

June 3, 1969

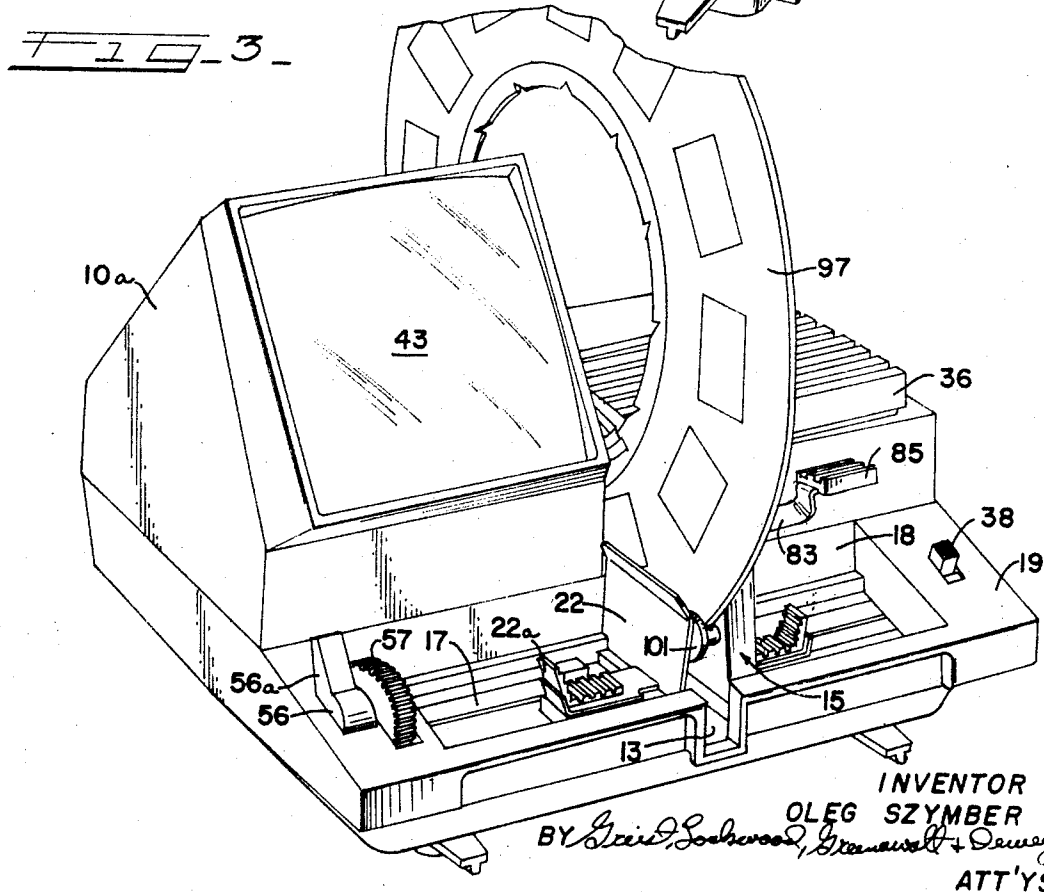
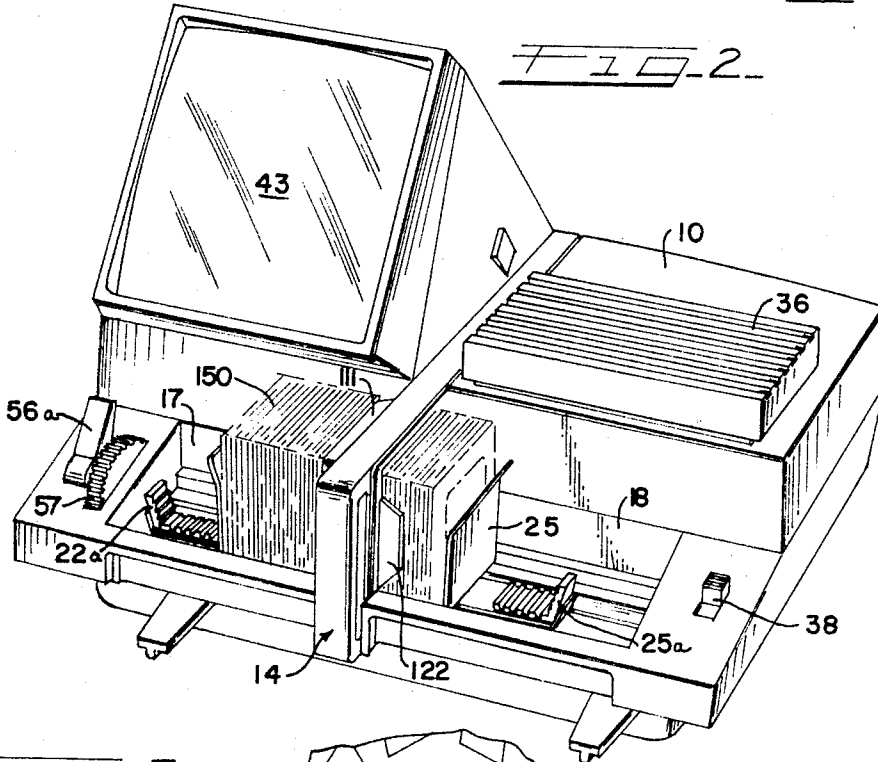
O. SZYMBER

3,447,869

SLIDE PROJECTOR-VIEWER AND SLIDE CHANGING DEVICE THEREFOR

Filed Dec. 19, 1966

Sheet 2 of 12



INVENTOR
OLEG SZYMBER
BY *Eric Lockwood, Granville & Dewey*
ATT'YS.

June 3, 1969

O. SZYMBER

3,447,869

SLIDE PROJECTOR-VIEWER AND SLIDE CHANGING DEVICE THEREFOR

Filed Dec. 19, 1966

Sheet 3 of 12

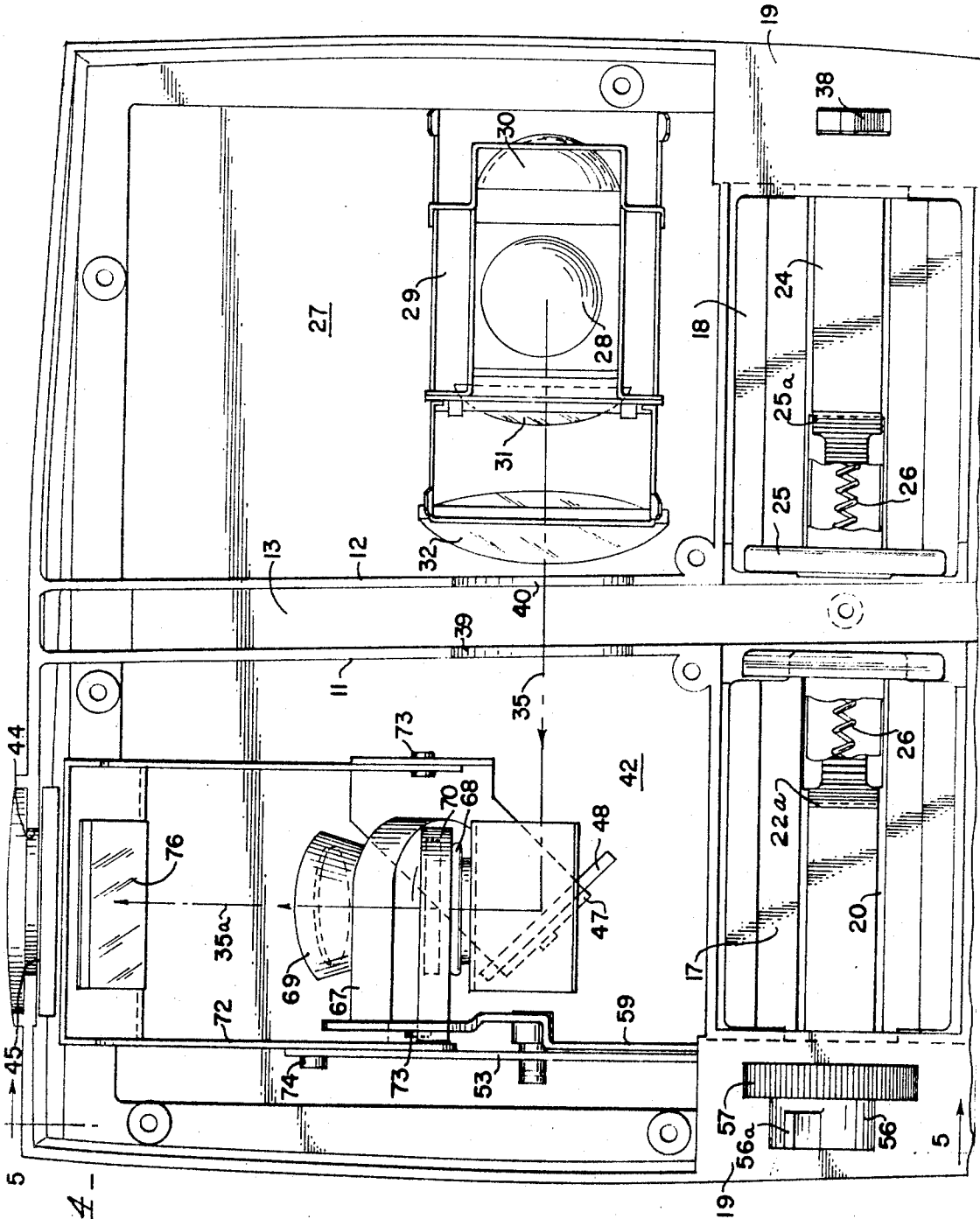


FIG. 4

INVENTOR
 OLEG SZYMBER
 BY *David L. Sedwood, Greenwood & Dewey*
 ATT'YS.

June 3, 1969

O. SZYMBER

3,447,869

SLIDE PROJECTOR-VIEWER AND SLIDE CHANGING DEVICE THEREFOR

Filed Dec. 19, 1966

Sheet 4 of 12

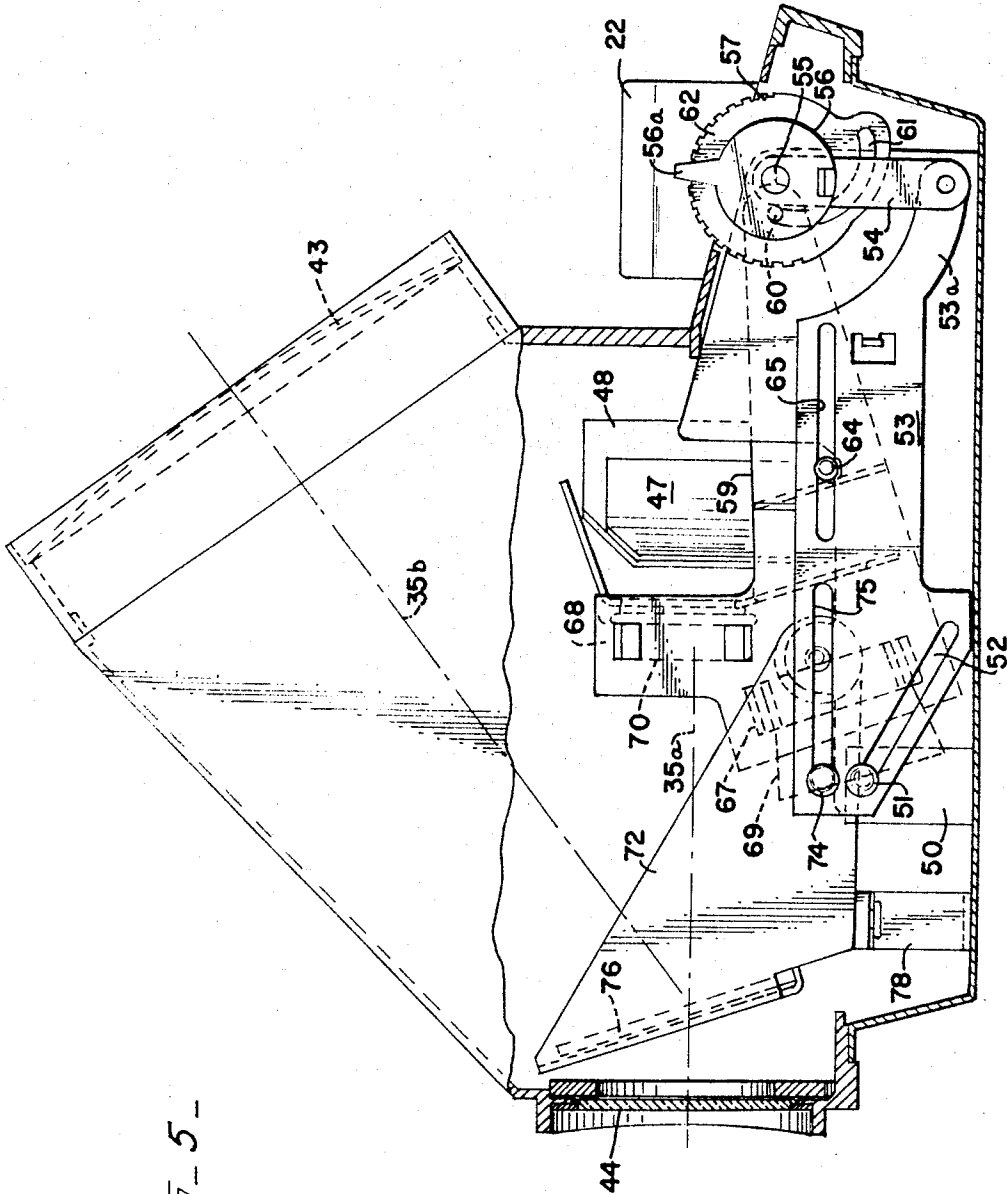


FIG. 5

INVENTOR
OLEG SZYMBER
BY *David Lockwood, Granovall & Dewey*
ATT'YS.

June 3, 1969

O. SZYMBER

3,447,869

SLIDE PROJECTOR-VIEWER AND SLIDE CHANGING DEVICE THEREFOR

Filed Dec. 19, 1966

Sheet 5 of 12

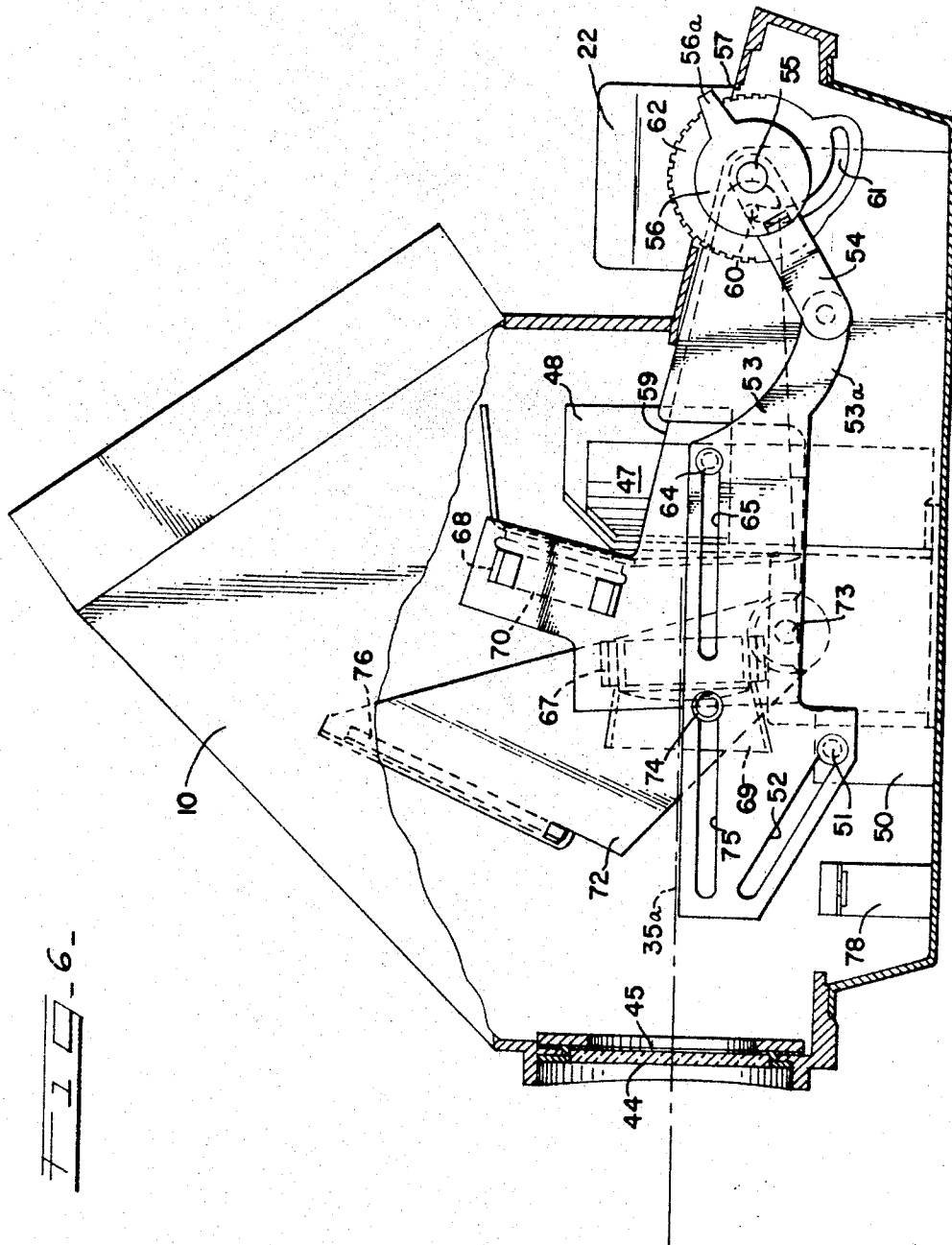


FIG. 6-

INVENTOR

OLEG SZYMBER

BY *Grant, Lockwood, Greenough & Dewey*
ATT'YS.

June 3, 1969

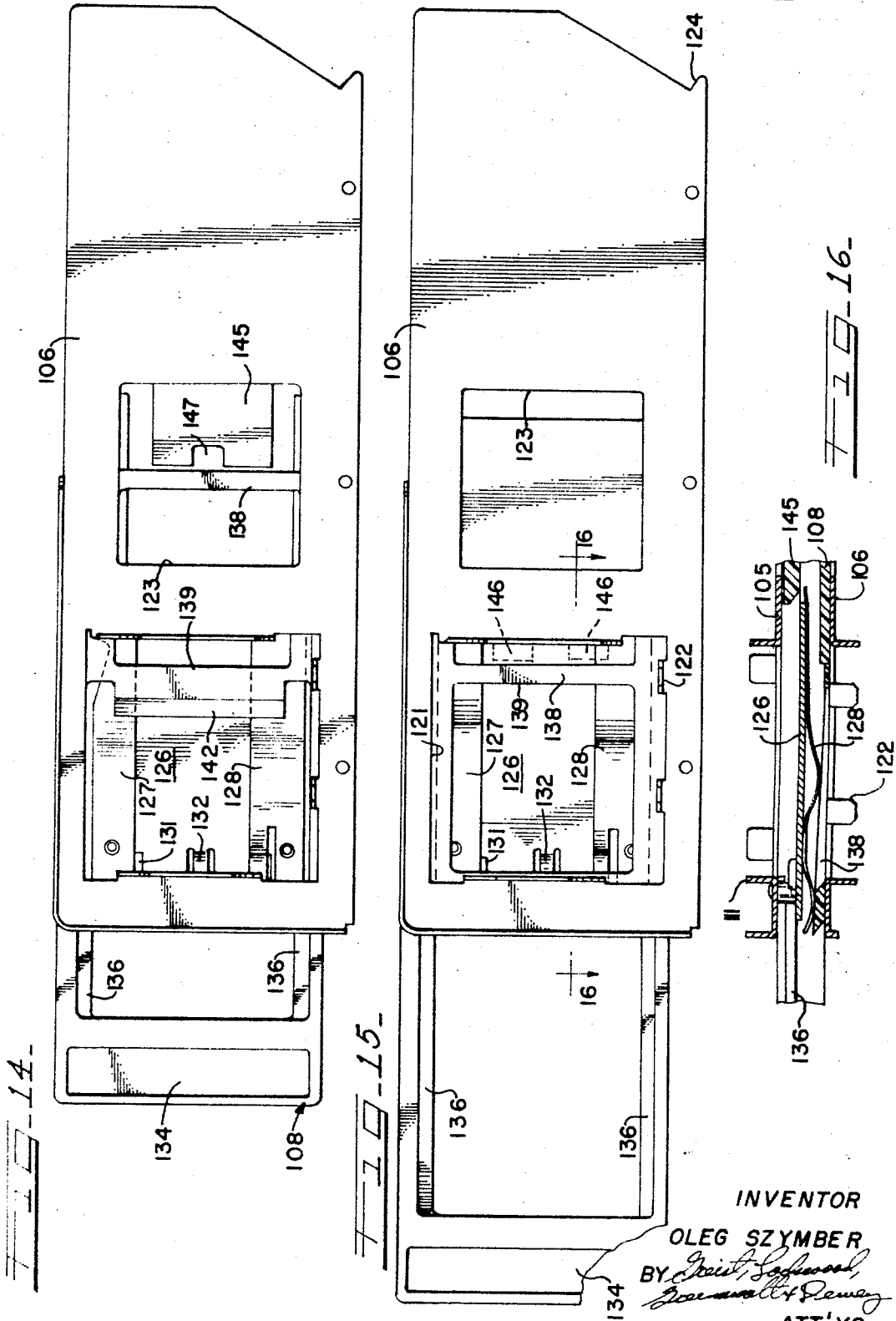
O. SZYMBER

3,447,869

SLIDE PROJECTOR-VIEWER AND SLIDE CHANGING DEVICE THEREFOR

Filed Dec. 19, 1966

Sheet 9 of 12



INVENTOR

OLEG SZYMBER

BY *Gustafson*

Deane & Deane

ATT'YS.

June 3, 1969

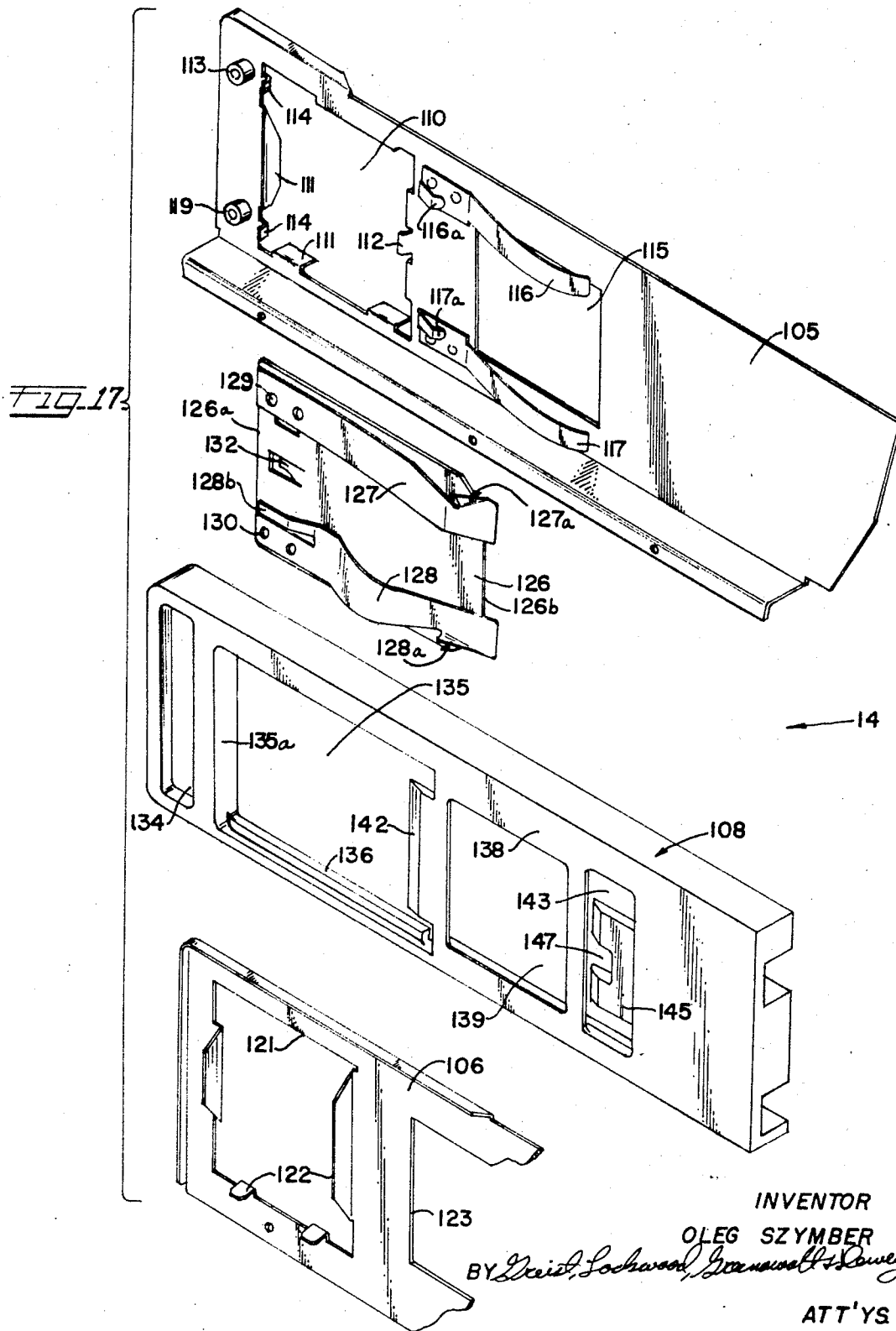
O. SZYMBER

3,447,869

SLIDE PROJECTOR-VIEWER AND SLIDE CHANGING DEVICE THEREFOR

Filed Dec. 19, 1966

Sheet 10 of 12



June 3, 1969

O. SZYMBER

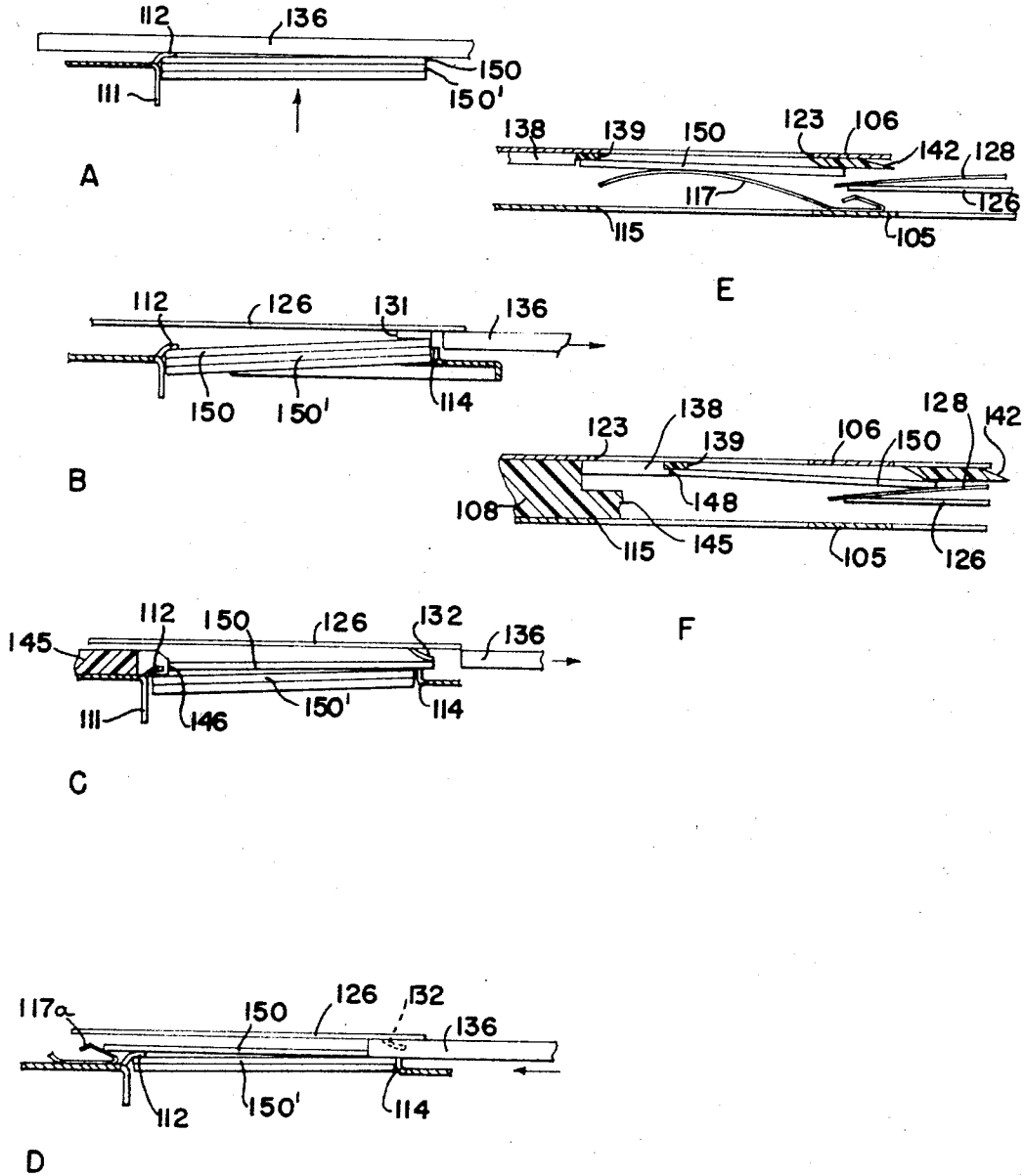
3,447,869

SLIDE PROJECTOR-VIEWER AND SLIDE CHANGING DEVICE THEREFOR

Filed Dec. 19, 1966

Sheet 12 of 12

F I O - 19 -



INVENTOR

OLEG SZYMBER

BY *David Lockwood, Greenwell & Davis*

ATT'YS.

1

3,447,869

**SLIDE PROJECTOR-VIEWER AND SLIDE
CHANGING DEVICE THEREFOR**Oleg Szymber, Chicago, Ill., assignor to GAF Corporation,
a corporation of Delaware

Filed Dec. 19, 1966, Ser. No. 602,962

Int. Cl. G03b 21/10

U.S. Cl. 353-71

18 Claims

2

ABSTRACT OF THE DISCLOSURE

The projector-viewer includes movably mounted lenses and a mirror permitting alternate projection on a remote screen and viewing on a rear projection screen, the latter forming part of the device itself. The projector-viewer is adapted for alternately receiving two different slide changing devices. One slide changing device detachably receives and supports a vertically oriented annular or disk-like slide carrying member, the latter supporting a plurality of slides in circumferential spaced relation. The other slide changing device cooperates with stack-type supply and take-up magazines forming part of the projector-viewer device itself for advancing slides one at a time from the supply magazine, to the projection gate and then to the take-up magazine.

BACKGROUND OF THE INVENTION*Field of the invention*

The field of the invention resides in the art of handling photographic slides and displaying the images thereon, more particularly to apparatus for alternately projecting slides on a remote screen and viewing the slides on a rear projection screen, such apparatus including an associated slide changing device.

Description of prior art

Graves 2,746,345 and Zweidinger 2,865,249 show devices for alternately projecting and viewing slides. The present invention represents an improvement over these prior art devices at least by the provision of an improved dual optical system and unique movable mounting means therefor.

Parlini et al. Patent 2,583,442, Horton Patent 2,864,190 and Ehemann 3,077,817 are representative of prior art having to do with slide changers for stack-type magazines. The slide changing device forming part of the present invention constitutes an improvement over the Parlini and Ehemann patents in providing for separation of a slide from the adjacent slide in a stack of slides in a manner to prevent edgewise interference between the slides. The Horton patent has to do with a slide changing device designed to minimize jamming resulting from edgewise interference between adjacent slides, and shows a tilted supply magazine to achieve this result. The slide changer of the present invention represents an improvement over Horton at least for the reason that in the former the slide magazines are not required to be tilted.

Summary of the invention

The present invention resides in a projector-viewer having new and improved means for alternately projecting a slide on a remote screen or viewing the same on a rear projection screen forming part of the device itself, and the present invention also includes an associated slide changing device having many unique features, including construction permitting separation of the foremost slide in the stack of slides from the adjacent slide in a manner so as to prevent jamming from edgewise interference between such slides.

A primary object of the present invention is the provision of a new and improved apparatus having a unique optical system permitting alternate projection and viewing of a photographic slide.

Another object of the present invention is the provision of an apparatus of the type described which is adapted to be associated with different forms of slide changing devices.

Still another object of the present invention is the provision of a combined projector-viewer having means on the housing adapted to cooperate with a detachable slide changer for forming stack-type supply and take-up magazines.

Another object of the present invention is the provision of an apparatus having an optical system permitting alternate projection and viewing of a slide, such optical system including a pair of objective lenses movably mounted by a unique camming arrangement whereby such lenses are alternately positioned in the optical axis of the projector.

Another object of the invention is the provision of an apparatus according to the foregoing object wherein such camming means permits associated focusing means to be of simple construction, such focusing means serving to adjust each of the objective lenses along the optical axis.

Still another object of the invention is the provision of an apparatus according to the foregoing objects wherein such camming means also causes movement of a mirror which forms part of the optical system during viewing of a slide.

Another object of the present invention is the provision of a new and improved slide changing device for use with stack type magazines, which slide changing device causes separation of the foremost slide in the stack from the adjacent slide in a manner to prevent jamming due to edgewise interference between such slides.

Another object of the present invention is the provision of a new and improved slide changer which provides for separation of the foremost slide in a stack of such slides from the adjacent slide in the stack by swinging such foremost slide about its trailing edge before being pushed to the display position.

Another object of the invention is the provision of a new and improved slide changing device including a frame and a slide changer movably supported thereby, such frame and slide changer having respective means cooperating to bring the foremost slide in the stack into engagement with cam means, such cam means serving to swing the foremost slide about its trailing edge thereby to cause separation of the foremost slide from the adjacent slide.

Still another object of the present invention is the provision of a new and improved slide changer for use with stack-type supply and take-up magazines, which slide changer advances slides one at a time from such a supply magazine to a display position and then to such a take-up magazine in an expeditious manner and without the likelihood of jamming.

These and other objects and advantages of the invention will become apparent from the following specification disclosing a preferred embodiment illustrated in the accompanying drawings wherein:

Brief description of the drawings

FIG. 1 is a side elevational view of a combined projector-viewer according to the present invention;

FIG. 2 is a reduced perspective view of the apparatus of FIG. 1;

FIG. 3 is a perspective view of the device of FIG. 1 showing the same associated with a different form of slide changer;

FIG. 4 is an enlarged top view of the projector-viewer

with the top housing cover plates removed for illustration of the optical system;

FIG. 5 is a section taken along line 5—5 of FIG. 4 and showing the various parts arranged for viewing an image on the rear projection screen forming part of the projector-viewer;

FIG. 6 is a section similar to FIG. 5 but showing the parts arranged for remote screen projection;

FIG. 7 is a perspective view of a new and improved slide changing device constructed in accordance with the present invention;

FIG. 8 is a perspective view of another form of slide changing device;

FIG. 9 is an enlarged, fragmentary front elevational view of the slide changing device shown in FIG. 8 showing the same in association with a slide carrying disc;

FIG. 10 is a section taken along the line 10—10 of FIG. 9;

FIG. 11 is an enlarged elevational view of the slide changing device illustrated in FIG. 7;

FIG. 12 is a view similar to FIG. 11 showing the slide changer in a different position;

FIG. 13 is a section taken along the line 13—13 of FIG. 12;

FIG. 14 is an elevational view of the slide changing device and corresponds with FIG. 11, the side shown in FIG. 14 being the opposite of that shown in FIG. 11;

FIG. 15 is an elevational view of the slide changing device and corresponds with FIG. 12, the side shown in FIG. 15 being the opposite of the side shown in FIG. 12;

FIG. 16 is a section taken along the line 16—16 of FIG. 15;

FIG. 17 is an exploded isometric view of the slide changing device;

FIG. 18 is an exploded isometric view of the slide changing device as seen from the side opposite the side shown in FIG. 17; and

FIG. 19 is a series of diagrammatic views showing the operation of the slide changing device of the present invention.

Description of a preferred embodiment

Referring now to the drawings and in particular to FIGS. 1-4, the projector-viewer will be seen to include a housing 10 divided into two sections or spaces by a pair of vertical, closely spaced plates 11 and 12, which plates define a slot 13 for alternately receiving slide changing devices 14 and 15. Slot 13 opens at the top thereof and also opens at one end thereof between cavities or pockets 17 and 18 extending along one side of the housing and opening upwardly into a console plate 19 forming part of the housing. Cavity 17, which is elongated as best shown in FIG. 4, includes a longitudinally extending slot 20 in the bottom thereof, which slot slidably mounts a slide pressure plate 22 having a handle portion 22a. Pressure point 22 and cavity 17 together define a slide supply magazine which cooperates with slide changer 14 as will be explained hereinbelow. Cavity 18 is also elongated as shown in FIG. 4 and includes a longitudinally extending slot 24 slidably mounting a slide pressure plate 25 having a handle portion 25a. The cavity 18 and pressure plate 25 together form a slide take-up magazine which cooperates with the slide changer 14 as will be explained herein. A spring 26 disposed below the bottoms of the cavities 17, 18 is connected to the pressure plates 22, 25 for urging the same toward the slot 13. The details of mounting and biasing the plates 22, 25 will not be shown or described herein as of themselves they form no part of the present invention; such construction may be similar to that shown in Hall U.S. Patent 3,258,867, assigned to the assignee hereof.

The plates 11, 12 define a housing chamber or space 27 (FIG. 4) which includes a projection lamp 28 suitably mounted in a chimney structure of framework 29. The framework 29 supports a reflector 30 and lenses 31, 32

defining an optical axis represented by the line designated 35. A louvered section or grating 36 is provided in the housing over the lamp for ventilation purposes. The lamp is controlled by an "on-off" switch 38 mounted on console portion 19. At this time it should be mentioned that the plates 11 and 12 are provided with respective apertures 39, 40 which are aligned with each other on the optical axis 35 and which define a projection gate or aperture.

Plates 11 and 12 also define another housing space or chamber 42, which space is closed at the top thereof by an upwardly extending housing portion 10a mounting a rear projection screen 43. Space 42 includes a front wall having an opening 44 therein, such opening being filled by a window 45 formed of either glass or transparent plastic material. The opening 44 will be referred to hereinbelow as a projection opening.

A bracket 47 is mounted on the floor of space 42, which bracket mounts a vertically extending mirror 48 inclined at a 45° angle with respect to optical axis 35, thereby reflecting the beam of light projected along the axis 35 through a 90° angle. The reflected beam of light defines a continuation of the optical axis which is represented by the line designated 35a. From FIGS. 4-6 it will be noted that the projection opening 44 is aligned with the optical axis 35a.

Referring now to FIGS. 5 and 6, the base of the housing 10 supports an upstanding bracket plate 50 in the housing space 42. The bracket plate 50 mounts a pin 51 slidably engaged in a slot 52 formed in an actuating plate 53. The actuating plate 53 includes an extended portion 53a pivotally engaged with one end of an arm 54. The other end of this arm is pivotally mounted on a pin 55 suitably supported by the housing 10. Rigidly connected to the arm 54 is a member 56 having an actuating lever 56a extending through an opening 57 in the console portion 19 of the housing. Swinging of the lever 56a by the operator's fingers serves to shift the actuating plate 53 back and forth between its lowermost position shown in FIG. 5 and its uppermost position shown in FIG. 6, such up-and-down motion being brought about by the inclined slot or cam surface 52 engaging the pin 51.

A frame plate 59 carries a pin 60 at one end thereof, which pin is received in a spiral-like cam track 61 formed in a focusing wheel 62. The focusing wheel or control is mounted on the pin 55 for rotation thereon. A portion of the focusing wheel 62 extends through the housing opening 57 thereby to permit manipulation of the former by the operator's fingers. Frame plate 59 also mounts a pin 64 which is received in a slot or cam surface 65 formed in the actuating plate 53. It will be noted that the slot 65 extends horizontally and is in parallel relation with the optical axis 35a both when the actuating plate 53 is in its uppermost position and lowermost position.

Frame plate 59 mounts arms 67, 68 each extending at a right angle thereto, which arms mount respective objective lens assemblies 69, 70. The respective axes of such lenses are contained in the same vertical plane but are inclined with respect to each other in such plane as clearly shown in FIGS. 5 and 6.

It should be apparent that shifting of the actuating plate 53 back and forth between its upper and lower positions serves to swing the frame plate 59 about the pin 60 for moving such frame plate between the upper and lower positions illustrated in FIGS. 6 and 5, respectively. This swinging movement of the plate 59 is of course caused by the engagement between the pin or cam follower 64 and the slot or cam surface 65. When the plate 59 is in its lower position shown in FIG. 5, the lens 70 is positioned on the optical axis 35a, and when the plate 59 is in its upper position shown in FIG. 6, the lens 69 is positioned on the optical axis. Focusing of either objective lens when the same is on the optical axis is achieved by manipulating the focusing knob 62, such

5

manipulation serving to reciprocate the plate 59, the direction of reciprocating being defined by the slot 65. Since the slot 65 is in parallel relation with the optical axis 35a when either of the lenses 69, 70 are positioned on the optical axis, a single focusing means can be utilized to focus both of these lenses.

A generally U-shaped frame plate 72 has the distal end portions thereof pivotally mounted about co-axially aligned pins 73 which are in turn mounted by appropriate brackets supported on the floor of the housing 10 in the space 42. One leg portion of the plate 72 carries a pin or cam follower 74 which slides in a slot or cam surface 75 formed in the actuating plate 53. It should be apparent that shifting of the actuating plate 53 back and forth between its upper and lower positions causes swinging movement of the frame 72 about the pins 73 between the upper and lower positions illustrated in FIGS. 6 and 5, respectively.

Frame 72 mounts a mirror 76 on the inside surface of the central portion thereof. When the frame 72 is in its lower position shown in FIG. 5, the mirror 76 intercepts the optical axis 35a and reflects the beam of light along an extended axis represented by the line designated 35b, which extended axis passes through the rear projection screen 43. In other words, the mirror 76 cooperates with the objective lens 70 for projecting an image on the rear of screen 43. As noted in FIG. 5, the frame 72 rests on a pedestal 78 which is mounted on the base of the housing in the space 42. The engagement between the pedestal 78 and the frame 72 provides for accurate and sturdy positioning of the mirror 76.

When the actuating member 53 is shifted to its upper position as shown in FIG. 6, the mirror 76 is swung upwardly such that the same does not intercept the optical axis 35a, thereby permitting remote screen projection through the projection opening 44 by objective lens 69.

The changing device 15, best shown in FIGURES 8-10, will now be described. This slide changing device and the associated slide carrying disc are similar to the slide changing mechanism and slide carrying disc disclosed and claimed in the application of Robert E. Smith, Ser. No. 451,889, filed Apr. 29, 1965.

The slide changing device 15 includes a frame plate 80 mounting a block 81 adjacent one end thereof. Plate 80 includes a rectangular opening 82 which is in alignment with the openings 39, 40 when the slide changing device 15 is detachably received in the slot 13. Plate 80 mounts an actuating lever 83 for pivoting movement about a pin 84. This lever includes an arm portion 83a supporting a button 85 adapting the lever for manual operation as will be apparent herein. The lever 83 includes another arm portion 83b which extends generally at a right angle with the arm 83a. The arm 83b has a tapered portion 83c loosely received in a cut-out opening 86 formed in one end of a shutter plate 88 which is mounted for slidable reciprocating movement on the frame plate 80 by means including a tab 88a which is slidably received in a slide 89 mounted on the plate 80. The shutter plate 88 is reciprocal between the solid and broken line positions shown in FIGURE 9.

A coil spring 91 has one end thereof secured to a tab 92 struck out from the plate 80, the other end of the spring 91 being connected as by means of a pin to the arm 83b of the actuating lever. The spring 91 acts to urge the actuating lever 83 in a counterclockwise direction as shown in FIGURE 9, thereby urging the shutter plate 88 to the right. When the shutter plate 88 is in this position relative to the frame 80, a rectangular aperture 94 in the shutter plate is in registry with the aperture 82 in the plate 80. It should be apparent that depressing the button 85 serves to swing the lever 83 in a clockwise direction thereby to shift the shutter plate to the left, i.e., to the broken line position shown in FIGURE 9, in which case the shutter plate covers the aperture 82.

The shutter plate 88 includes an integral, upstanding

6

portion 96 which is shaped to define a drive pawl for advancing a slide carrying disc, the outline of which is represented by phantom line 97. (The slide carrying disc is illustrated more or less in diagrammatic form in FIGURE 3.) Reference should be had to the aforementioned Smith application for a detailed explanation of the construction and operation of this slide carrying disc. It will be sufficient herein to say that such disc mounts a plurality of slides in circumferential spaced relation for being advanced one at a time to the aperture 82.

The slide carrying disc 97 is supported in vertically disposed relation by rollers 99, 100 and 101, which rollers are supported on the frame plate 80. These rollers engage the periphery of the slide carrying disc and rotatably mount the same for being advanced by the pawl 96 which reciprocates along with the shutter plate 88. As explained in the aforementioned Smith application, the drive pawl engages teeth formed on the slide carrying disc to permit indexing thereof. Suitable stop pawl means (not shown) are provided for engaging other teeth on the disc thereby to prevent retrograde movement of the latter during repositioning of the pawl 96, i.e., movement of the same from left to right as viewed in FIG. 9. Again, reference should be had to the above-mentioned Smith application for a more detailed explanation of the nature and operation of the slide changing device and slide carrying disc.

With reference to FIG. 3, it will be understood that the slide changing device 15 is detachably mounted in the slot 13 with the aperture 82 in alignment with the apertures 39, 40. Thus, the projector-viewer is adapted to receive the slide changing device 15 for viewing or projecting a plurality of slides carried by the slide carrying disc. When using slide changing device 15, the slide supply and take-up magazines including the plates 22 and 25 serve no purpose. The plate 22 merely rests against the face of the roller 101, and the plate 25 rests against the outside surface of the block 81.

The slide changing device 14, which forms part of the present invention, will now be described. Referring to FIG. 7, this slide changing device will be seen to consist primarily of a front frame plate 105 and a rear frame plate 106, which plates are secured together by means of a number of fasteners 107 thereby defining a guideway slidably supporting a slide changer 108. Front plate 105 (FIGS. 7, 11-13 and 17) will be seen to include a generally rectangular opening 110 having a plurality of integral flanges 111 formed around the edges thereof, which flanges extend in perpendicular relation to the plane of the plate. It will be understood that the opening 110 is aligned with the slide supply area or magazine 17 when the slide changing device 14 is detachably received in the slot 13 of the projector-viewer for receiving the slides urged toward the slide changing device by the pressure plate 22 (FIG. 2). The flanges 111 engage marginal portions of the slides guiding the same into the opening 110. Plate 105 includes a tab 112 which extends into the opening 110 from one edge thereof. As noted in FIG. 13, this tab is offset inwardly of the slide changing device from the plane of the plate 105. Plate 105 also includes a pair of right-angle tabs 114 which extend inwardly of the slide changing device in perpendicular relation to the plane of the plate 105.

Plate 105 is further defined by a rectangular aperture 115. It will be understood that this aperture is in registry with the aperture 39 when the slide changing device 14 is detachably received in the slot 13 of the projector-viewer. A pair of leaf spring members 116, 117 have corresponding ends thereof secured to the inside face of the plate 105 as by means of rivets. These leaf springs have the free end portions thereof bent away from the plate 105 and into contact with a web portion of the slide changer 108 for holding a slide in the display position as will be explained hereinbelow. The springs include integral finger portions 116a, 117a which serve to

deflect a slide from the plate 105 toward the slide changer as will be explained below. As best noted in the upper portion of FIG. 17, the plate 105 includes a pair of integral spacer sleeves 113, 119 which are centrally bored for receiving suitable fasteners.

Referring now to FIGS. 14-16, the rear frame plate 106 will be seen to include an opening 121 which is aligned with the opening 110 in front plate 105. It will be understood that the opening 121 opens into the take-up area or magazine 18 of the projector-viewer when the slide changing device 14 is detachably received in the slot 13. As will become apparent herein, the opening 121 permits exit of slides from the slide changing device to the take-up magazine. The plate 106 includes a plurality of integral flanges 122 which extend from the edges of the opening 121 in perpendicular relation with the plane of the plate 106. These flanges engage marginal portions of the slides and guide the same into the take-up magazine. The plate 106 also includes a rectangular aperture 123 in alignment with the aperture 115 in the front plate 105. It will be understood that the aperture 123 is in registry with the aperture 40 in the projector-viewer when the slide changing device 14 is detachably received in the slot 13. The plate 106 is further defined by an integral foot 124 which engages a complimentary-shaped member (not shown) formed in the closed end of the slot 13 for aiding in detachably securing the slide changing device 14 therein.

The slide changing device 14 includes a generally rectangular partition plate 126 (FIG. 17) which is mounted between the plates 105, 106 in parallel spaced relation with the latter and in alignment with the openings 110, 121. Partition plate 126 supports a pair of leaf springs 127, 128. Corresponding ends of these springs are secured to the plate 126 by means of pairs of fasteners 129, 130. One of the fasteners 129 and one of the fasteners 130 extend through the openings in the spacer sleeves 113, 119 and thereby serve to secure the plate 126 in parallel spaced relation with the plate 105. As noted in FIG. 17, the free ends of the springs 127, 128 extend beyond one edge of the partition plate 126. These ends of the leaf springs engage an edge portion of the slide and deflect the same between the partition plate 126 and the rear plate 106 during return movement of the slide changer 108. The springs 127, 128 have respective ear portions 127a, 128a bent toward plate 106 for minimizing the possibility of return of a slide to the display position during the next cycle of the slide changer. It will be noted that leaf spring 128 has the midportion thereof bent away from the plate 126. This bent portion of the spring, in cooperation with an integral finger portion 128b, serves as a means for pushing slides through the opening 121 and into the take-up magazine. As best noted in FIGS. 13, 17 and 18, the partition plate 126 includes a pair of tabs 131 and a finger 132 formed by cutting the plate 126 and bending the cut portion therefrom.

The slide changer 108 forming part of the slide changing device 14 is slidably mounted between the front and rear frame plates 105, 106 respectively. The slide changer 108 includes oppositely disposed recesses 134 in one end thereof, which recesses serve as finger gripping portions permitting manual reciprocation of the slide changer. The changer also includes a generally rectangular-shaped opening 135 which extends longitudinally of the same. The changer 108 further includes a pair of rails 136 which extend along upper and lower edges of the opening 135. As best noted in FIGS. 13 and 18, the rails have a thickness less than the thickness of the changer 108 and are located inwardly from both outer faces of the latter. As observed in FIG. 17, the rails 136 have a length less than the length of the opening 135.

The slide changer 108 is further defined by a thin web portion 138 in which a slide viewing aperture 139 is formed. It should be noted that the web portion 138 is arranged adjacent the face of the changer 108 which

slides against the inside surface of the rear frame plate 106. Web portion 138 includes an integral wedge 142 which extends into the opening 135 and which serves as a means for camming slides in the take-up magazine to permit easy entry of a slide in such take-up magazine. The slide changer 108 has another opening 143 which is provided for weight and material saving purposes and which performs no function as far as slide changing is concerned.

Looking now to FIG. 18, the slide changer 108 will be seen to include an integral tongue 145 which is laterally offset from the web 138 and which has a height substantially less than the total height of the changer 108. The tongue includes a pair of slide catching surfaces 146 which are separated by a cutout 147, such cutout being provided to receive the tab 112 when the slide changer 108 is fully withdrawn (FIG. 13).

At this time it should be mentioned that the rails 136 of the changer slide between the plate 105 and upper and lower marginal portions of the partition plate 126. Movement of the slide changer into the guideway formed by the plates 105, 106 is limited by abutting engagement of the edge 135a of the opening 135 with the edge 126a of the partition plate. Movement of the slide changer in the opposite direction is limited by abutting engagement of the other edge 126b of the partition plate with the wall surface 145a forming part of the tongue 145 (FIG. 13). As seen in FIG. 18, the changer 108 includes a pair of slide pushing ledges 148 (only one of such ledges is illustrated) which engage an edge of a slide for pushing the same to the slide take-up magazine during return movement of the slide changer.

Referring particularly to FIG. 19, the operation of the slide changing device 14 is as follows: Assume that the slide changing device is properly mounted in the slot 13 and assume further that a stack of slides 150 (FIG. 2) are provided in the supply magazine, in which case the pressure plate 22 acts to urge the slides toward the opening 110 in the front frame plate 105. With the slide changer 108 in its innermost position (FIG. 19A), the foremost slide in the stack is supported in the opening 110 by the action of the pressure plate 22 urging such slide against the tab 112 and the rails 136. As the slide changer 108 is withdrawn, i.e., pulled from left to right as seen in FIGS. 7 and 19, the rails 136 slide along the foremost slide 150, the same still being held in the opening 110 by engaging edges of the same and the flange 111. As the slide changer 108 approaches its outermost position, the rails 136 are completely withdrawn from the slide 150. When this occurs, the force of the pressure plate 22 acting on the slides causes the trailing edge portion of the foremost slide to enter the guideway and drop on the tabs or stops 131 formed on the partition plate 126 (FIG. 19B). This movement of the foremost slide tends to cause initial separation between the trailing edge portion of the same and the corresponding portion of the adjacent slide 150', although there is a tendency for the remaining slides in the stack also to cock or tilt as viewed in FIG. 19B. The tabs 114 prevent the adjacent slide 150' from entering the guideway which is defined by the plates 105, 106.

Continued movement of the changer 108 in the same direction brings the catch surfaces 146 into engagement with the leading edge of the slide thereby pushing the same off the tab 112 and at the same time forcing the trailing edge thereof between the tabs 114 and the finger 132 (FIG. 19C). The tabs 114 and the finger 132 cooperate to cam or swing the slide 150 about its trailing edge portion thereby separating the same from the adjacent slide 150'. The slide is swung in this manner as the finger 132 engages the same nearer the trailing edge than the area of the slide contacted by the ends of the fingers 114. When the direction of movement of the slide changer is reversed, the ends of the rails 136 engage the trailing edge of the slide for pushing the same into the space between the springs 116, 117 and web portion 138 of the slide changer,

the spring fingers 116a, 117a serving to aid deflecting the slide toward such web portion (FIG. 19D).

When the changer 108 is in its fully inserted or innermost position, the slide will be held against the aperture 139 by the springs 116, 117 in registry with the apertures 115, 123 and 139 (FIG. 19E). In other words, the slide is then positioned on the optical axis 35 of the projector-viewer between the apertures 39, 40 for either viewing on the screen 43 or projection on the remote screen through the projection opening 44.

After the slide has been projected or viewed as the case may be, the changer 108 is pulled outwardly of the frame plates 105, 106 thereby bringing the slide pushing surfaces 148 in engagement with the slide for returning the same with the changer 108 (FIG. 19F). After the slide moves a very short distance, the leading edge thereof engages the tips of the deflecting springs 127, 128 which extend across the edge 126b of the partition plate. The ends of these leaf springs insure that the slide enters the space between the partition plate and the rear frame plate 106 during return movement of the slide changer (FIG. 19F).

The wedge 142 cams the pressure plate 25 or the last slide to enter the take-up magazine, as the case may be, for forming a space to facilitate entry of a slide into the take-up magazine. When the slide has been pushed completely into the opening 121 of the rear frame plate 106, the leaf spring 128 acts to push the slide through the opening 121 and into the take-up magazine. The portion 128a of the leaf spring presses against the slide which has just been returned to the take-up magazine and biases the same therein for minimizing the possibility of return of a slide from the opening 121 to the display position when the changer 108 is again pushed in for feeding another slide to the display position or projection gate.

It should be apparent that the slide changing device 14 provides a unique means for separating the foremost slide in the supply magazine from the adjacent slide thereby to prevent jamming due to edgewise interference between such slides. The slide changing device 14 provides for changing slides expeditiously and with very little likelihood of jamming. It will be noted that the changer 108 is in its innermost position when a slide is being displayed and that the changer extends outwardly of the frame plates only momentarily. In other words, the changer 108 will be in its innermost position most of the time, which is desirable at least for aesthetic reasons.

While the invention has been shown in but one form, it will be obvious to those skilled in the art that it is not to be so limited. On the contrary, the invention is susceptible of various forms and modifications without departing from the spirit and scope of the appended claims.

I claim:

1. In a slide changing device of the type adapted to feed slides edgewise one at a time from a supply magazine to a display position, wherein the slides are held in the supply magazine in stack form and are urged therein in a feed direction, wherein the device includes a frame defining a guideway extending between the supply magazine and the display position, a slide changer mounted in said guideway for movement between a first position and a second position thereby to advance a slide from the supply magazine to the display position, the improvement comprising, said frame including cam means engageable with the trailing edge portion of the foremost slide in the stack for swinging said slide about its trailing edges thereby to separate the same from the adjacent slide in the stack, means including catch means on said slide changer engageable with the foremost slide as the former approaches its first position for bringing the trailing edge portion of the foremost slide into engagement with said cam means thereby to swing such slide about its trailing edge to cause separation of this slide from the adjacent slide, said slide changer including pushing means engage-

able with the trailing edge of the foremost slide for pushing the same to the display position upon movement of said slide changer from its first to its second positions.

2. The improvement according to claim 1 wherein said frame and said changer include respective first and second means for holding the foremost slide in position to be engaged by said catch means, said first means including a member on the frame engageable with the leading edge portion of the foremost slide and said second means including a formation on the slide changer which slidably engages the foremost slide, which formation extends longitudinally of the slide changer and terminates at a point intermediate the ends of the latter such that the formation is withdrawn from the foremost slide as the slide changer approaches said first position.

3. The improvement according to claim 1 wherein said cam means includes first and second fingers engageable with respective opposite faces of the trailing edge portion of the foremost slide, said fingers engaging the foremost slide at different distances from the trailing edge thereof for swinging such slide about its trailing edge.

4. In a slide changing device of the type adapted to feed slides edgewise one at a time from a supply magazine to a display position, wherein the slides are held in the supply magazine in stack form and are urged therein in a feed direction, wherein the device includes a frame defining a guideway extending between the supply magazine and the display position, a slide changer mounted in said guideway for movement between a first position and a second position thereby to advance a slide from the supply magazine to the display position, the improvement comprising, said frame being provided with an opening for receiving the foremost slide in the supply magazine, first and second means on said frame and slide changer respectively for engagement with such foremost slide thereby to support the same in said opening, said first means being located adjacent said opening for engaging the foremost slide adjacent the leading edge of the latter, said second means being located on said slide changer such that the former is disengaged from the foremost slide as the slide changer approaches said first position thereof whereupon said first means and the slide urging means cooperate to tilt the foremost slide for entry of at least the trailing edge portion thereof into said guideway, said frame fixedly mounting cam means arranged to engage opposite faces of the foremost slide adjacent the trailing edge portion thereof for swinging such slide about the trailing edge portion thereof, said slide changer including catch means arranged to engage the leading edge of the foremost slide upon continued movement of the slide changer toward its first position for disengaging the foremost slide from said first means and for bringing the trailing edge portion of said foremost slide into engagement with said cam means thereby to allow the latter to swing the foremost slide for separating the latter from the adjacent slide, said slide changer including a pushing surface arranged for engagement with the trailing edge of the foremost slide for pushing the same to the display position upon movement of the slide changer from its first position to its second position.

5. The improvement according to claim 4 further defined by, said frame including a plate in which said opening is formed, said frame also including a partition plate arranged in parallel spaced relation with said first-mentioned plate adjacent the opening therein, said first-mentioned plate having at least one tab arranged to engage the trailing edge portion of the foremost slide on the face thereof which adjoins said adjacent slide, said partition plate including at least one finger arranged to engage the trailing edge portion of the foremost slide on the other face thereof and nearer the trailing edge of such slide than the area thereof engaged by said tab, said finger and said tab constituting said cam means.

6. The improvement according to claim 5 wherein said first means is defined by another tab extending from said

first-mentioned plate at the edge of said opening which is adjacent the leading edge portion of the foremost slide.

7. In a slide changing device of the type adapted to feed slides edgewise one at a time from a supply magazine to a display position, wherein the slides are held in the supply magazine in stack form and are urged therein in a feed direction, wherein the device includes a frame defining a guideway extending between the supply magazine and the display position, a slide changer mounted in said guide way for movement between a first position and a second position thereby to advance a slide from the supply magazine to the display position, the improvement comprising, said frame including first and second plates defining said guideway and having said slide changer mounted therebetween, said first plate being provided with an opening for receiving the foremost slide in the supply magazine, a partition plate mounted between said first and second plates in spaced relation with the latter and adjacent said opening, first and second means on said first plate and slide changer respectively for engagement with said foremost slide thereby to support the same in said opening, said first means being located adjacent said opening for engaging the foremost slide adjacent the leading edge of the latter, said second means being defined by a formation on said slide changer which is slidable between said first plate and said partition plate, said formation being located on the slide changer such that the former is disengaged from the foremost slide as the slide changer approaches said first position thereof whereupon said first means and the slide urging means cooperate to tilt the foremost slide for entry of at least the trailing edge portion thereof into said opening, said first plate and said partition plate having first and second elements, respectively, arranged to engage opposite faces of the foremost slide adjacent the trailing edge portion thereof, said second element being arranged to engage the foremost slide nearer the trailing edge thereof than the area engaged by said first element thereby to swing the foremost slide about the trailing edge portion thereof, said slide changer including catch means arranged to engage the leading edge of the foremost slide upon continued movement of the slide changer toward its first position for disengaging the foremost slide from said first means and for forcing the trailing edge portion of the foremost slide between said first and second elements thereby to allow the latter to swing the foremost slide for separating the same from the adjacent slide, said slide changer including a pushing surface engageable with the trailing edge of the foremost slide for pushing the same to the display position upon movement of the changer from its first position to its second position.

8. The improvement according to claim 7 wherein said first element is defined by one or more tabs formed on said first plate on the edge of the opening therein which is adjacent the trailing edge portion of the foremost slide.

9. The improvement according to claim 7 wherein said first means is defined by a tab formed on said first plate on the edge of the opening therein which is adjacent the leading edge portion of the foremost slide.

10. The improvement according to claim 7 further defined by, said first and second plates having respective aligned apertures defining said display position, said frame including first leaf spring means engageable with upper and lower marginal portions of a slide for yieldably holding the same against the inside surface of said second plate in alignment with the aperture therein, second leaf spring means on the side of said partition plate which is adjacent said second plate, said second spring means being engageable with the leading edge portion of a slide during movement of said changer from its second to its first position thereby to cam the slide between said partition plate and said second plate, said second plate including an opening in general alignment with said opening in said first plate, which second-mentioned opening permits slides to exit to a take-up magazine.

11. The improvement according to claim 10 wherein said second spring means includes a leaf spring having a portion intermediate the ends thereof which is bowed away from said partition plate, said spring portion being aligned with the opening in said second plate for pushing a slide therethrough and into the take-up magazine.

12. A combined slide viewer and projector comprising, a housing including a pair of vertical closely spaced walls which divide the housing into two spaces and which also define a slot open at the top and at least one end thereof for reception of a slide changing device, said walls having respective apertures therein defining a projection gate, means mounted in one of said housing spaces for projecting a beam of light horizontally through said apertures in perpendicular relation to said walls, a vertically disposed first mirror fixedly mounted in the other housing space for reflecting said light beam in a horizontal plane through 90°, said housing including in an outer wall portion thereof a projection opening arranged to have the reflected beam of light passed therethrough for remote screen projection of the image of a slide in said projection gate, said housing mounting a rear projection screen, a second mirror in said other housing space and means movably mounting the same for interception of the reflected light beam between said first mirror and said projection opening thereby to permit viewing of the image of said slide on said rear projection screen.

13. A combined slide viewer and projector according to claim 12 in combination with a slide changing device detachably received in said slot, which device is adapted for removably mounting in a vertical plane a slide carrying disc of a type adapted to mount a plurality of slides in circumferential spaced relation, said changing device including indexing means for intermittently rotating said disc thereby to advance slides carried by the disc one at a time to said display position.

14. The combined slide viewer and projector according to claim 12 further defined by, said housing including means defining slide supply and take-up magazine areas arranged on opposite sides of said slot adjacent said one end thereof, a pair of slide pushing plates mounted in said areas, respectively, for movement toward and away from said one end of the slot, biasing means engaged with each of said plates thereby urging the latter toward each other, an elongated slide changing device detachably received in said slot with one end of the former disposed between said areas, which device includes a frame consisting of spaced plates defining a guideway, said plates each having an aperture in alignment with respective apertures in said walls and thereby defining a display position, said device also including slide entry and exit openings in said one end thereof, which entry opening is arranged to receive slides one at a time from said supply area and which exit opening is arranged to discharge slides one at a time to said take-up area, a slide changer mounted in said guideway for reciprocating movement therein for moving slides edgewise from said entry opening to said display position and from the latter to said exit opening.

15. A combined viewer and projector comprising, a housing having means therein defining an optical axis, said housing having a projection opening in one outer wall thereof, which opening is arranged on said optical axis to permit projection on a remote screen, said housing mounting a rear projection screen, a first frame in said housing carrying first and second objective lenses, means for moving said first frame for alternately locating said first and second lenses on said optical axis, a mirror and a second frame movably mounting the former for movement back and forth between a first position wherein the mirror intercepts the optical axis between one of said lenses and said projection opening and a second position wherein said mirror is in non-interfering relation with said optical axis, said mirror being arranged in said first position to cooperate with said one lens and said rear projection

13

screen for projecting an image on the latter, and means for moving said first and second frames relative to each other such that said mirror occupies its first position when said first lens is on the optical axis and said mirror occupies its second position when said second lens is on the optical axis.

16. The combined viewer and projector according to claim 15 further defined by, said first and second lenses being mounted on said first frame in angular relation to each other, said first frame being mounted for swinging movement back and forth between a first position wherein said first lens is on the optical axis and a second position wherein said second lens is on the optical axis, and means for shifting said first frame in both positions thereof for reciprocating each of said lenses along the optical axis for focusing.

17. A combined viewer and projector comprising, a housing having means therein defining an optical axis, said housing having a projection opening in one outer wall thereof, which opening is arranged on said optical axis to permit projection on a remote screen, said housing mounting a rear projection screen, an actuating member having a pair of cam means with at least one of said cam means consisting of a rectilinear cam surface, means for shifting said actuating member back and forth between first and second positions such that said cam surface is parallel with the optical axis when the actuating member is in its first and second positions, a first frame and pivotal means mounting the same for swinging movement, first and second lenses carried by said first frame in angularly offset relation with each other, a cam follower on said first frame and engaged with said cam surface for alternately swinging said first and second lenses into the optical axis in response to movement of said actuating member between said positions, a mirror and a second frame swingably mounting the same, cam means on said second frame and engaged with the other cam means on said actuating member for swinging said mirror into the optical axis when one of said lenses is on such axis and

14

for swinging said mirror out of the optical axis when the other lens is on such axis, said mirror being arranged for cooperating with said one lens and said rear projection screen for reflecting an image onto the latter, said other lens serving to permit remote screen projection through said opening, and adjustment means engaged with said pivotal means for moving said cam follower in either direction along said cam surface independently of movement of the actuating member thereby to achieve focusing with both of said lenses.

18. The combined viewer and projector according to claim 17 wherein the means for shifting said actuating member includes lever means mounted on the housing for swinging movement about a first axis and having one end thereof pivotally connected to said actuating member, said adjustment means including a focusing member mounted by the housing for rotation about said first axis and including a cam track engaged with a pin connected to said first frame and defining said pivotal means, said cam track being arranged for moving said cam follower along said cam surface in response to rotation of said focusing member.

References Cited

UNITED STATES PATENTS

2,439,987	4/1948	Roger	88—24
2,634,653	4/1953	Barth	88—28
2,844,895	7/1958	Brumberger	40—79
2,858,628	11/1958	Rideout	88—28
2,893,146	7/1959	Geiger	40—79
3,077,817	2/1963	Ehemann	88—28
2,138,057	6/1964	Castedello	88—24

NORTON ANSHER, *Primary Examiner.*

LEO H. MCCORMICK, JR., *Assistant Examiner.*

U.S. Cl. X.R.

353—77, 82, 116, 117