

June 16, 1942.

P. S. WARRINER
 APPARATUS FOR THE AUTOMATIC PROJECTION OF PHOTOGRAPHIC
 TRANSPARENCIES AND THE LIKE

2,286,322

Filed Aug. 3, 1940

2 Sheets-Sheet 1

Fig. 1

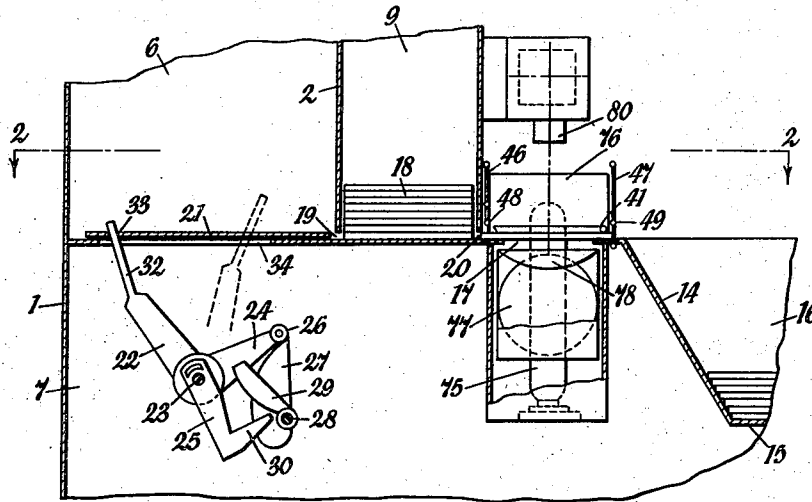


Fig. 2

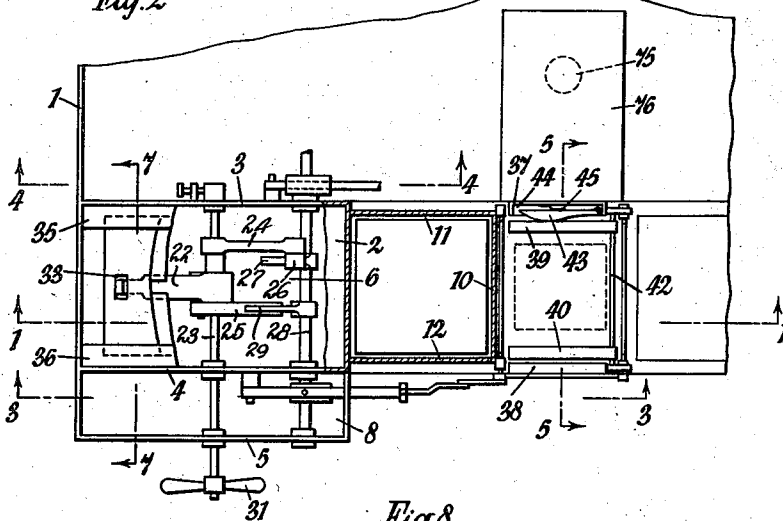
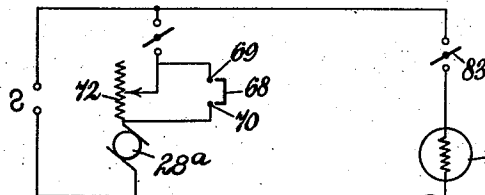


Fig. 8



Inventor:—
 Percy S. Warriner,
 By: Smith, Michael and Gardiner,
 Attorneys.

June 16, 1942.

P. S. WARRINER
APPARATUS FOR THE AUTOMATIC PROJECTION OF PHOTOGRAPHIC
TRANSPARENCIES AND THE LIKE
Filed Aug. 3, 1940

2,286,322

2 Sheets-Sheet 2

Fig. 3

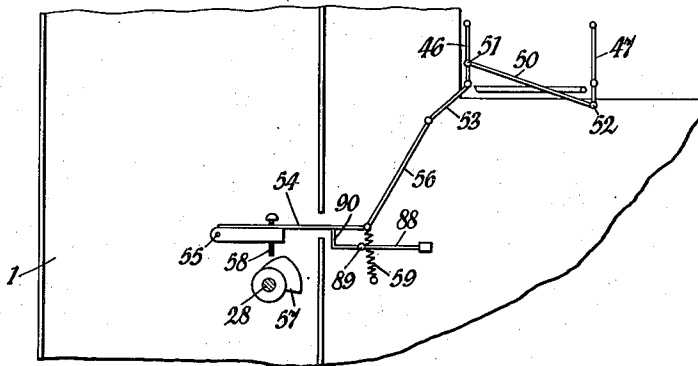


Fig. 5

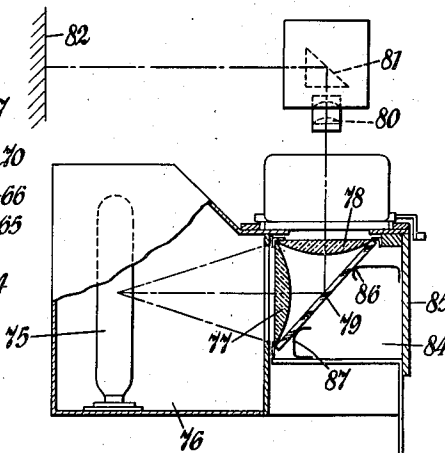


Fig. 4

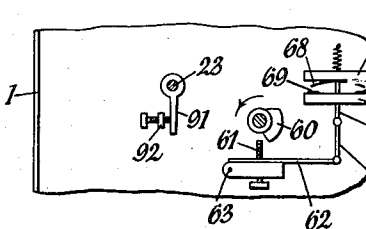


Fig. 7

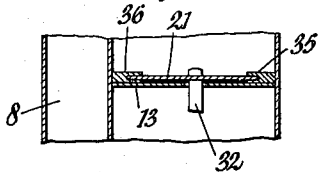
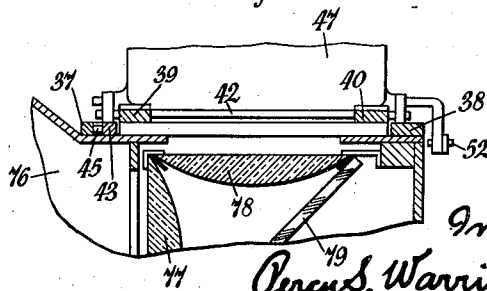


Fig. 6



Inventor:

Percy S. Warriner,
By: Smith, Michael & Gossline,
Attorneys

UNITED STATES PATENT OFFICE

2,286,322

APPARATUS FOR THE AUTOMATIC PROJECTION OF PHOTOGRAPHIC TRANSPARENCIES AND THE LIKE

Percy Stuart Warriner, Doncaster, England

Application August 3, 1940, Serial No. 350,968
In Great Britain June 10, 1940

11 Claims. (Cl. 88—28)

This invention relates to continuously operable automatic projectors for the projection of photographic transparencies and the like, hereinafter referred to as "slides."

According to the invention, such a projector comprises in combination, a vertical slide magazine, down which the slides descend by gravity and from which they are ejected in succession, the lowermost one at a time, by way of an exit passage in the side of the magazine; a projection aperture, located with its plane horizontal and in alignment with the exit passage; a horizontal track for the slides, extending from the exit passage, first to the projection aperture, where it constitutes a support for the slides while they are being shown and then to a device for receiving the shown slides; a rapidly reciprocating slide ejector, operative with the interposition of a dwell (slide-showing) period between each reciprocation and the next, to shoot the slides out of the magazine, by way of the exit passage in the side thereof, and along the track to the showing position thereon, a previously ejected slide in that position being displaced therefrom by this action towards the receiving device; shutter means automatically operative in time with the reciprocations of the slide ejector to close the aperture during the periods of slide-change; and means for applying pressure upon the slides as they move to the showing position so as to brake their movement thereto and prevent them from being overshot therepast by the throw of the ejector, the said pressure being applied through the intermediary of the shutter means.

In this way a construction is readily provided in which a very high ratio of slide-showing period to slide-changing period is obtainable without the necessity to introduce complications or complexity of parts into the design of the machine, this being due to the provision of braking means for the slides as they move along the track to the showing position and the possibility in consequence of employing a rapidly reciprocating slide ejector operating with a dwell (slide-showing) period (which can be of any desired duration according to requirements and the limits of design of the machine) interposed between each reciprocation and the next.

In the case of a power-operated machine, the motor of the machine may be arranged to run at a higher rate of speed during the slide-change periods than during the slide-showing periods, as hereinafter more particularly described. In this manner, the ratio referred to above may be still further increased.

A preferred construction employing such shutter means is described in detail hereinafter. According to that preferred construction, the machine further comprises presser bars intervening between the shutter means when these are in the operative (closed) position and the path of the marginal portions of the slides as these move to the showing position, the arrangement being such that the shutter means when these are in the operative position bear upon the presser bars and the latter in turn bear upon the slides so as to brake the movement thereof and prevent them from being over-shot past the showing position by the throw of the ejector.

The device for receiving the shown slides may comprise a reception chamber therefor as in the particular embodiments of the invention hereinafter described. Alternatively, it may comprise a device which is automatically operable in time with the other parts of the machine to replace the shown slide into the magazine for re-ejection therefrom in a cyclic manner. In this latter event, the arrangement employed for the return of the slides to the magazine may be that which forms the subject matter of my concurrent application for United States patent No. 338,638.

The invention includes other useful and novel features as will be apparent from the following description of a preferred embodiment of the invention with reference to the accompanying drawings.

In the drawings,

Figure 1 is a vertical section through a part of a slide projection apparatus constructed in accordance with the invention, the section being taken on the section line 1—1 of Figure 2;

Figure 2 is a horizontal section through the apparatus shown in Figure 1, on the section line 2—2 of that figure;

Figure 3 is a fragmentary vertical section through the apparatus shown in Figures 1 and 2, taken on the section line 3—3 of Figure 2;

Figure 4 is a fragmentary vertical section through the same apparatus, on the section line 4—4 of Figure 2;

Figure 5 is a fragmentary vertical section at right angles to the planes of the sections of Figures 3 and 4, on the section line 5—5 of Figure 2;

Figure 6 is a fragmentary vertical section also on the section line 5—5 of Figure 2 through the projection aperture of the apparatus and the parts in the immediate vicinity thereof, the section being drawn on a larger scale than Figure 5;

Figure 7 is a fragmentary vertical section

through the apparatus on the section line 7—7 of Figure 2, and

Figure 8 is a wiring diagram hereinafter more particularly described.

Like reference numerals indicate like parts in the various figures.

Referring to the drawings, the slide projection apparatus there shown comprises a framework generally enclosing the moving parts of the apparatus. This framework includes inter alia a transverse wall 1, a second transverse wall 2 and three longitudinal walls 3, 4, 5. The walls 2, 3, 4 enclose with a part of the wall 1 a compartment 6 below which is another compartment 7. Abreast the compartments 6, 7 is a third compartment 8 bounded by the walls 4, 5, a part of the wall 2 where this extends beyond the plane of the wall 4 and a part of the wall 1. Adjacent the compartment 6 is a vertical slide magazine 9 bounded by the part of the wall 2 which bounds the compartment 6, a wall 10 opposite said part of the wall 2 and two walls 11, 12 at right angles thereto. Bounding the compartment 6 and forming the floor of the magazine 9 is a horizontal wall 13 which extends from the wall 1 to the upper edge of an inclined wall 14 forming with a horizontal wall 15 and continuations of the walls 3, 4 beyond the line of the wall 14 a reception chamber 16 for the shown slides. In the wall 13 at a position adjacent the magazine 9 and to the right thereof in Figure 1 is a projection aperture 17.

The slide magazine 9 is arranged to accommodate a pile of slides 18 one upon the other, and with the plane of the slides horizontal. At the bottom of the portion of the wall 2 which bounds the magazine on the left-hand side (in Figure 1) thereof is a slot 19 extending for the full width of the magazine and constituting an exit passage for the slides therefrom. At the bottom of the wall 10 is a similar slot 20. The width of these slots 19, 20 in the vertical direction slightly exceeds the thickness of a single slide and the bottom of the slot is flush with the upper surface of the wall 13, which, as above remarked, forms the floor of the magazine. The lowermost slide of the pile can, therefore, be pushed through the slot 20 into showing position over the projection aperture 17 by a movement in its own plane, with retention, however, of all of the rest of the slides above it in the magazine.

The means for moving the slides from the magazine comprises a horizontal pusher plate 21 which is reciprocable in its own plane, which, as appears from the figures, is parallel to that of the wall 13. The pusher plate 21 is shown in the figures in its withdrawn or rearward position, that is, in the position it occupies immediately prior to the commencement of a forward stroke. Its leading edge is, therefore, just about to enter the slot 19 and the lowermost slide of the pile of slides in the magazine is, as shown, resting on the floor of the magazine in readiness to be pushed out of the magazine through the slot 20 during the operative or forward stroke of the pusher plate.

The pusher plate 21 is reciprocated by an oscillating arm 22, with the interposition between each reciprocation and the next of a dwell (slide-showing) period in which it remains stationary. The arm 22 is fast with a horizontal rock shaft 23 with which is also fast a second arm 24 and adjustably fast a third arm 25. On the free end of the arm 24 is a roller 26 forming the follower of a cam 27 fast with a second horizontal shaft 75

28. Also fast on the shaft 28 is a second cam 29 which coacts with a finger 30 projecting laterally from the arm 25. The arrangement is such that as the shaft 28 rotates, the rock shaft 23 is oscillated, this due to the action of the cams 27, 29 coacting respectively with the roller 26 and the finger 30. The shaft 28 is continuously driven by an electric motor 28a (see Figure 8). As stated, the arm 25 is adjustably fast with the shaft 23. This is for the purpose of effecting a fine adjustment of the angular position of the arm 25 and thereby of the throw of the arm 22. The parts 22, 24, 25, 26, 27, 29 and 30 are all positioned as shown, within the compartment 6, the shaft 28 extending, however, not only through this compartment 6 but also through the compartment 8 adjacent thereto. The shaft 23 also extends not only through the compartment 6 but also through the compartment 8 to a position beyond the outer wall 5 thereof where there is affixed to the shaft a handle 31 for manual operation of the apparatus when required.

The arm 22 has a reduced portion 32 at the free end of the arm and this reduced portion 32 works in a fulcrum slot 33 provided to receive it in the rear end of the pusher plate 21. The wall 13, in order to accommodate the said reduced portion 32 of the arm 22 as the arm oscillates, that is, from the full-line position of Figure 1 to the dotted-line position therein, is formed with a slot 34 as shown clearly in Figure 7 and the pusher plate 21 is guided in its reciprocatory movement by a pair of guides 35, 36 secured to the upper side of the wall 13.

During its movement into position over the projection aperture 17 through the slot 20, the slide in course of ejection from the slide magazine by the forward stroke of the pusher plate 21, is guided between a pair of guide bars 37, 38 affixed to the upper face of the wall 13, the said guide bars 37, 38 being positioned as shown, abreast the projection aperture and the distance between them being such that the slide has a free sliding fit to and from showing position over the aperture. These guide bars, together with the wall 13 form what is in effect a track for the slides.

In order that the slide shall be held perfectly still when in showing position over the projection aperture, a pair of presser bars 39, 40 are provided which are mounted at 41 on a hinge rod 42 to swing in vertical planes about the axis of the hinge rod and so by their weight bear downwardly upon the marginal portions beneath them of the slide in position over the projection aperture, thereby holding the slide stationary in the showing position. The free end of the presser bars 39, 40, that is, the end thereof remote from the hinge rod 42 is chamfered on the underside as shown in Figure 1, to facilitate the entrance of the leading edge of the moving slide as this is pushed to the showing position from the bottom of the magazine. The slide in the showing position is further prevented from movement relatively to the projection aperture once it has been placed thereover, by a laterally disposed presser lever 43 accommodated in a recess 44 provided to receive it in the guide bar 37, the presser lever 43 being pressed by a spring 45 in the direction to engage it with the edge of the slide in position over the projection aperture, thereby pressing the slide lightly against the opposing edge of the opposite guide bar 38.

The arrangement is such, as will be understood from what has been so far described of the ap-

paratus, that at each throw of the arm 22 of the slide ejecting mechanism, a slide is ejected from the showing position over the projection aperture into the reception chamber 16 and another is pushed into the showing position from the bottom of the magazine, the pile of slides remaining in the magazine descending therein to the floor of the magazine following the completion of withdrawal of the pusher plate 21 therefrom in the backward or return stroke of the arm 22.

Associated with the projection aperture are a pair of hinged flaps 46, 47 which for a shutter to obturate the aperture during the periods of slide change. These flaps are hinged respectively at 48 and 49. During the periods of slide change they occupy horizontal positions in which they completely close the aperture against the passage of light therethrough. During the intervening slide showing periods they occupy the vertical positions in which they appear in Figure 1. In order that they shall move together they are interchanged by a connecting rod 50 pivoted at 51 to the flap 46 and at 52 to the flap 47. The flaps 46, 47 are arranged to operate automatically and in time with the slide ejecting mechanism. For this purpose they are operatively connected to the shaft 28 where this extends, as above described, through the compartment 8. The operative connection comprises a crank 53 fast with the flap 46 so as to swing therewith about the pivotal axis of the flap, a resilient arm 54 pivoted at 55 to the wall 4 of the framework of the apparatus, a connecting rod 56 pivotally connected at one end to the crank 53 and at the other end to the arm 54, a cam 57 fast with the shaft 28 and a projection 58 on the arm 54, the projection 58 forming a follower member relatively to the cam 57 and the various parts enumerated of the operative connection being held in the flap-open positions in which they appear in Figure 3 by a tension spring 59 always urging them to these positions. The arrangement, therefore, is one according to which the spring 59 maintains the flaps in the open position while the flaps are moved to the closed position by the action of the cam 57 coacting with the projection 58 on the arm 54, the cam 57 working, therefore, against the pull of the spring 59. The projection 58 is adjustable in its position in the arm 54 with respect to the path of the cam 57 and the parts are so proportioned that the cam 57 first operates to bring the flaps down to closed position, in which position they abut at their lateral edges the upper surface of the presser bars 39, 40, and then upon continued rotation bend the resilient arm 54 against the reaction of the presser bars transmitted to it through the flaps and the parts of the operative connection between the flaps and the free end of the arm 54 and so applies through the flaps and said parts of the operative connection a yielding downward pressure upon the pressure bars 39, 40 and through the intermediary of these, upon the slide as it is being pushed into position over the projection aperture. In this way, a braking action is applied to the movement of the slide which ensures that it shall not be overshot past the aperture.

The electric motor which drives the shaft 28 is arranged to be run at a higher rate of speed during the slide change period than through the intervening (slide-showing) periods. For this purpose, an automatic two-speed control for the motor is provided. The parts forming this control comprises a cam 60 (Figure 4) fast on the

shaft 28. The cam 60 coacts with a projection 61 on an arm 62 pivoted at 63 to the wall 3. The arm 62 is pivotally connected at the face end to a rod 64 which in turn is pivotally connected to a rod 65 extending freely through a contact block 66 to a second contact block 67 about it. The contact block 67 is normally urged in a direction away from the contact block 66 so as to separate a contact 68 on the block 67 from a co-operating pair of contacts 69, 70 on the block 66, by a spring 71 and the cam 60 operates as it rotates to draw the block 67 towards the block 66 and thereby close the circuit through the contacts 68, 69, 70, the diagram of which circuit is shown in Figure 8. The arrangement is such that just before the commencement of a slide change period, the switch constituted by the contacts 68, 69, 70 is closed by the cam. This short-circuits a controller resistance 72 in the motor circuit and so effects a speeding-up of the motor. The higher speed of the motor continues until termination of the slide change period, when the switch 68, 69, 70 opens and again throws in the resistance 72 into the motor circuit, so restoring the speed of the motor to a lower value, which continues to the commencement of the next slide change period, that is, through the ensuing slide showing period. If desired, an arrangement can be used according to which the rod 64 (or some equivalent part) operates a centrifugal governor geared to the motor.

Referring now to the optical part of the apparatus, the source of light employed is a vertical projection lamp 75 of standard type. This lamp is enclosed in a lamp housing 76 in front of which is a condenser assembly consisting of two lenses 77, 78 disposed at right angles to one another as shown in Figure 5 and a mirror 79 disposed at 45° to the lenses 77, 78. The arrangement is such that the light entering the lens 77 strikes the mirror 79 and is deflected upwardly thereby through the lens 78 to a projection lens 80 from which the beam passes to a reversing prism 81 and thence horizontally to the screen 82 on to which the slide is being projected. The lamp 75 may, as in the arrangement illustrated in Figure 8, be included in a circuit forming an extension of the motor control circuit, said extension including a lamp switch 83 as shown.

The lenses 77, 78 and the mirror 79 are assembled in a box 84 contiguous to the lamp housing 76 and situated, as shown, immediately below the projection aperture 17. Conveniently, a front wall 85 of this box 84 is removable to give access to the interior of the box and the arrangement is such that when the wall 85 is in position it holds the mirror 79 and the two lenses 77, 78 in position by the abutment against the back of the mirror of a resilient bearing member 85 affixed to the back of the wall 85 and a co-operating resilient bearing member 87 affixed to the bottom wall of the box.

It will be observed that the diverging (horizontal) lens 78 is positioned very near the projection aperture 17. This, coupled with the arrangement of the lenses in the manner described with a deflecting mirror optically between them, ensures that a maximum quantity of light shall pass through the condenser assembly for a given size of lens used therein, or otherwise expressed, that for a given requisite intensity of the light beam thrown upwardly through the projection aperture a minimum size of lens shall be required in the condenser assembly. Thus, with

the parts of the condenser assembly arranged as shown, the distance on the one hand between the collecting lens 77 and the light source and the distance on the other between the diverging lens 78 and the aperture, are both reduced to a minimum. In addition, the arrangement referred to lends itself to compactness of design of the optical system as a whole.

The apparatus may be operated by hand, for example for purposes of starting up or in the event of the source of power failing. By oscillating the handle 31, that is to say, with the rock shaft 32 turned to a position in which the cams 27, 25 thereon are clear of the path of the arms 24, 25 on the shaft 23, the slide ejecting mechanism is actuated, while to operate the shutter flaps by hand a hand lever 38 (Figure 3) is provided which is pivoted at 89 to the wall 4 and is situated in the compartment 8. This lever is formed with a finger 90 which when the lever is depressed bears on the arm 54 and lifts it to close the shutter flaps in the manner above described. It will be seen that the apparatus can be operated by hand without disconnection of the power means.

In order to limit the movement of the handle 31, adjustable stop means are provided, comprising a lever 91 (Figures 2 and 4) fast on the shaft 23 and a corresponding screw abutment 92 on the wall 3.

As shown, the shafts 23 and 28 are supported in bearings in the walls 3, 4, 5.

It will be appreciated that excessive pressure of the shutter flaps on the presser bars 39, 40 such as might cause jamming due to the additional load on the cam 57 is prevented by the resilient nature of the arm 54, while the pressure of the shutter flaps on the bars is adjustable to a nicety by adjustment of the screw 58.

The relative angular positions of the cams 29 and 57 on the shaft 28 are such that the shutter flaps close immediately prior to the pusher plate 21 commencing its operative stroke and the form of the cams is such that the shutter flaps open again immediately upon termination of this stroke of the pusher plate.

The invention is capable of considerable variation in respect of constructional details such, for example, as the form of the slide ejecting and shutter operating mechanisms and all such variations are to be understood to be within the scope of the invention as delineated in the following statement of claim.

What I claim and desire to secure by Letters Patent of the United States is:

1. An automatic continuously operable slide projector comprising, in combination, a vertical slide magazine, down which the slides descend by gravity and from which they are ejected in succession, the lowermost at a time, by way of an exit passage in the side of the magazine; a projection aperture, located with its plane horizontal and in alignment with the exit passage; a horizontal track for the slides, extending from the exit passage, first to the projection aperture, where it constitutes a support for the slides while they are being shown and then to a device for receiving the shown slides; a rapidly reciprocating slide ejector, operative with the interposition of a dwell (slide-showing) period between each reciprocation and the next, to shoot the slides out of the magazine, by way of the exit passage in the side thereof, and along the track to the showing position thereon, a previously ejected slide in that position being displaced

therefrom by this action towards the receiving device; shutter means automatically operative in time with the reciprocations of the slide ejector to close the aperture during the periods of slide-change; and means for applying pressure upon the slides as they move to the showing position so as to brake their movement thereto and prevent them from being over-shot therepast by the throw of the ejector, the said pressure being applied through the intermediary of the shutter means.

2. An automatic continuously operable slide projector comprising, in combination, a vertical slide magazine, down which the slides descend by gravity and from which they are ejected in succession, the lowermost at a time, by way of an exit passage in the side of the magazine; a projection aperture located with its plane horizontal and in alignment with the exit passage; a horizontal track for the slides, extending from the exit passage, first to the projection aperture, where it constitutes a support for the slides while they are being shown and then to a device for receiving the shown slides; a rapidly reciprocating slide ejector, operative with the interposition of a dwell (slide-showing) period between each reciprocation and the next, to shoot the slides out of the magazine, by way of the exit passage in the side thereof, and along the track to the showing position thereon, a previously ejected slide in that position being displaced therefrom by this action towards the receiving device; shutter means automatically operative in time with the reciprocations of the slide ejector to close the aperture during the periods of slide change; and presser bars intervening between the shutter means when these are in the operative (closed) position and the path of the marginal portions of the slides as these move to the showing position, the arrangement being such that the shutter means when these are in the operative position bear upon the presser bars and the latter in turn bear upon the slides so as to brake the movement thereof and prevent them from being over-shot past the showing position by the throw of the ejector.

3. An automatic continuously operable slide projector as specified in claim 1, wherein the shutter means are constituted by two flaps which are pivoted to swing about axes disposed along opposite edges of the projection aperture.

4. An automatic continuously operable slide projector comprising, in combination, a vertical slide magazine, down which the slides descend by gravity and from which they are ejected in succession, the lowermost at a time, by way of an exit passage in the side of the magazine; a projection aperture located with its plane horizontal and in alignment with the exit passage; a horizontal track for the slides, extending from the exit passage, first to the projection aperture, where it constitutes a support for the slides while they are being shown and then to a device for receiving the shown slides; a rapidly reciprocating slide ejector, operative with the interposition of a dwell (slide-showing) period between each reciprocation and the next, to shoot the slides out of the magazine, by way of the exit passage in the side thereof, and along the track to the showing position thereon, a previously ejected slide in that position being displaced therefrom by this action towards the receiving device; shutter means automatically operative in time with the reciprocations of the slide

ejector to close the aperture during the periods of slide-change, said shutter means being constituted by a pair of flaps pivoted to swing about axes disposed along opposite edges of the projection aperture, the flaps swinging upwardly to open and downwardly to close; presser bars intervening between the shutter flaps when these are in the operative (closed) position and the path of the marginal portions of the slides as these move to the showing position, the arrangement being such that the shutter flaps when these are in the operative position bear upon the presser bars and the latter in turn bear upon the slides so as to brake the movement thereof and prevent them from being over-shot past the showing position by the throw of the ejector; and means for applying yielding pressure upon the shutter flaps in the direction to close them when the flaps are in said operative position.

5. An automatic continuously operable slide projector as specified in claim 4, wherein the shutter flaps are driven through the intermediary of an operative connection which includes a resilient member and the yielding pressure upon the flaps when these are in the operative position is the result of a yielding of the resilient member under a continuation of the operative thrust transmitted through it to the flaps after these have been brought to the operative position.

6. An automatic continuously operable slide projector as specified in claim 2, wherein the presser bars are arranged, by resting on the marginal portions of the slide in position at the showing position, after the shutter means have been moved to the inoperative (opened) position, to retain the slides stationary in the showing position during the periods of slide-showing.

7. An automatic continuously operable slide projector as specified in claim 2, wherein an additional presser member, located at the side of the track and yieldingly pressed towards the path of one of the edges of the slides as these move to the showing position, is provided for the purpose of further braking the movement of the slides to the showing position.

8. An automatic continuously operable slide projector as specified in claim 1, wherein the slide ejector is normally power-operated, a driving motor being incorporated in the machine for this purpose, operatively connected to the ejector, and a two-speed control for the motor is provided, automatically operated by a control member driven by the motor in synchronism with the slide ejector, whereby the driving motor is caused to run at a higher rate of speed during the slide changing periods than during the intervening dwell (slide showing) periods.

9. An automatic continuously operable slide projector comprising, in combination, a vertical slide magazine to contain a supply of slides to be shown, which slides leave the magazine by way of an exit passage in the side thereof; a projection aperture, located with its plane horizontal and in alignment with the exit passage; a hori-

zontal track for the slides, extending from the exit passage, first to the projection aperture, where it constitutes a support for the slides while they are being shown and then to a device for receiving the shown slides; a rapidly reciprocating slide ejector, operative with the interposition of a dwell (slide-showing) period between each reciprocation and the next, to shoot the slides out of the magazine, by way of the exit passage in the side thereof, and along the track to the showing position thereon, a previously ejected slide in that position being displaced therefrom by this action towards the receiving device; and means for applying pressure upon the slides as they move to the showing position so as to brake their movement thereto and prevent them from being over-shot therepast by the throw of the ejector.

10. An automatic continuously operable slide projector comprising, in combination, a vertical slide magazine to contain a supply of slides to be shown, which slides leave the magazine by way of an exit passage in the side thereof; a projection aperture, located with its plane horizontal and in alignment with the exit passage; a horizontal track for the slides, extending from the exit passage, first to the projection aperture, where it constitutes a support for the slides while they are being shown and then to a device for receiving the shown slides; a rapidly reciprocating slide ejector, operative with the interposition of a dwell (slide-showing) period between each reciprocation and the next, to shoot the slides out of the magazine, by way of the exit passage in the side thereof, and along the track to the showing position thereon, a previously ejected slide in that position being displaced therefrom by this action towards the receiving device; shutter means automatically operative in time with the reciprocations of the slide ejector to close the aperture during the periods of slide-change; and means for applying pressure upon the slides as they move to the showing position so as to brake their movement thereto and prevent them from being over-shot therepast by the throw of the ejector, the said pressure being applied through the intermediary of the shutter means.

11. An automatic continuously operable slide projector as specified in claim 1, wherein the slide ejector is normally power-operated, a driving motor being incorporated in the machine for this purpose, operatively connected to the ejector through the intermediary of a transmission shaft, in combination with a two-speed control device automatically operative under the control of the motor and in synchronism with the movements of the slide ejector, to effect a speeding up of the transmission shaft during the slide changing periods as compared with the speed of the shaft during the intervening dwell (slide showing) periods.

PERCY STUART WARRINER.