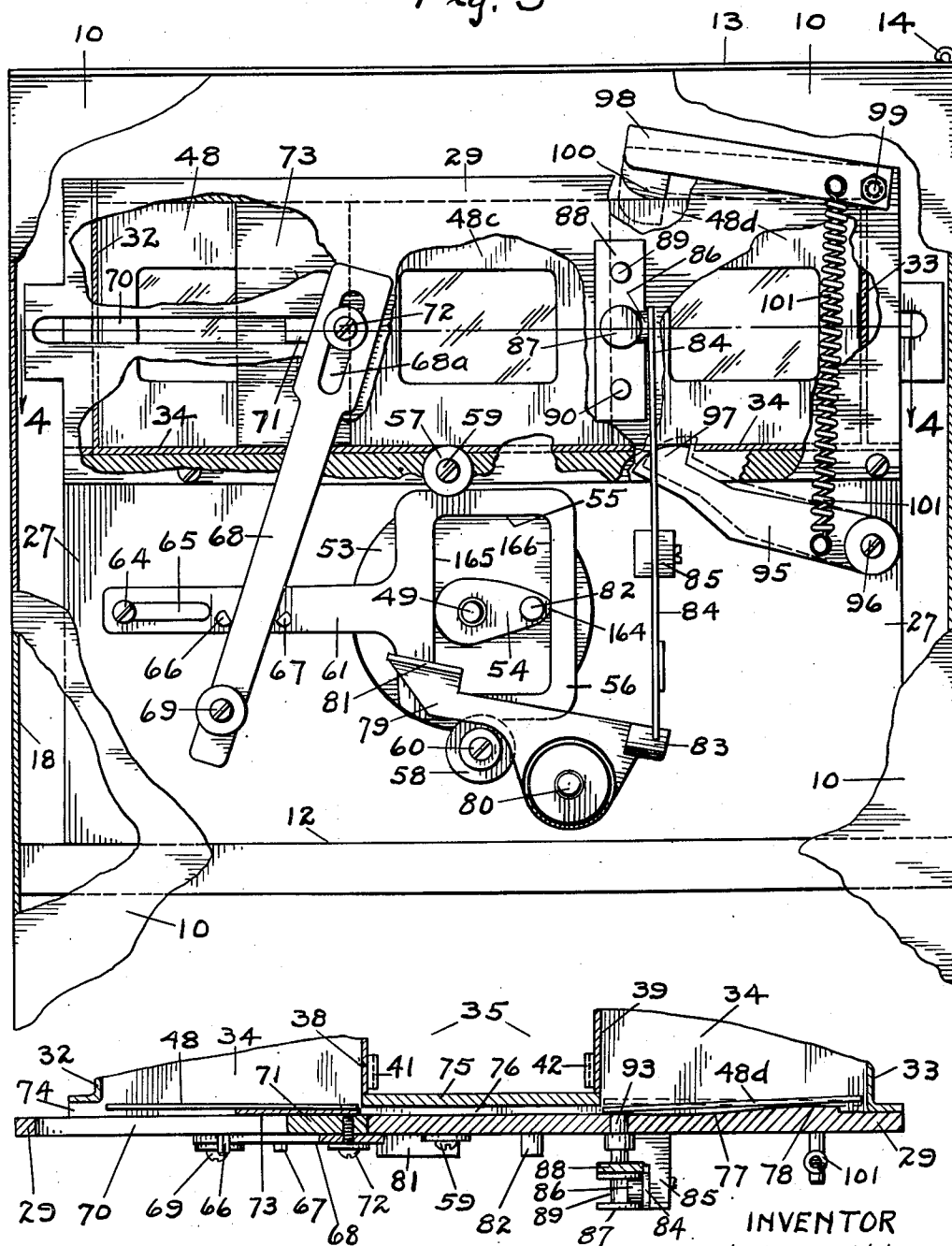


Fig. 4

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Fig. 5

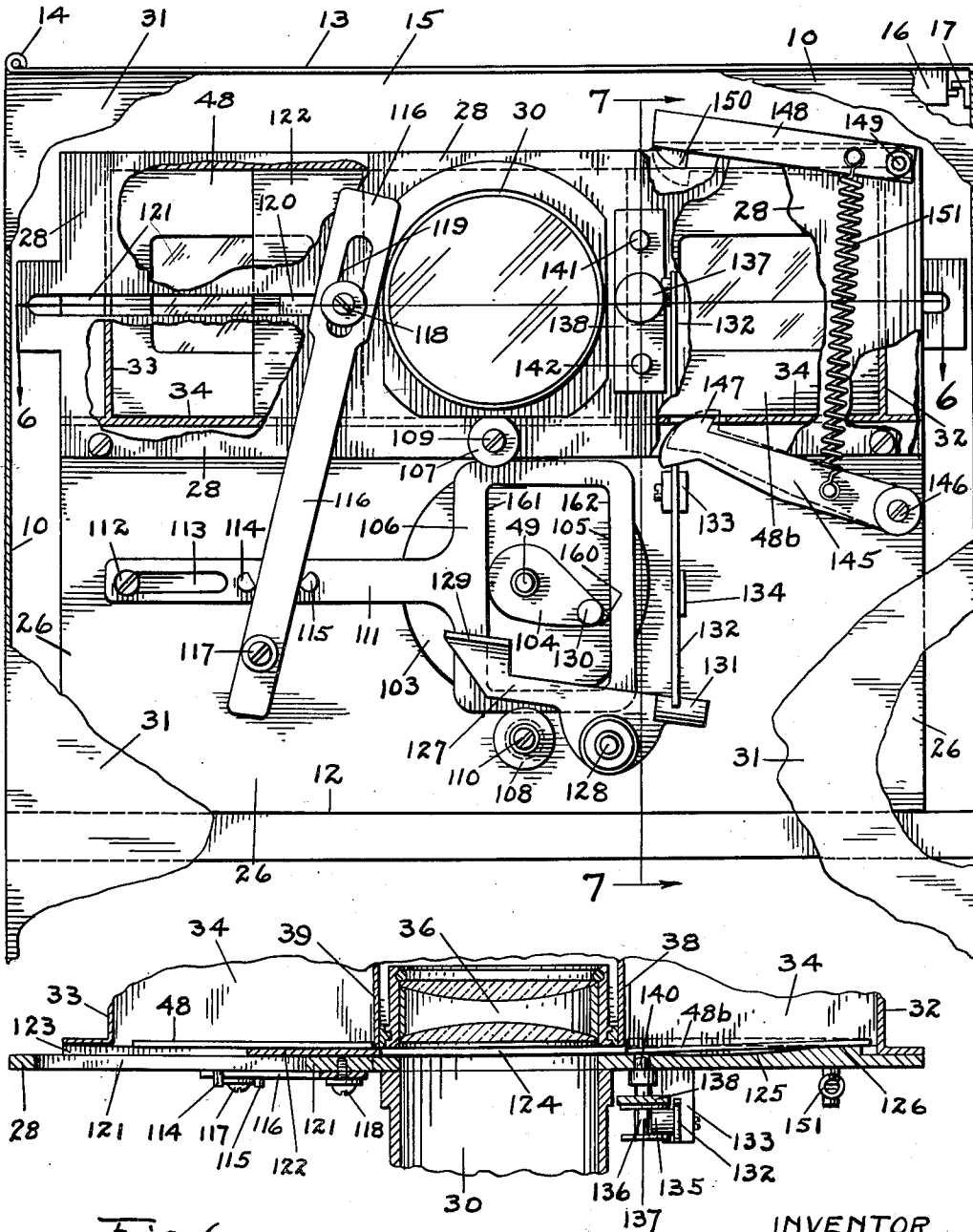


Fig. 6

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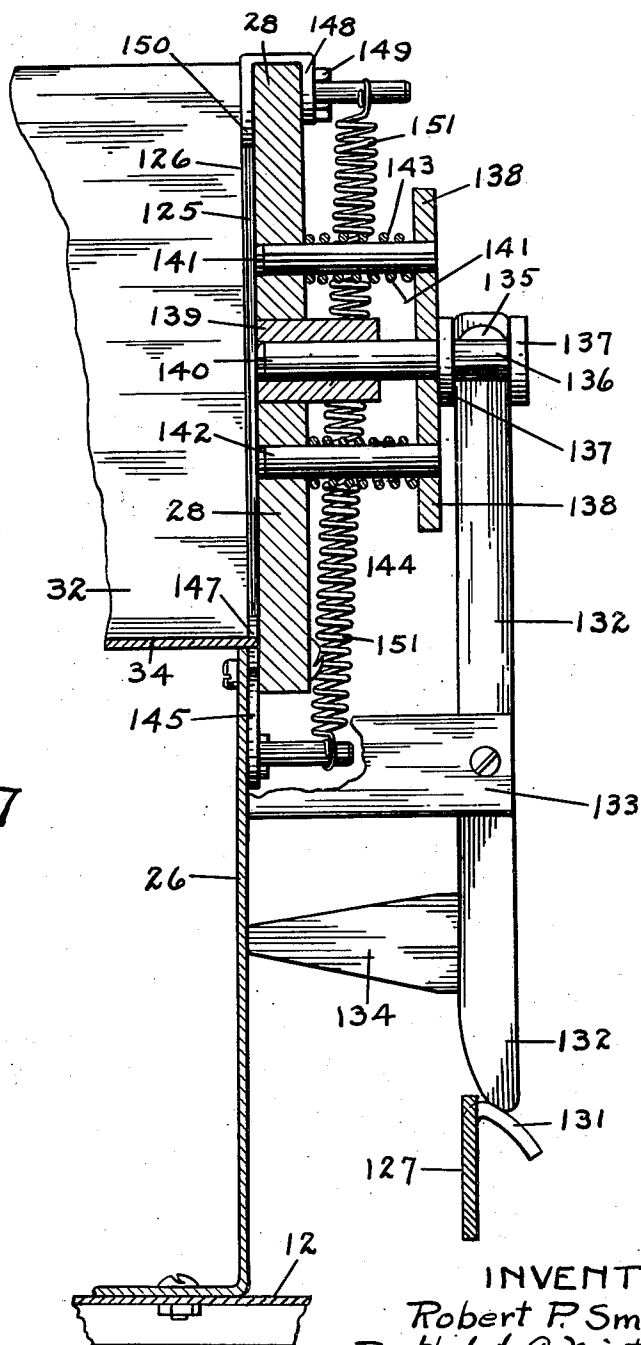


Fig. 7

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Fig. 8

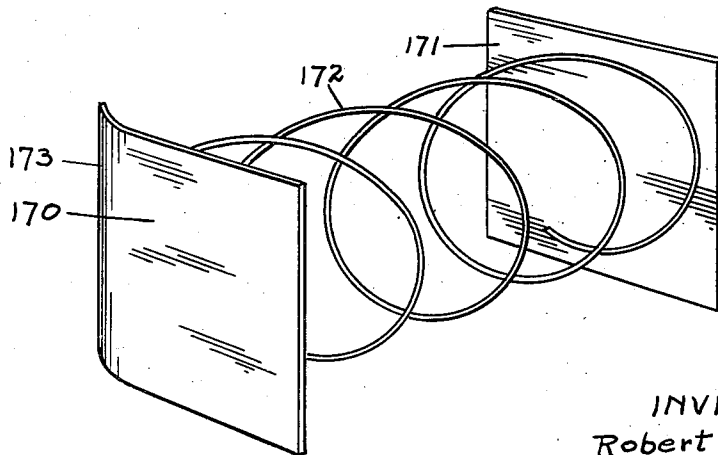
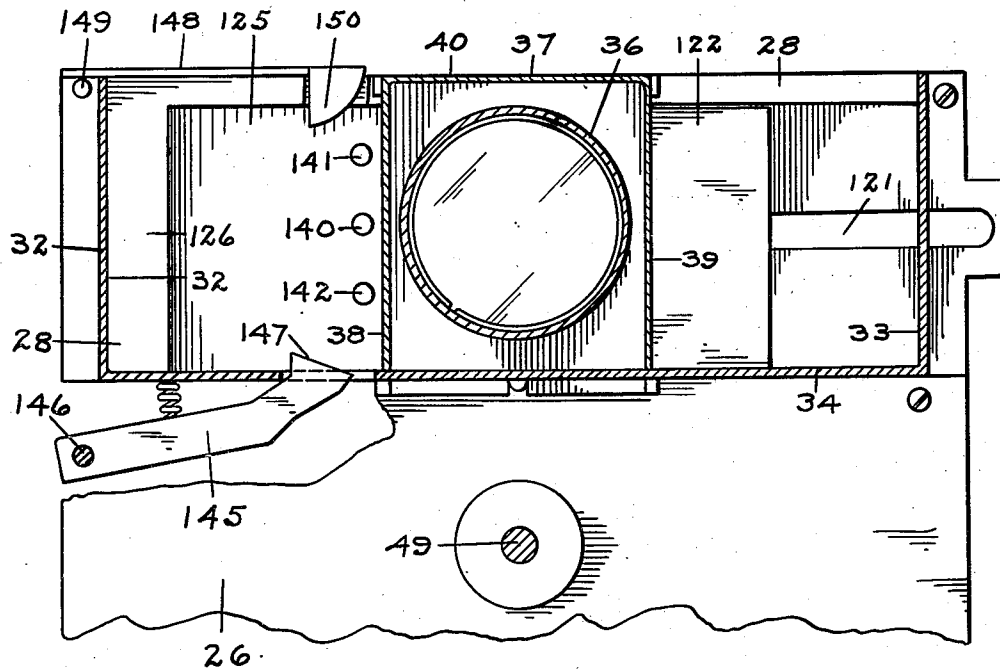


Fig. 9

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UNITED STATES PATENT OFFICE

2,632,362

PROJECTING MACHINE FOR PROJECTING
FROM STACKS OF INDIVIDUALLY FRAMED
FILMS

Robert P. Smith, Crawfordsville, Ind.

Application December 30, 1950; Serial No. 203,688

6 Claims. (Cl. 88-28)

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This invention herein described involves a machine for projecting onto a screen views from transparencies such as film carried in a frame of the type generally known under the trademark "Kodachrome" of the Eastman Kodak Company. The film showing the view is in each instance held in a substantially rigid frame so that the frames themselves may be handled as integral units in presenting the film for projection purposes.

In showing such film units, it has heretofore been the general practice to use a projecting machine wherein there is a cross slide holding at most two or three of the film unit frames, and this slide had to be filled by an operator, and then shifted after the desired length of view of the film as projected onto the screen has been had. Not only is the operator required to load the slide, and then shift it, but he is also compelled to be certain that the frames are presented right side up in order to have the view appear in the proper presentation on the screen.

In the present invention, the machine is loaded with a number of the frames with one ahead of another in the proper or desired sequence, and all originally turned in the proper erection, and from then on, the machine automatically takes one frame at a time to locate that frame within the lens system so that the projecting light may shine therethrough and cause the image to be shown on the screen toward which the lens system is directed. The frame in that system is allowed to remain there for the duration of the period of time for which the machine is timed, and then, automatically, that frame is passed on out of the lens system into its proper location in sequence in another horizontally aligned stack, following which the next in order of viewing of the frames is carried into the lens system and then allowed to dwell there for the desired showing. This sequence of operations is continued until the entire lot of frames is carried through the lens system for the showing.

Not only is this true, in respect to the showing, but the frames are returned in proper order to be ready and available for re-showing, this re-showing being carried on at once in the machine if it is so desired. The automatic re-aligning of the frames for subsequent viewing in the desired sequence is of high importance, because it frequently happens in the prior system above referred to that these frames will be out of order, or will be reversed in position even if in order. The present invention avoids such misaligning of the frames in the entire number in the lot.

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Therefore the primary purpose of the invention is to provide in a single unitary structure, in a small compact form, an automatically operating mechanism which will receive a large number of the frames carrying the films to be displayed, take each frame individually for separate viewing through a lens system casting the image from the film onto a screen, allowing that image to remain visible on the screen for a definite period of time, following the end of which time, the frame is moved on into a definite predetermined alignment ready for subsequent viewing in the same order if so desired.

Many other objects and advantages of the invention will occur to those versed in the art upon considering the following description of one particular form of a machine which I have found to be very workable. This one form is shown in the accompany drawings, wherein,

Fig. 1 is a view in side elevation, and section as viewed from the left-hand side of a machine embodying the invention;

Fig. 2 is a top plan view of the machine, with portions broken away to disclose under parts;

Fig. 3 is a view in rear elevation and partial section of the upper portion of the machine;

Fig. 4 is a view in horizontal section on the line 4-4 in Fig. 3;

Fig. 5 is a view in front elevation and partial section of the upper portion of the machine;

Fig. 6 is a view in horizontal transverse section on the line 6-6 in Fig. 5;

Fig. 7 is a view in vertical section on an enlarged scale on the line 7-7 in Fig. 5;

Fig. 8 is a view in vertical section on the line 8-8 in Fig. 1; and

Fig. 9 is a view in perspective of a spacer means usable when sufficient number of film frames are not available to fill one side of the machine as will be referred to later.

Referring to the drawings, the machine involving the invention is herein illustrated as being embodied within an outer box-like cabinet generally designated by the numeral 10. This cabinet 10 carries a floor 11 across the underside, and an intermediate shelf or floor 12. The top 13 is in the nature of a lid or cover hinged through the hinge 14 to the opposite or right-hand side 15 of the cabinet 10. The cover 13 may be secured in a closed position in any suitable manner, such as by the latch 16 herein shown as being engaged with a keeper 17; Fig. 5.

On the left side or wall 18 of the cabinet 10 there are carried the motor control switch 19 and the lamp control switch 20. Electric current is

made available through a cord or cable 21 entering the cabinet 10 at any suitable place, such as through the left-hand wall 18 as indicated in Fig. 1.

The switch 20 controls flow of current from the cable 21 to a lamp 22 which is mounted on a standard 23 in turn carried by the intermediate floor 12. The motor control switch 19 controls flow of current from the cable 21 to the main drive motor 24 and the fan motor 25. The drive motor 24 is herein shown as being mounted on the base floor 11 whereas the fan drive motor 25 is mounted on the intermediate floor 12, Fig. 1.

There is mounted on the intermediate floor 12, a U-frame having the upturned front and rear plates or walls 26 and 27 respectively.

At the upper ends of these walls 26 and 27 there are mounted respectively a front plate or block 28 and a rear plate or block 29 vertically disposed therefrom.

A lens tube 30 is mounted on the forward side of the block 28 to extend through the front wall 31 of the cabinet 10, Figs. 1 and 2. There is a vertically disposed wall 32 interconnecting the outer left-hand portions of the blocks 28 and 29, and also a wall 33 vertically disposed and interconnecting the outer right-hand end portions of these blocks 28 and 29. These side walls 32 and 33 extend substantially throughout the height of the two blocks 28 and 29, and have a floor 34 extending therebetween, and entirely thereacross between the forward portions of these side walls, but separated by an opening 35 between the rear portions.

The lamp 22 extends substantially centrally between the walls 32 and 33 through the opening 35 immediately adjacent the rear end portion of the forward part of the floor 34, Fig. 1.

There is a rear cylindrical lens housing 36 detachably mounted on the back side of the block 28 to extend over the central portion of the floor 34, Figs. 1 and 2.

A rectangular hood generally designated by the numeral 37 is provided with the respective vertically disposed side walls 38 and 39, Fig. 8, to rest by their forward under edges on the forward portion of the floor 34. This hood 37, closed across its top side by the ceiling wall 40 entirely across between the inner opposing faces of the blocks 28 and 29 to form a housing for the lamp 22 and also to provide means for carrying off excess heat therefrom. The rear end of the housing 37 has its side walls 38 and 39, Fig. 4, engaged by spring tongues 41 and 42 which extend from floor 34 on each side of the opening 35.

Between the lamp 22 and the rear lens housing 36 there is interposed a glass partition 43 as a means of protecting the lens system from the heat of the lamp 22. Behind the lamp 22 there is set up a mirror 44 which extends across and is supported by the side walls 38 and 39 of the housing 37. It is to be noted that the top end of the mirror 44 terminates short of the ceiling 40 which at that position, is inclined upwardly and rearwardly by the portion 45.

This portion 45 extends upwardly in spaced relation above the rear block 29 so as to leave a window 46 thereabove for the escape of heat generated by the lamp 22 within the housing 37. This escape of heat is made positive by reason of the fact that the fan motor 25 is located immediately below the opening 35 in the floor 34 to drive the fan 47 which causes a blast of air to travel upwardly through the opening 35 and out this window 46. Part of the blast from the fan

47 enters the housing between the glass screen 43 and the mirror 44 as best indicated in Fig. 1. The walls 32 and 38 are parallel, and are spaced apart a distance just sufficient to permit a film carrying frame 48 to be inserted therebetween and to slide freely therealong in positions at right angles to these walls, that is the plane of the frame would be at right angles to the planes of these two walls. In like manner, the spacing between the walls 33 and 39 is made to be just slightly greater than the transverse width of the frames 48 so that these frames may slide freely therebetween. In other words the positioning of the housing 37 intermediate the outer walls 32 and 33 serves not only as a lamp housing and ventilating means, but also, by its vertically disposed side walls, in conjunction with the outer walls 32 and 33, forms two distinct slide ways for the frames 48 when they are vertically disposed therebetween.

Referring to Figs. 1 and 2, there is a shaft 49 revolvably carried by its front and rear ends by the vertically disposed plates 26 and 27. This shaft 49 extends through a gear reduction unit 50 which is driven by a shaft 51 interconnected by a belt 52 with the motor 24.

The shaft 49, by its rear end portion, extends through the plate 27, and through a plate 53, herein shown as in the nature of a circular disc, which is mounted on the back side of the plate 27 immediately below the block 29. Fixed in driving relation on the outer end of the shaft 49 is a cam member 54. This cam 54 appears through a window 55, rectangular in shape, which window appears in a cam follower 56, Fig. 3. This cam follower 56 is held in sliding contact across the back face of the plate 53 in any suitable manner, herein shown as by the upper and lower washers 57 and 58 maintained in contact, that is sliding contact, with the back face of the follower 56 by means of the screws 59 and 60 respectively.

This cam follower 56 has a shank 61 extending substantially horizontally to the left, to be supported by means of a screw 64 which passes through a slot 65 longitudinally disposed in the outer end portion of the shank. The shank 61 carries spaced apart pins 66 and 67 extending rearwardly, between which there is passed a rocker arm 68. This rocker arm 68 is rockably supported by its lower end portion below the shank 61 in any suitable means, herein shown as by means of the screw 69.

The rocker arm 68 extends upwardly to be substantially in sliding contact with the back face of the block 29 and to extend across a horizontally disposed slot 70 provided in this block 29 in its left-hand portion.

There is a cross head 71 slidably contained in the slot 70 to be free to reciprocate throughout its length. A pin or screw 72 passes through a slot 68a extending longitudinally of the arm 68 in its upper portion thereof, to engage the cross head 71.

On the forward side of the block 29 there is positioned a feeder plate 73 to have a height substantially equal to the height of one of the film frames 48. The horizontal breadth of the feeder plate 73 is substantially half that of the film frame 48. The cross head 71 is fixed to the back side of the feeder plate 73 so that by means of the arm 68, the feeder plate 73 may be reciprocated across the forward face of the block 29. There is a vertically disposed opening 74, Fig. 4, between the rear end of the wall 32 and

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the block 29, between which the feeder plate 73 may travel when in the extreme outer position.

There is positioned a wall 75 across the rear ends of the walls 38 and 39 of the housing 37, Fig. 4, and this wall 75 is spaced forward from the block 29 a distance to leave a transverse passageway 76 slightly greater than the thickness of one of the film frames 48. In other words there is sufficient space between the wall 75 and the block 29 to permit traversing therebetween one of the frames 48, but one only. The forward face 77, Fig. 4, of the wall 29, to the right of the housing wall 39, slopes forwardly by a thickened portion of the block 29 into a forwardly disposed face 78 which is substantially within the plane of the back face of the wall 75. The purpose of this sloping face 77 will be made apparent in describing the operation, of the machine following the completion of the description of the structure.

A lever 79, Fig. 3, is rockably mounted on a pin 80. This pin 80 as are also the screws 64 and 69, is fixed to or carried by the plate 27. The left-hand end of the lever 79 terminates in an upper and rearwardly turned lip 81 which is in the path of a rearwardly extending pin 82 mounted on the outer end portion of the cam 54. The direction of rotation of the shaft 49 is such that the cam 54 will be revolved in a counterclockwise direction as viewed in Fig. 3. The lever 79 has a portion carried to the right-hand side of its pivot pin 80, and this portion carries a rearwardly and downwardly turned lip 83.

This lip 83 is in the path of the lower end of a vertically disposed lever 84. The lever 84 is rockably mounted intermediate its top and lower ends in a bracket 85 carried by the plate 27 below the block 29. The lever 84 is free to rock in a plane at right angles to the plate 27. The lever 84 carries a pin 86 extending from the left-hand side of the lever 84 to enter into an annular slot around a post 87 which is fixed to a head 88. The slot in the post 87 is designated by the numeral 89, Fig. 4.

This head 88 carries the upper and lower pins 89 and 90 respectively to extend horizontally forwardly in sliding relation into the block 29. Springs 91 and 92 surround these pins 89 and 90 between the head 88 and the block 29, Fig. 1. Thereby, the head 88 is tended to be retained in a position rearwardly of the block 29 and is carried toward the block 29 as the lever 84 may be rocked by upward travel of the lip 83 on the lever 79 as occasioned by the pin 82 pushing down on the lip 81 to kick out the lower end of the lever 84. There is also a central pin 93, Fig. 4, carried by the head 88 to extend slidably through the block 29. This pin 93 is disposed centrally between the pins 89 and 90, and in fact is a direct continuation of the member 87. All of these pins 89, 90 and 93 enter the block 29 to be carried therethrough by the lever 84 immediately to the right-hand side of the wall 39 of the housing 37.

Near the right-hand upper corner of the plate 27 below the block 29 there is pivotally mounted a finger 95, mounted to swing about a pivot pin or screw 96. The finger 95 has a rounded nose 97 extending from the upper side of the finger to enter through the floor 34 to swing upwardly thereabove immediately adjacent the forward face of the block 29 adjacent the housing wall 39. Another finger 98 is rockably mounted on a pin 99 at the upper right-hand corner of the block 29 to swing along the back face of the block 29. From the left-hand end of the finger 98 there is

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a finger 100 turned over and then downwardly to enter along the forward side of the block 29 in direct opposition to the nose 97 of the finger 95. A spring 101 is connected by its ends to these fingers 95 and 98 whereby they are normally pulled one toward the other. These members 97 and 100 are so located that when a film frame 48 is carried through the passageway 76 and past the housing wall 39, the bottom and top edges of the frame will ride over the opposing edges of the members 97 and 100 to spread them apart against the pull of the spring 101 as indicated in Fig. 3.

Referring to Figs. 5 and 6 particularly, the same construction is employed on the front end of the structure as has just been described as being carried on the rear plate 27 and block 29. In this front structure, the shaft 49 comes through the plate 26, and through a bearing plate 103 which is mounted against the front face of the plate 26. On the forward end of the shaft 49 ahead of the plate 103 there is fixed a cam 104. This cam 104 rides within a rectangular window 105 of a cam follower 106, this follower 106 being retained in sliding contact against the front face of the plate 103 by any suitable means such as by the washers 107 and 108 held in place respectively by the screws 109 and 110. The follower 106 has a shank 111 extending to the left as viewed from the front of the device, Fig. 5, to have a screw 112 passed through a slot 113 extending longitudinally through the shank toward its outer end. The screw 112 is carried by the plate 26. Between spaced pins 114 and 115 on the shank 111 there is passed a rocker arm 116 which is pivotally carried by the plate 26 by means of a screw 117 rockably carried through the lower portion of the arm 116. The arm 116 extends upwardly to be in substantial sliding contact along the front face of the block 28, and has a screw 118 passing through a slot 119 longitudinally extending through the upper end portion of the arm 116, the screw 118 being fixed in a cross head 120 which is confined to longitudinal travel within the slot 121 which is provided to extend horizontally through the block 28.

On the back side of the block 28, there is positioned a feed slide 122 secured in a fixed manner to the cross head 120 so that rocking of the arm 116 will cause the slide 122 to reciprocate across the floor 34 in substantial sliding contact with the back face of the block 28. There is a passageway 123 left between the front end of the wall 33 and the back face of the block 28 in order to permit clearance for the feed slide 122 to travel therebetween. The breadth of the feed slide 122 is made to be substantially one-half or slightly less than the breadth of the film frame 48.

The mounting of the rear lens system 36 is made to be such that there is a passageway 124, Fig. 6, left between the forward end of that mounting 36 and the back face of the block 28, this passageway being just wide enough to permit one frame 48 to slide freely therethrough. The block 28 has a face 125 continuing from the forward face of this passageway 124 to incline rearwardly into the thickened portion 126 of the block 28, Fig. 6, whereby a frame 48 coming through the passageway 124 will have its advancing vertical edge portion carried rearwardly as it travels across this inclined face 125 to come to rest on the rearwardly projecting portion 126.

Below the cam follower frame 106, there is a lever 127 rockably mounted on the pin 128 which is carried by the frame 26. This lever 127 has a

forwardly extending lip 129 to be in the path of a pin 130 which is fixed to extend forwardly from the cam 105. The lever 127 extends in the other direction from the pin 128 to carry an outwardly and downwardly turned lip 131 in the nature of a cam, to be directly under the lower end of a lever 132 which normally bears against this lip 131.

The lever 132 is rockably carried by a bracket 133 which is mounted to extend forwardly from the front face of the plate 26, Fig. 7. A foot 134 is mounted on the lever 132 below the bracket 133 to serve as a limiting abutment to bear against the front face of the plate 26. The upper end of the lever 132 carries a pin 135 which enters a slot 136 provided circumferentially around a post 137. This post passes through a head 138 and continues on through a guide 139 which is fixed in the block 28, to permit the post 137 to slide therethrough and in an inward position pass at least across the distance between the surface 125 and the rear portion 126 of the block 28. This portion of the post 137 which slidably travels through the block 28, through the sleeve 139, is designated by the numeral 140, and is in the nature of a pin to have a smaller diameter than the outer end of the head 137.

Fixed to the head 138, are the upper and lower pins 141 and 142 respectively aligned vertically with the pin 140 also slidably entering through the block 28. The head 138 is normally held in an outer position as indicated in Fig. 7, by means of compression springs 143 and 144 bearing between the back face of the head 138 and the forward face of the block 28. The springs 143 and 144 serve to keep the lever 132 rocked by its lower end into contact with the cam lift 131. Referring to Fig. 5, there is mounted on the plate 26, below the block 28, near the upper right-hand corner as view in Fig. 5, a finger 145 to be rockably supported by a screw 146. This finger 145 extends upwardly to have a nose 147 entering through a hole in the floor 34 to be in the path of the under edge of a frame 48 when it is in contact with the back face of the block 28. A finger 148 is rockably attached by means of a bolt or pin 149 to the upper corner portion of the block 28 to swing along the front face of the block 28 to have a nose portion turned over therefrom across the top of the block and then downwardly on the inside face, designated by the numeral 150. This nose 150 is in the path of the top edge of the frame 48 when it is in contact with the inner face of the block 28. The noses 147 and 150 are adjacent the wall 38 of the housing 37, whereby that portion of the frame 48 adjacent that wall is interengaged by its top and bottom edges between those noses. The two fingers 145 and 148 are interconnected by means of a spring 151 which tend to draw one toward the other, the limiting factor being the striking of the lower finger 145 against the underside of the floor 34 and the cross part of the nose 150 striking the top edge of the block 28.

Operation

In operating the structure as described, the cover 13 is lifted upwardly, and sufficient number of film frames 48 are placed between the wall 33 and the wall 39 to fill that space between the plates 28 and 29 just sufficiently to have one frame exert a slight pressure against the adjacent frame. Then the space between the wall 32 and the wall 38 is likewise filled, the frame 48 against the block 28 being the last frame to be brought into the lens system, the frame 48 against the block 29 being the next frame to be brought

against the frame 48 on the other side of the housing 37 in that order as they are to be displayed, the front frame 48 against the block 28 to the right of the housing 37, Fig. 2, being the first frame to enter the lens system.

The switches 19 and 20 are shifted to their closed positions to set into operation the motors 24 and 25 and to illuminate the lamp 22. The shaft 49 is thus revolved at the predetermined speed as determined by the ratio of the gears in the reduction 50. Both the forward end cam 104 and the rear end cam 54 are slowly revolved in unison. Referring first to the mechanism on the front end of the structure, which is the mechanism that carries the frames 48 across into the lens system and out therefrom, the cam 104 revolves in a counterclockwise direction as viewed in Fig. 5, to have the nose of the cam bring the follower 106 to the extreme right-hand position, and as the cam 104 continues to revolve, the follower 106 will remain in that right-hand position until the nose designated by the numeral 160 comes around to strike the edge 161 of the follower 106, to push the follower 106 to the left. In that travel, the arm 116 is rocked to the left, carrying the feed plate 122 across the inside of the block 28 until it is carried outwardly sufficient to permit a frame 48 to press forwardly to cause that front plate 48 to come into full contact throughout its area with the back face of the block 28, the slot 128 being carried outwardly sufficiently to permit the slide 122 to travel entirely out beyond the left-hand edge of that front frame 48 as viewed in Fig. 5.

The feed plate 122 will dwell in that extreme outer left-hand position until the nose 160 travels on around to strike the edge 162 of the follower 106 to carry the follower back to the right-hand position as indicated in Fig. 5. In this travel, the arm 116 is brought back to the position as indicated in Fig. 5, and during its travel to that position, the right-hand edge of that feed plate 122 will have been brought against the left vertical edge of the frame 48 then bearing against the back face of the plate 28 with the result that this frame 48 is carried from its original position to enter through the passageway 124, Fig. 6, as pushed therein by the plate 122. The frame will remain in that passageway because that is the limit of travel of the feed plate 122.

The feed plate 122 will remain stationary until the cam 104 carries around to bring the nose 160 again into contact with the follower edge 161 so that the plate 122 is again shifted to the left-hand position to permit another frame 48 to come into contact with the back face of the block 28, that particular frame having been bearing against the back side of the feed plate 122 until that plate travels to the left to get out of the way. Upon the return travel of the feed plate 122 to the right, it pushes the second frame 48 against the first frame 48 whereby the frame within the passageway 124 is pushed on out of that passageway to cause it to slide across the inclined face 125 to have it cocked to have the outer edge toward the wall 32 spaced rearwardly from the edge just leaving the passageway 124. As that frame herein designated by the numeral 48b comes out of the passageway 124, it travels between the noses 147 and 150 to cause them to be spread apart and thus frictionally engage the bottom and top edges of the frame 48b, and to remain in that engagement for the time being as the frame 48b takes the position as indicated in Fig. 6. Following that travel to position the frame 48b as described, the cam 104 continues

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in its revolving travel, to return the feed plate 122 as before to the left-hand side, and in so doing, after the feed plate is thus positioned, the pin 130 carried by the cam 104 comes down to strike the lip 129, to rock the lever 127, and thus cause the lever 132 to rock inwardly or rearwardly by its upper end portion to press the head 138 toward the block 28. In so doing, the pins 140, 141, and 142, are forced rearwardly through the block 28, to come into contact with the frame 48b and push its end portion adjacent the wall 33 rearwardly to assume the dash line position, Fig. 6, whereby the frame 48b is freed from frictional engagement by the noses 147 and 150, these noses then springing inwardly one toward the other respectively, to be between the frame 48b and the back surface of the block 28, that is just behind the inclined surface 125 as it leaves the right-hand end of the passageway 124, Fig. 6. Thus these noses 147, and 150 spring in front of the frame 48b to serve as spacers holding the frame 48b rearwardly by that edge portion so as to provide clearance for the next appearing frame 48 so that this next appearing frame 48 may enter between the frame 48b and the inclined surface 125. Thus it is to be seen that by causing the outer end portion of the frame 48b to travel rearwardly as it comes up over the thickened portion 126 of the block 28, and then kicking the other edge portion of the frame 48b rearwardly, there is provided an entry way for the next following frame 48b.

In describing that operation, of feeding the frames 48 across the inside of the block 28, between the rear lens block 36 and the lens tube 30, there is an interval time elapsing to allow the frame in the passageway 124 to remain there for a sufficient length of time to permit the audience to view the projection from that frame on a suitable screen. This interval time is set up by the arrangement of the cam 104 within the cam follower 136. In other words the time elapsing is that required for the nose 160 to leave the edge 161 on its down travel, and then come thereagainst as it comes up and around on its continuing travel.

The travel of the pin 130 across the nose 129 is rather rapid, and the lever 132 is in effect given a quick flip in order to release the frame 48b from the grip of the two finger noses 147 and 150. The springs 143 and 144 serve to kick the lever 132 back to its substantially vertically disposed position as indicated in Fig. 7.

At the same time that the frames 48 are being fed transversely across the front of the device behind the front block 28, the frames are being fed transversely across in the opposite direction ahead of the back block 29. This is accomplished by the cam 54 on the back end of the shaft 49 turning within the window 55 in the follower 56. As the nose of the cam 164 comes around into contact with the follower edge 165, the follower 56 is shifted to the left, to rock the arm 68 accordingly and thus carry the feed plate 73 to the extreme left at the end of the travel of the follower 56. At that time, a frame 48 on the left-hand side of the housing 37 will come into full contact with the front face of the block 29, and then as the cam nose 164 comes on around (travelling counterclockwise as viewed in Fig. 3), the nose 164 will strike the edge 166 of the follower 56, to carry it to the right again, and in this action, the feed plate 73 will push the frame 48 then against the block 29 on across into the passageway 76 between the wall 75 and the front

face of the block 29, the feed plate 73 being so proportioned as to stop the frame 48 while completely within that passageway 76, this position being indicated by the frame 48c, Fig. 3. Then upon the second reciprocation of the arm 68 to bring a subsequent frame 48 into contact with the front face of the block 29, the feed plate 73 will strike the left-hand edge of the frame 48, and push it against the frame 48c, to carry it on across to the position 48d as indicated in both Figs. 3 and 4. As the frame 48d strikes the inclined surface 77, its leading edge will travel up that surface and over across the thickened portion 78 of the block 29, so that the frame 48d is then inclined, that is it is out of parallel relation with the passageway 76. As the frame 48d leaves the passageway 76, it will slide by its bottom and top edges over the noses 97 and 100 of the fingers 95 and 98, to spread those fingers apart so that the noses will grip the frame 48d frictionally therebetween. The frame 48d will remain in that position while the arm 68 goes through another travel back to the left-hand position, following which the pin 82 on the cam 54 will come around and strike the lip 81 on the lever 79, to cause the cam lip 83 to kick out the lower end of the lever 84, and thus push the head 89 forwardly toward the block 29, to cause the pins 89, 99, and 93 to travel forwardly through the block 29, to strike the edge portion of the frame 48d, that is that edge portion which is adjacent the wall 39, to kick that portion out from between the grip of the noses 97 and 100, to cause the frame to go into the position indicated by the dash lines in Fig. 4, that position being retained by reason of the noses 97 and 100 dropping in behind the frame 48d when in that dash line position.

Thus it is to be seen that as the film frames 48 are fed across the forward end portion of the device behind the block 28, they are also fed in the opposite direction across the front side of the block 29, the films travelling there across in accordance with the travel at the front end so that as one film is taken out in one place, it is replaced at the back of the other "pile."

In both instances, that is in the front feed and the rear feed, the noses of the fingers in each instance serve first to retain the shifted frame in the inclined positions, that is inclined from the normal parallel position of one frame with another, until the fingers push the frames forwardly along the wall of the lamp housing, whereupon those noses drop in behind the pushed ahead edge portion so as to prevent the other frames from returning the shifted frames against the blocks 28 and 29 as the case may be, all in order that there may be space for entrance under the shifted edges of the next succeeding oncoming frames.

It may sometimes happen, that there are not enough of the frames 48 to fill both spaces on the sides of the lamp housing 37. In that situation, the available frames 48 are placed in the right-hand frame "trough" that is between the wall 39 and the outer wall 33, and then if there be sufficient old frames not to be viewed, these old frames are placed in behind to fill up the space so as to maintain the desired pressure of the frames 48 forwardly against the block 28 to secure or rather insure the proper feeding by the cross slide 122. Likewise old frames may be used on the receiving side, that is the side between the outer wall 32 and the housing

Where that is not desirable, or not permissible, then there may be used a device of the nature shown in perspective in Fig. 9, wherein there are two end plates 170 and 171 of substantially the same size and area as that of the individual frames 48. Between these two plates 170 and 171 there is interposed an elongated spread apart spring 172 so that undue pressure between the plates 170 and 171 will not arise during the feeding thereagainst of either plate as the case may be when this device is dropped into either one of the spaces on the sides of the housing 37, one of the devices as shown in Fig. 9 being used on one side and one on the other side, when the number of frames 48 are quite small in number.

In using this device shown in Fig. 9, the frames of course will not be displayed a second time since they cannot travel entirely around the circuit. They will have to be shifted from one side to the other past these devices. This device only serves as a spacer of a resilient nature to fill in the spaces between the back block 29 and the frames 48 thereahead on the right-hand side of the housing 37 and between the block 29 and the block 28 so that the frames which have been viewed can come back thereagainst and be held in vertical alignment.

In order to prevent jamming of the machine by either of the feed plates 73 or 122 striking the plates 170 and 171 on this spacer device, these plates 170 and 171, or at least one plate such as plate 170 is provided with a vertical edge portion 173 curved backwardly from the plate plane to provide clearance for entry of either feed plate 73 or 122 between that edge portion 173 and the face of the block 29 or 28 as the case may be, whereby the plate 170 will be pushed back as the feed plate travels therebetween.

Therefore while I have described the invention in the one particular form which provides a very positive and yet simple mechanism to accomplish the purpose, I do not desire to be limited to that precise form in view of the fact that mechanical variations may be employed without departing from the spirit of the invention within the scope of the following appended claims.

I claim:

1. A machine to project in sequence from a plurality of separated film frames, comprising a pair of frame holding compartments each having a generally horizontally disposed floor to receive the frames on edge in substantially vertically disposed relation in a horizontally disposed stack; a lamp housing between the compartments; a lens system ahead of said housing at a relatively front end of the machine; a front wall across each of said compartments; one of said compartments being for frames to be projected, and the other compartment for receiving frames already projected; a frame shifting member of not to exceed frame thickness reciprocable across the back face of the to-be-projected frame compartment; said lens system being provided with a transverse passageway thereacross confining the frames therein to substantially vertical positions; said shifting member engaging one frame at a time to push it off the front end of said stack into said passageway, and to push the preceding frame from said passageway along the back side of the wall of the projected-frame compartment; a pair of vertically opposed, elastically gripping members at the exit end of said passageway in said last compartment, between which members the top and bottom edges

of the frame move during the travel of the frame from the passageway to be gripped and held; members for pushing said frame by a vertical edge portion adjacent said passageway exit end rearwardly from the grip of said members to permit said members to spring toward each other between said wall and said frame to provide entrance therebetween of the next frame coming from said passageway; means for reciprocating said frame shifting member, and means operated in timed sequence with the reciprocating means for actuating said frame rearwardly pushing members.

2. A machine to project in sequence from a plurality of separated film frames, comprising a pair of frame holding compartments each having a generally horizontally disposed floor to receive the frames on edge in substantially vertically disposed relation in a horizontally disposed stack; a lamp housing between the compartments; a lens system ahead of said housing at a relatively front end of the machine; a front wall across each of said compartments; one of said compartments being for frames to be projected, and the other compartment for receiving frames already projected; a frame shifting member of not to exceed frame thickness reciprocable across the back fence of the to-be-projected frame compartment; said lens system being provided with a transverse passageway thereacross confining the frames therein to substantially vertical positions; said shifting member engaging one frame at a time to push it off the front end of said stack into said passageway, and to push the preceding frame from said passageway along the back side of the wall of the projected-frame compartment; a pair of vertically opposed, elastically gripping members at the exit end of said passageway in said last compartment, between which members the top and bottom edges of the frame move during the travel of the frame from the passageway to be gripped and held; members for pushing said frame by a vertical edge portion adjacent said passageway exit and rearwardly from the grip of said members to permit said members to spring toward each other between said wall and said frame to provide entrance therebetween of the next frame coming from said passageway; means for reciprocating said frame shifting member, and means operated in timed sequence with the reciprocating means for actuating said frame rearwardly pushing members; said reciprocating means comprising a cam, a lever rocked by the cam and interconnected with said frame shifting member; and said pushing member operating means comprising a spring normally withholding the pushing members from the path of frames coming thereacross from said passageway, and a lever rockably mounted to be rocked by travel of said cam to press said members rearwardly against the opposition of said spring.

3. A machine to project in sequence from a plurality of separated film frames, comprising a pair of frame holding compartments each having a generally horizontally disposed floor to receive the frames on edge in substantially vertically disposed relation in a horizontally disposed stack; a lamp housing between the compartments; a lens system ahead of said housing at a relatively front end of the machine; a front wall across each of said compartments; one of said compartments being for frames to be projected, and the other compartment for receiving frames already projected; a frame shifting member of not to exceed frame thickness reciprocable

across the back face of the to-be-projected frame compartment; said lens system being provided with a transverse passageway thereacross confining the frames therein to substantially vertical positions; said shifting member engaging one frame at a time to push it off the front end of said stack into said passageway, and to push the preceding frame from said passageway along the back side of the wall of the projected-frame compartment; a pair of vertically opposed, elastically gripping members at the exit end of said passageway in said last compartment, between which members the top and bottom edges of the frame move during the travel of the frame from the passageway to be gripped and held; members for pushing said frame by a vertical edge portion adjacent said passageway exit and rearwardly from the grip of said members to permit said members to spring toward each other between said wall and said frame to provide entrance therebetween of the next frame coming from said passageway; means for reciprocating said frame shifting member, and means operated in timed sequence with the reciprocating means for actuating said frame rearwardly pushing members; said frame edge gripping members having frame edge contact portions limited to a zone immediately adjacent to said passageway exit.

4. A device of the character described comprising a pair of compartments for holding in each a stack of frames and having an interconnecting frame transfer passageway with an entrance thereto at one end of one compartment and an exit therefrom at an end of the other compartment; means for pushing frames from said one compartment, a vertical edge of one frame against a vertical edge of a preceding frame, into said passageway; and a pair of substantially vertically opposed, elastically reciprocable members located in the path of frames emerging from said exit, against and between which members the top and bottom edges of the frames are forcibly guided from said passageway to have those edges slidably gripped by said members; and means shifting laterally in respect to frame travel through said passageway, a frame from the grip of said members to allow said members to retract one toward the other behind the frame to permit the then retracted said members to serve as abutments against return frame travel; said frame gripping members comprising a lower nose and an upper nose, both in substantial vertical alignment, and spring means normally urging the noses one toward the other; stops limiting movement of the noses to a spacing therebetween of parts thereof at least less than the height of said frames; and each of said noses being inclined downwardly and upwardly respectively on sides directed toward oncoming frames against which the bottom and top edges of those frames will initially come into contact and by continued travel of the frames therebetween urge said noses apart one from the other.

5. A device of the character described comprising a pair of compartments for holding in each a stack of frames and having an interconnecting frame transfer passageway with an entrance thereto at one end of one compartment and an exit therefrom at an end of the other compartment; means for pushing frames from said one

compartment, a vertical edge of one frame against a vertical edge of a preceding frame, into said passageway; and a pair of substantially vertically opposed, elastically reciprocable members located in the path of frames emerging from said exit, against and between which members the top and bottom edges of the frames are forcibly guided from said passageway to have those edges slidably gripped by said members; and means shifting laterally in respect to frame travel through said passageway, a frame from the grip of said members to allow said members to retract one toward the other behind the frame to permit the then retracted said members to serve as abutments against return frame travel; a surface at the end of said other compartment inclining from said passageway exit inwardly of the compartment; said members being located adjacent said exit, whereby a frame coming from said exit is carried over said surface into a horizontally inclined position pivoting thereto between said gripping members; and frame shifting means having elements located to push on that portion of the frame held between said members to rock the frame on a fulcrum provided by the innermost portion of said surface and to carry the frame substantially laterally from said gripping members.

6. In a device for transferring frames from one compartment through a projecting position into a second compartment and having means to effect said transfer, a pair of frame gripping members elastically urged one toward the other and normally spaced apart a distance less than a dimension across a frame between its opposite edges; said gripping members being located to be in the paths of said edges as the frame enters said second compartment in each instance, to have said members spread apart by those edges and yieldingly be gripped thereby; means for rocking the frame by one end portion while gripped by said members by the other end portion; and means pushing said other end portion of the frame from the grip of said members to restore the frame into substantial parallelism with, but spaced from the line of transfer of the frame from said projecting position.

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