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P. S. ALLEN
FILM TRANSPORTING MECHANISM FOR AUTOMATIC
PHOTOGRAPHIC APPARATUS

2,623,650

Filed Aug. 9, 1947

3 Sheets-Sheet 1

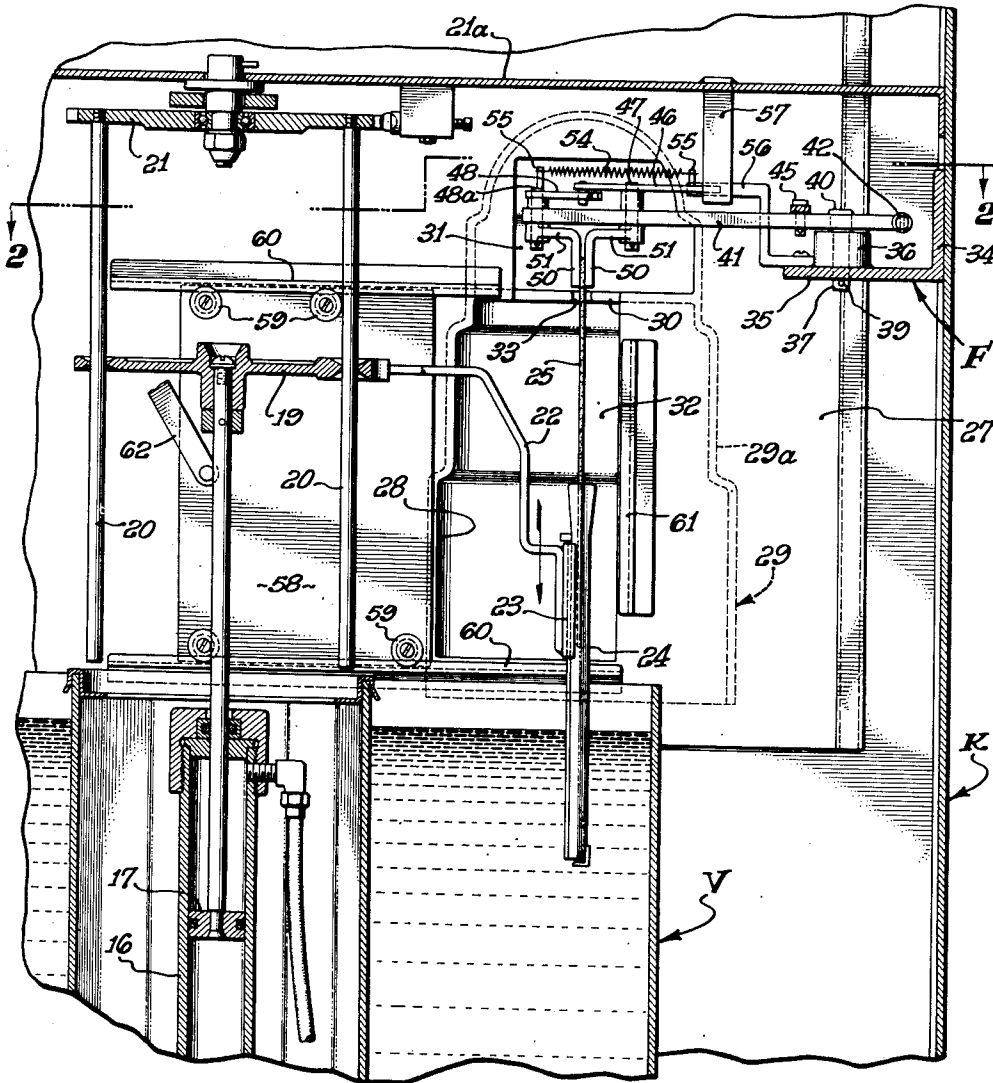


Fig. 1.

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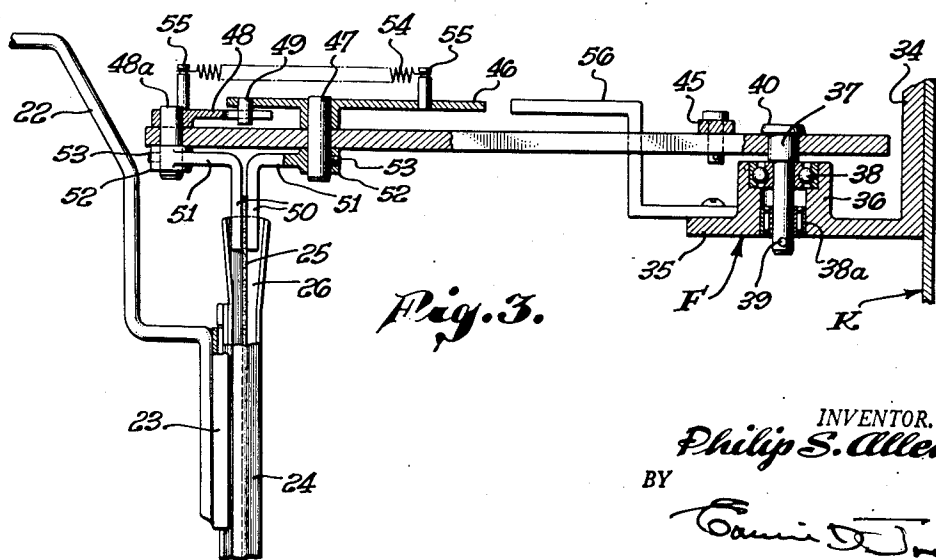
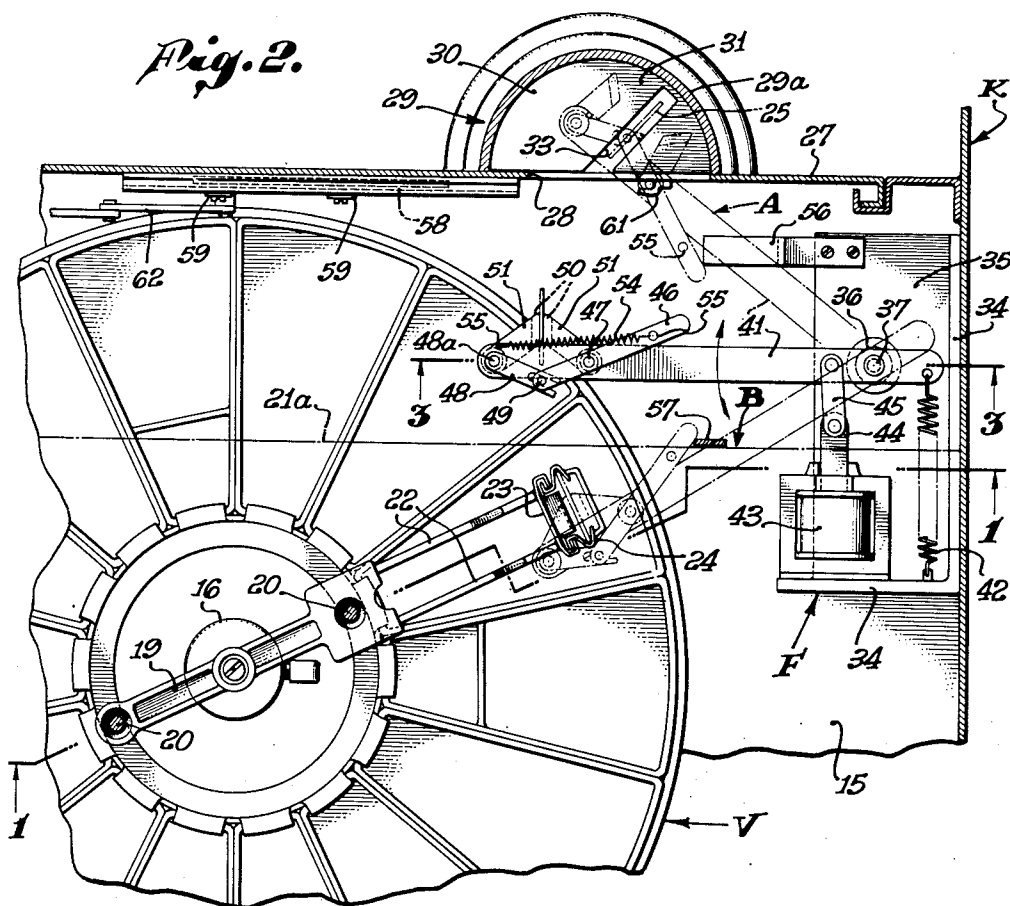
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3 Sheets-Sheet 2



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Fig. 5.

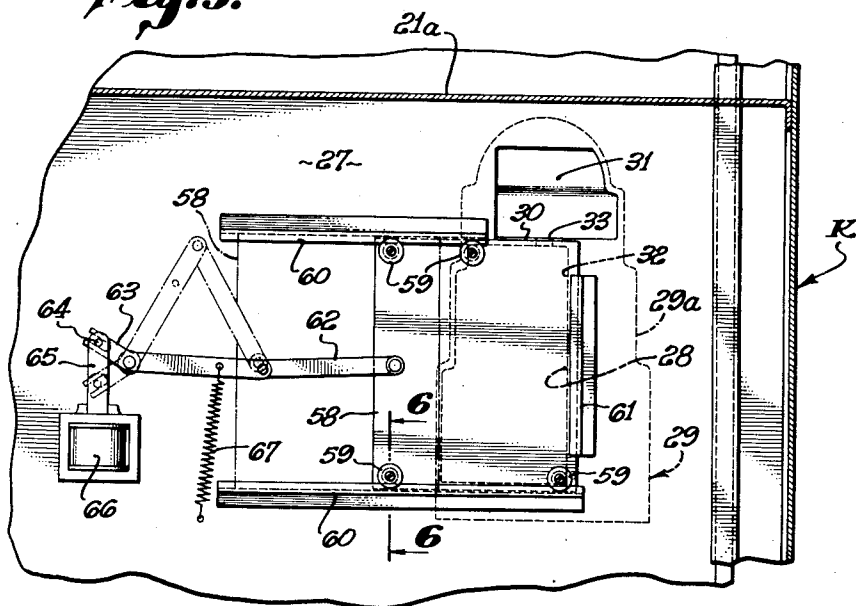


Fig. 4.

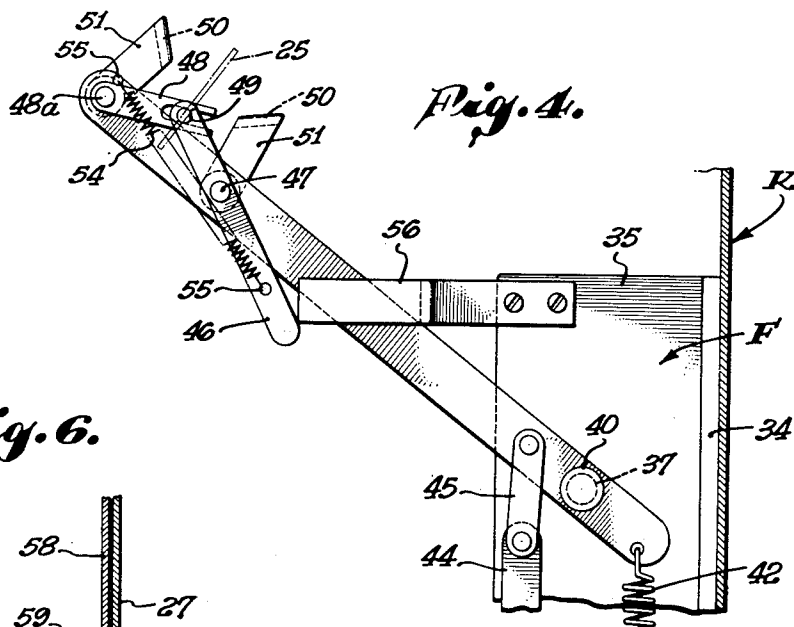
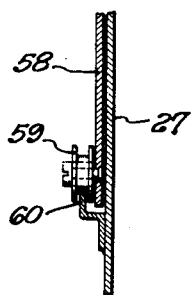


Fig. 6.



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FILM TRANSPORTING MECHANISM FOR
AUTOMATIC PHOTOGRAPHIC APPARATUS

Philip S. Allen, Long Beach, Calif.

Application August 9, 1947, Serial No. 767,798

4 Claims. (Cl. 214-17)

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My invention relates to automatic photographic apparatus of the character embodied in my copending application, Serial No. 648,737, filed February 19, 1946, now Patent No. 2,541,016, issued February 13, 1951, and more particularly to the mechanism for transporting the film strip from the immersing carrier to a delivery point exteriorly of the apparatus to the vendee.

It is a purpose of my present invention to provide a film strip transporting mechanism which is characterized by its structural simplicity, low cost of manufacture, durability, and surety of operation to effect removal of the film strip from the carrier and to transport it to a chute or other delivery point for presentation to the vendee.

It is also a purpose of my invention to provide in combination with a film transporting mechanism of this character, a sliding door operating mechanism, the door normally closing an opening through which the film strip is delivered to the vendee, to prevent tampering with those parts of the mechanisms accessible through the opening, and the mechanism operating automatically to open the door concurrently with and only upon operation of the film transporting mechanism to allow delivery of the film to the vendee.

I will describe only one form of film strip transporting mechanism, and one form of door operating mechanism, each embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings:

Fig. 1 is a view showing in fragmentary vertical section and taken on the line 1-1 of Fig. 2, one form of film strip transporting mechanism embodying my invention incorporated in one form of automatic photographic apparatus.

Fig. 2 is a horizontal sectional view taken on the line 2-2 of Fig. 1.

Fig. 3 is an enlarged vertical sectional view taken on the line 3-3 of Fig. 2.

Fig. 4 is a top plan view of the mechanism shown in Fig. 3.

Fig. 5 is a fragmentary vertical sectional view looking at the inner side of the casing and showing the door and operating mechanism therefor.

Fig. 6 is an enlarged vertical sectional view taken on the line 6-6 of Fig. 5.

Referring specifically to the drawings, K designates generally a casing in which are housed the film transporting mechanism, and those parts

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of the automatic photographic apparatus with which the mechanism is associated and which I will now briefly describe. Within the casing K are a circular series of vessels V supported on a stationary platform 15 (see Fig. 2), with each vessel of sector form so as to leave between the confronting inner ends thereof a vertical opening in which is situated a fluid pressure cylinder 16 containing a piston 17 rotatably connected at its upper end to a cross arm 19 which is slidable vertically on a pair of rods 20. These rods are secured at their upper ends to the wheel 21 of a pawl and ratchet mechanism mounted on a partition 21a and operable to rotate the rods about a vertical axis in a step-by-step movement. This mechanism forms no part of the present invention but is embodied in my copending application, Serial No. 767,797 filed August 9, 1947, now Patent No. 2,544,644, issued March 13, 1951.

The cross arm 19 is formed with a depending extension 22 on the lower end of which is secured a bracket 23 in which is mounted a carrier 24 for a film strip 25 and in such manner that the strip is held in full extended position therein. The construction of this carrier is set forth in my copending application, Serial No. 648,737 filed February 19, 1946, now Patent No. 2,541,016, issued February 13, 1951, and its construction is such that at the upper end thereof it is formed with openings 26 to expose opposite sides of the film strip so that it can be gripped and removed from the carrier as will be more fully described hereinafter.

One vertical wall 27 of the casing K, at a point above the vessels V, is formed with an exit opening 28 which leads to a vertical chute 29 (see Fig. 2) formed by securing a semicircular plate 29a to the outer wall of the casing, and which plate is closed at its upper end but open at its lower end to form a discharge outlet for the film strip.

Adjacent the upper end of the chute 29 is a transverse partition 30 dividing the chute into an upper compartment 31 and a lower compartment 32 which communicates with the exit opening 28. The partition 30 is formed with a slot 33 provided for the purpose of allowing the upper end portion of the film strip 25 to be extended into the upper compartment in the operation of transporting the film strip to the chute.

A frame F is suitably secured in fixed position to the inner side of one vertical wall of the casing K, to support the various elements constituting the film strip transporting mechanism, and

this frame is constructed to provide a side wall 34 and a bottom wall 35.

The bottom wall 35 is formed with a hub 36 in which a stub shaft 37 is journaled by means of bearings 38 and 38a, a pin 39 in the lower end of the shaft securing it against upward removal from the hub. The upper end of the shaft 37 is formed with a head 40 to confine an arm 41 thereon, and to which the arm is secured by a press-fit so that the shaft provides a pivotal mounting for the arm. This shaft 37 extends through the arm adjacent one end thereof as will be seen in Figs. 2 and 3, and to the same end of the arm is connected a coiled contractile spring 42, with the other end of the spring connected to the side wall 34. This spring serves to urge the arm 41 to the broken line position A shown in Fig. 2, but to move the arm from this position to the position B shown in broken lines in the same figure, an electro-responsive device is employed. This device may comprise a solenoid 43 secured to the side wall 34 and having a movable core 44 operatively connected by a link 45 to the arm 41 at that side of its pivot opposite the spring 42.

On the opposite end of the arm 41 is mounted a lever 46 on a stub shaft 47 extending vertically through the arm. This lever 46, at one end, is operatively connected to an arm 48 by a pin and slot connection 49, to form in effect a toggle for actuation of a pair of jaws 50. The arm 48 is fixed to a stub shaft 48a which extends vertically through the arm 41 to the underside thereof. The jaws 50 are vertically disposed in side by side relation, and are provided with lateral extensions 51 terminating in collars 52 secured by screws 53 to the lower ends of the stub shafts 47 and 48a.

The toggle formed by the lever 46 and the arm 48 is urged to the position shown in solid lines in Fig. 2 or to the position shown in broken lines when the arm is in position A, by means of a spring 54 connected to the lever and arm by pins 55 and moving from one side to the other of the line through the pivotal axis of the jaws. In the solid line position of the lever and arm the jaws 50 are in closed or gripping position, while in the broken line position thereof the jaws are in open or releasing position. This opening and closing of the jaws occurs in response to movement of the arm 41 and at such times as to grip, transport, and release the film strip in the manner intended. To this end the bottom wall 35 of the frame F has secured thereto an abutment 56 of a form to extend above the arm 41 (see Fig. 3) and be disposed in the path of movement of the lever 46 as the arm 41 is swung toward the chute 29, and to so actuate the lever as to move the jaws 50 to open position.

As best illustrated in Fig. 1 the mounting of the arm 41 is such that in the extreme position thereof just described the jaws and their operating means are positioned in the upper compartment 31 of the chute. To move the jaws to closed position from the open position in which they remain following the aforescribed operation by virtue of the spring 54, a second abutment 57 is secured to and depends from the partition 21a to be disposed in the path of movement of the lever 46, so that as the arm 41 is moved to position B the lever will strike the abutment and move the jaws to closed position in which they are retained by the spring 54.

For the purpose of preventing possible tampering with those parts of the mechanism which might be accessible through the lower end of

the chute 29, the exit opening 23 is normally closed by a door 58 mounted on rollers 59, with the latter movable on rails 60 fixed to the inner side of the wall 27. The closed position of the door is defined by a vertical jam 61. The mechanism for moving the door to both open and closed position may consist of a link 62 connected to the door and pivotally connected to a bell crank lever 63, this lever being mounted on the wall 27 and by means of a pin and slot 64 operatively connected to the movable core 65 of a solenoid 66 likewise fixed on the wall 27.

A spring 67 is secured at one end of the wall 27 and at its other end to the lever 63 adjacent its point of connection with the link 62, thus the spring serves to urge the door to closed position. The door is moved to open position through energization of the solenoid 66, it being understood that when energized the core 65 is pulled downward to swing the lever 63 upward and thus move the link 62 rearward and upward to the position shown in broken lines in Fig. 5.

Prior to the operation of my film strip transporting mechanism, it will be understood that the carrier 24 is reciprocated successively in the vessels V of the series through operation of the piston 17 and the pawl and ratchet mechanism, the film strip carried thereby being then subjected to the various developing, rinsing, and fixing liquids contained in the vessels, until finally the carrier reaches the elevated position shown in Fig. 3 in which the film strip is in a position to be removed from the carrier and transported to the chute through operation of my mechanism in the following manner:

With the solenoid 43 deenergized the arm 41 is urged to position A by the spring 42, and thus the jaws are open as has been described. The door 58 is in closed position because the solenoid 66 is deenergized thus allowing the spring 67 to urge the door to this position. Incidentally, the partition 30 prevents surreptitious access to the jaws and arm and thus prevents tampering therewith. To transport the film strip from the carrier to the chute and discharge the strip into the chute for delivery to the vendee, the solenoid 66 is first energized to open the door 58. This is followed by energization of the solenoid 43 which swings the arm 41 to position B, wherein the jaws 50 are closed by the lever 46 striking the abutment 56, to grip the upper end of the film strip. In the operation of the photographic apparatus the carrier 24 now moves downwardly, and the film strip being gripped by the jaws is removed from the carrier under such downward movement thereof.

With the film strip removed from the carrier the solenoid 43 is now deenergized, thus allowing the spring 42 to swing the arm 41 back to position A, it being understood that during this movement the jaws remain closed under the action of the spring 54 to hold the film strip until the lever 46 strikes the abutment 56 when the jaws are swung to open position. As shown in Fig. 1 the slot 33 accommodates the upper end of the film strip as the latter is moved into the chute, and once the jaws are opened the film strip is released to gravitate downwardly and outwardly of the chute to the vendee.

Once the film strip has been discharged as described, the solenoid 66 is deenergized thus allowing the spring 67 to close the door 58.

Any suitable circuit controller may be employed to supply current to the solenoids 43 and 66 so as to effect operation of the door and film

transporting mechanism in the manner just described.

A film transporting mechanism constructed in accordance with my invention renders transporting of the film strip from the carrier to the delivery chute positive in all instances by virtue of the construction and mode of operation of the several parts constituting the mechanism, and more particularly the toggle mechanism aided by the spring for maintaining the jaws in firm clamping relation to the film strip during transporting thereof, and the positive release of the film strip once it has reached the delivery chute.

Although I have herein shown and described only one form of film strip transporting mechanism, and one form of door operating mechanism, embodying my invention, it is to be understood that various changes and modifications may be made therein without departing from the spirit of my invention and the spirit and scope of the appended claims.

I claim:

1. In combination: a mechanism for transporting a film strip from a film carrier to a delivery chute, comprising means for gripping the film strip while in the carrier; mechanism for actuating said gripping means to move them above said delivery chute and then release the film strip, a discharge opening for said chute; a door for said discharge opening; means for urging said door to closed position; and means for opening said door in timed relation to the movement of said gripping means to allow the released films to be removed through said discharge opening.

2. In combination: a casing having two vertical walls one of which is provided with a discharge opening; a chute on the outer side of said casing and covering said opening; a film strip carrier within said casing; a frame secured to the other vertical wall of said casing; an arm pivoted on said frame to occupy one position in which it is directly above said carrier and another position in which it is extended into said chute; means for urging said arm to the last mentioned position; a pair of jaws pivoted on said arm; toggle means on said arm including a lever for opening and closing said jaws; a spring for urging said toggle means to close or open said jaws; a partition in said casing; means for moving said arm to a position directly above said carrier; an abutment on said frame to engage said lever as said arm is moved into said chute for opening said jaws; a second abutment secured to said partition and engageable by said lever for moving said jaws to closed position as said arm is moved directly over said carrier; and a door mounted for linear movement on that wall formed with a discharge opening; means for urging said door to closed position; and means for moving said door to open position.

3. In combination: a casing having two vertical walls one of which is provided with a discharge opening; a chute on the outer side of said casing and covering said opening; a film strip carrier within said casing; a frame secured to

the other vertical wall of said casing; an arm pivoted on said frame to occupy one position in which it is directly above said carrier and another position in which it is extended into said chute; means for urging said arm to the last mentioned position; a pair of jaws pivoted on said arm; toggle means on said arm including a lever for opening and closing said jaws; a spring for urging said toggle means to close or open said jaws; a partition in said casing; means for moving said arm to a position directly above said carrier; an abutment on said frame to engage said lever as said arm is moved into said chute for opening said jaws; a second abutment secured to said partition and engageable by said lever for moving said jaws to closed position as said arm is moved directly over said carrier; a second partition in said chute having a slot to accommodate the film strip with said jaws, toggle means and spring received in said chute above said second partition.

4. In combination: a casing having two vertical walls one of which is provided with a discharge opening; a chute on the outer side of said casing and covering said opening; a film strip carrier within said casing; a frame secured to the other vertical wall of said casing; an arm pivoted on said frame to occupy one position in which it is directly above said carrier and another position in which it is extended into said chute; means for urging said arm to the last mentioned position; a pair of jaws pivoted on said arm; toggle means on said arm including a lever for opening and closing said jaws; a spring for urging said toggle means to close or open said jaws; a partition in said casing; means for moving said arm to a position directly above said carrier; an abutment on said frame to engage said lever as said arm is moved into said chute for opening said jaws; a second abutment secured to said partition and engageable by said lever for moving said jaws to closed position as said arm is moved directly over said carrier; a second partition in said chute having a slot to accommodate the film strip with said jaws; toggle means and spring received in said chute above said second partition; and a door mounted for linear movement on that wall formed with a discharge opening; means for urging said door to closed position; and means for moving said door to open position.

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