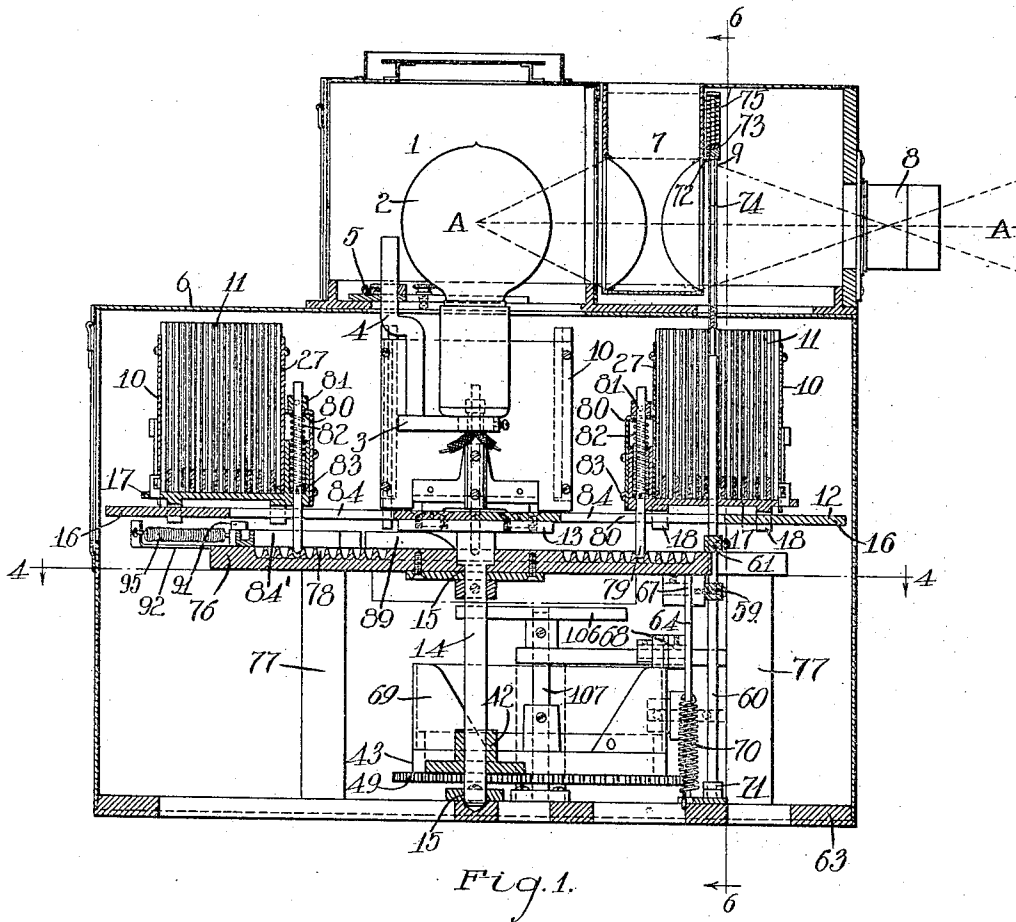
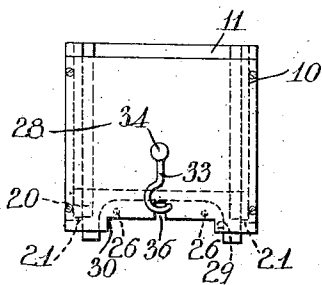
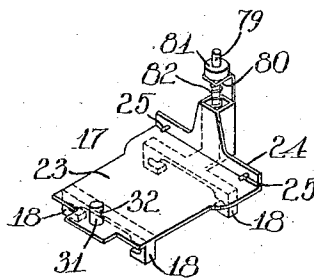
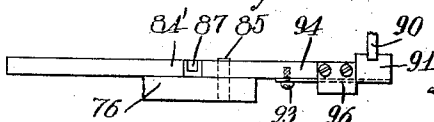


G. L. W. PALMER.  
PROJECTING APPARATUS.  
APPLICATION FILED JULY 17, 1916.

1,240,593.

Patented Sept. 18, 1917.

4 SHEETS—SHEET 1.



Inventor:  
George L. W. Palmer  
By *Charles S. Godding*  
Attorney

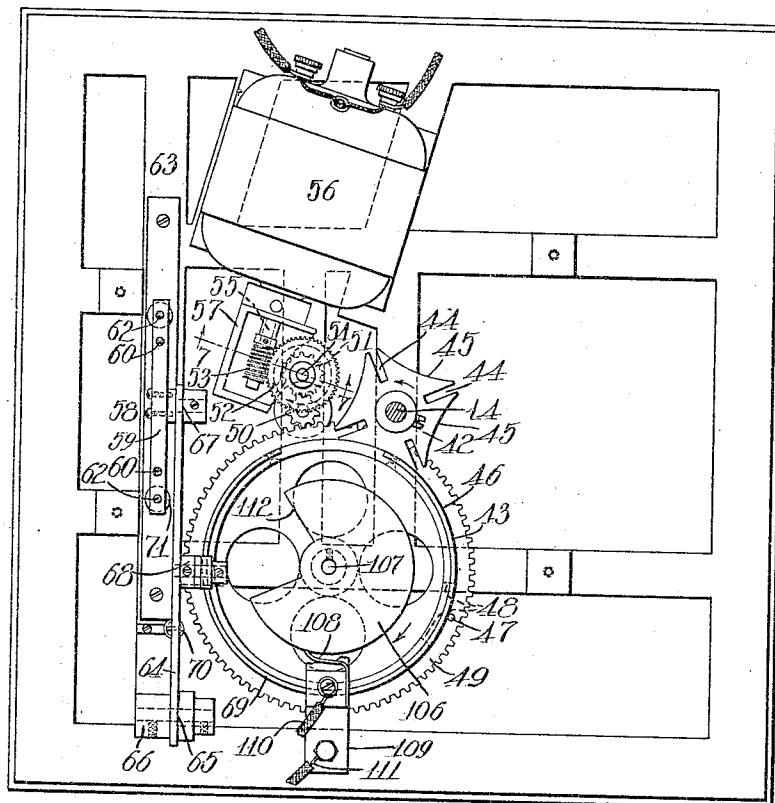
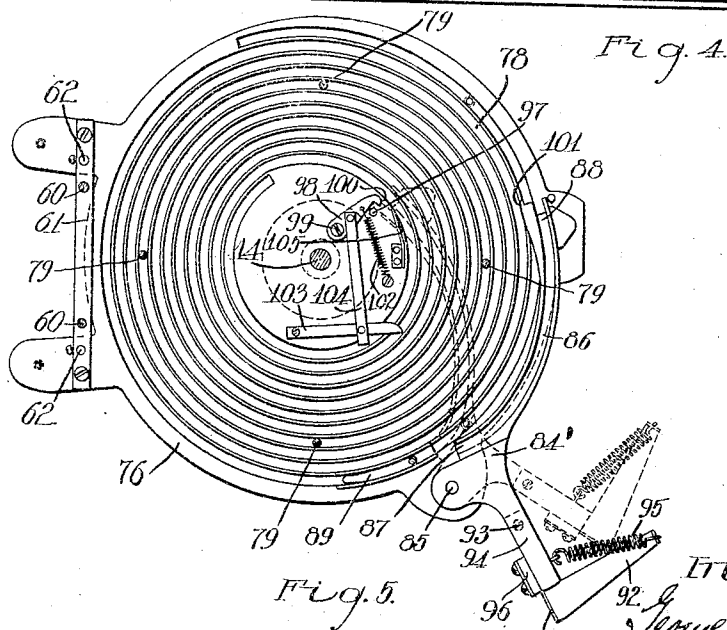


Fig. 5.

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4 SHEETS—SHEET 3.

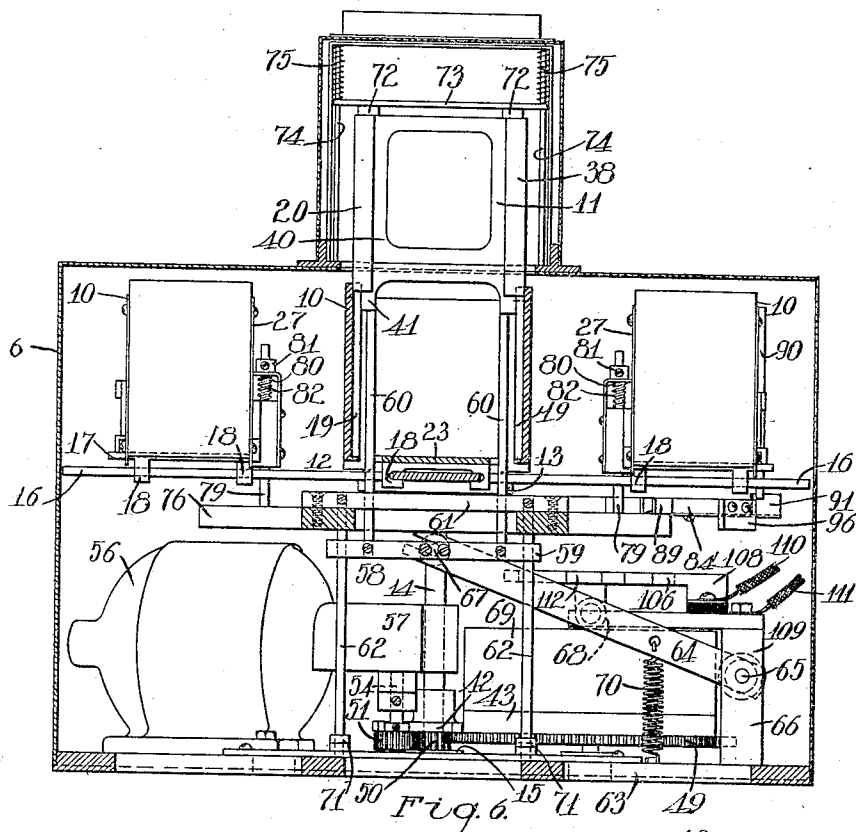
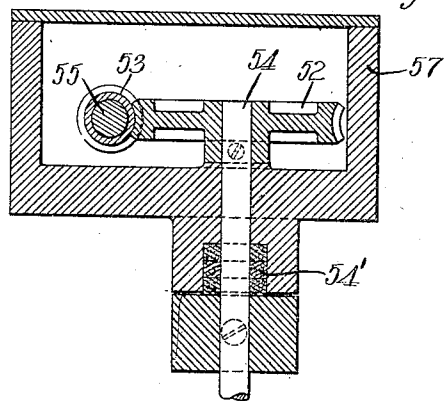


Fig. 7.

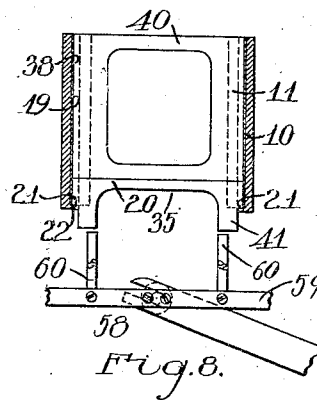


Fig. 8.

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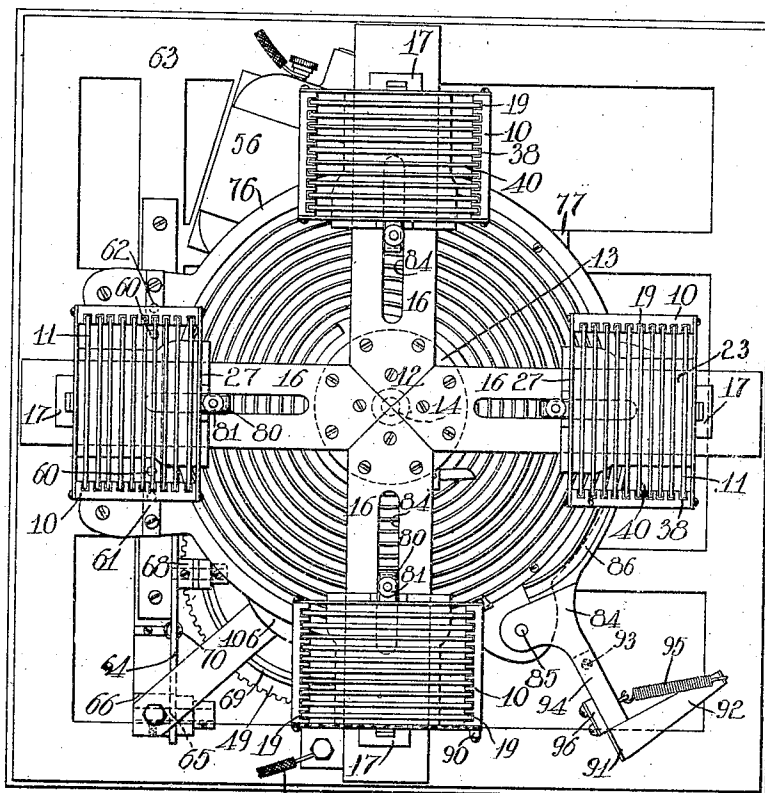


Fig. 10.

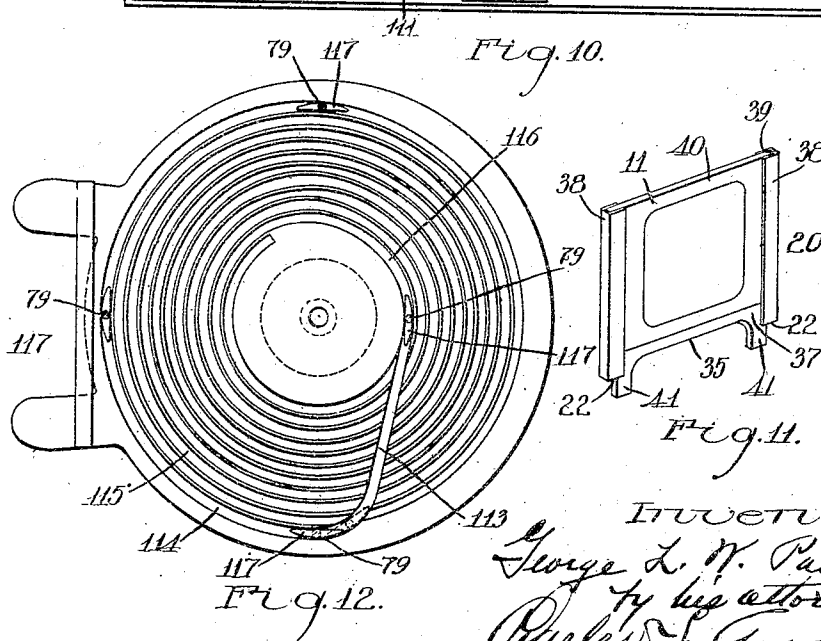


Fig. 11.

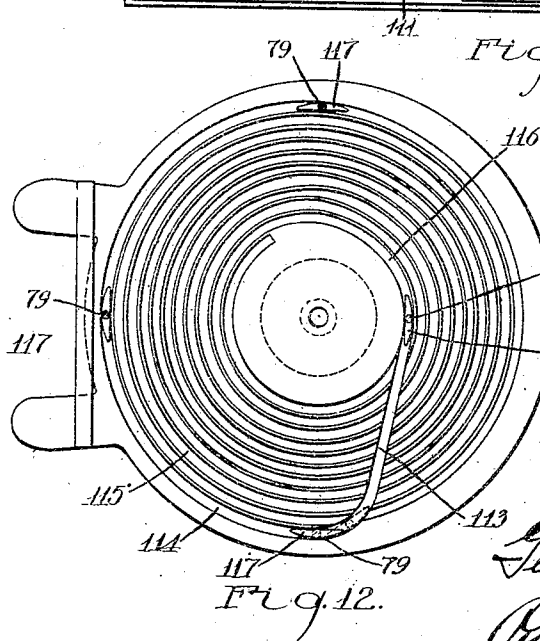


Fig. 12.

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# UNITED STATES PATENT OFFICE.

GEORGE L. W. PALMER, OF ROXBURY, MASSACHUSETTS.

## PROJECTING APPARATUS.

1,240,593.

Specification of Letters Patent. Patented Sept. 18, 1917.

Application filed July 17, 1916. Serial No. 109,612.

*To all whom it may concern:*

Be it known that I, GEORGE L. W. PALMER, a citizen of the United States, residing at Roxbury, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Projecting Apparatus, of which the following is a specification.

This invention relates to improvements in projecting apparatus.

The object of the invention is to provide a comparatively simple, automatic apparatus for displaying a series of transparencies and in repeating the display an indefinite number of times.

Another object of the invention is to provide an apparatus in which the transparencies may be removed and replaced by other sets during the operation of the apparatus and without in the least interrupting the sequence of the display.

Still another object of the invention is to provide instrumentalities for presenting the several transparencies to the projecting instrumentalities.

Still another object of the invention is to automatically return the transparencies to their initial positions, whereby the display may be repeated in the same order in which it was first presented.

The invention consists in the combination and arrangement of parts whereby the above objects and certain other objects hereinafter appearing, may be attained, as set forth in the following specification and particularly pointed out in the claims.

Referring to the drawings:

Figure 1 is a vertical section, with parts shown in elevation of a projecting apparatus embodying my invention.

Fig. 2 is a detail view of one of the transparency containers.

Fig. 3 is a perspective view of one of the slides for supporting the container.

Fig. 4 is a plan section taken on the line 4—4 of Fig. 1.

Fig. 5 is a plan view of the cam and switch for effecting the step by step advance and return of the transparency containers.

Fig. 6 is a section taken on the line 6—6 of Fig. 1.

Fig. 7 is a section taken on the line 7—7 of Fig. 4.

Fig. 8 is a detail vertical section through one of the containers illustrating a trans-

parency holder in elevation therein and the elevating means therefor shown in its operating alinement therewith.

Fig. 9 is a side view of the cam switch.

Fig. 10 is a plan view illustrating the instrumentalities for automatically presenting the transparencies to the projecting instrumentalities, the upper portion of the casing which incloses said instrumentalities and the projecting instrumentalities being removed.

Fig. 11 is a perspective view of a transparency holder with a transparency shown therein.

Fig. 12 is a detail view of a modified form of cam, with the cam followers shown in their respective positions in a groove thereof.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 1 designates the instrumentalities for producing luminous rays and in its present embodiment consists of an electric lamp 2 secured to a support 3 including an arm 4 which is adjustably mounted in a bracket 5 fast to a casing 6, said casing inclosing the entire apparatus. The light producing instrumentalities are arranged to cooperate with suitable lenses to project the luminous rays upon a screen, said lenses preferably embodying a condensing lens 7 and a projecting lens 8 disposed in proper alinement upon portions of the casing 6. The light producing and projecting instrumentalities are constructed and arranged in accordance with the construction usually followed in an apparatus of this nature.

The optical center of the lenses of this apparatus is shown at 9 and into this position the transparencies or slides are moved at certain intervals so as to intercept the rays of light passing through the lenses and result in the projecting of the image or images on said transparencies upon a screen not shown in the drawings.

As hereinbefore stated, the principal features of the invention comprise instrumentalities for automatically presenting the transparencies to the projecting instrumentalities or, in other words, for successively placing said transparencies in the position indicated at 9. The preferred manner of accomplishing this result is to provide a plurality of transparency containers, 10, 10 in which the transparencies 11 are arranged parallel with each other in said container

but the containers themselves are disposed about a common axis and revolved about said axis so as to aline with the axis of the rays of light said axis being indicated by the line A—A, Fig. 1.

The containers 10 are each detachably secured to a rotary member 12 preferably consisting of a supporting member 13 provided with a vertically disposed shaft 14 journaled in bearings 15, 15. A plurality of radial arms 16, preferably four in number, are secured to the member 13. A slide 17 is adjustably mounted upon each of the arms 16 to slide radially with respect to the axis of the rotary member 12, said slide having lugs 18, 18 which engage the radial arms 16 of said member 13.

The containers 10 are preferably of rectangular form with vertical grooves 19 formed in two opposed sides of said container and adapted to receive holders 20, each adapted to hold one transparency. The containers 10 are provided with ledges 21, 21 along the lower edges of the sides containing the grooves 19, said ledges engaging shoulders 22 on the holders 20, whereby said holders will be prevented from dropping through the bottom of the containers 10, the bottom of said container being otherwise open while the top of said container is entirely open to permit said holders to be inserted in the grooves 19. The lugs 18 of the slide 17 are attached to a horizontal plate 23 constituting the main portion of the slide 17.

At the inner end of the horizontal portion 23 is a vertically disposed member 24 constituting a stop for the rear end of the container 10. A pair of pins 25 project laterally from the face of the member 24 into holes 26 formed in the rear wall 27 of said container, said pins being adapted to prevent the displacement of the rear end of said container. The rear wall 27 and the front wall 28 of said container are recessed at 29 and 30 respectively to receive corresponding portions of the plate 23, so that when said container is slipped on to the slide 17 said recesses will properly position and guide said containers until the pins 25 thereof enter the holes 26.

At the forward or outer end of the horizontal plate 17 is a stud 31 having a notch 32 on its inner face provided to receive a hook 33 pivoted at 34 to the front wall 28 of the container after said container has been properly positioned on the slide 17. The hook 33 firmly locks said container to the slide 17 to prevent the displacement thereof when the transparencies contained therein are elevated to intercept the rays of light, but at the same time permits said container to be readily detached from the slide when it is desired to supply a new set of transparencies.

The transparency holders 20 are recessed at 35 and the front wall of the container is recessed at 36 so as to clear the stud 31 when said container is being placed upon the slide or removed therefrom. The holders 20 are of skeleton construction and preferably consist of a base 37 having upright members 38 provided with grooves 39 to receive a transparency 40. Opposite ends of the base 37 are shouldered at 22 as hereinbefore stated to engage the ledges 21 of the container 10 and directly within and adjacent to said shoulders are depending members 41 arranged to project slightly below the lower edges of the container 10. As previously stated, the containers 10 are revolved about the axis of the shaft 14 so as to aline the transparencies in said containers with the rays of light from the projecting devices.

The movement of the carrier 12 is preferably intermittent providing a rest during the projecting of the images on the transparencies. The mechanism for accomplishing the rotation of said rotary member preferably consists of a pair of intermittent gears, commonly known as Geneva gears, consisting of a driven member 42 and a driving member 43. The driven member 42 is provided with radial slots 44 preferably four in number to correspond with the number of containers 10. The portions of said driven member between said slots are concaved at 45 to correspond with the periphery 46 of the driving member 43, said periphery being circular in form.

The driving member in the present instance is adapted to rotate the driven member one quarter of a rotation for each complete rotation of said driving member, and for this purpose a pin 47 is located at the proper point and adjacent to the periphery 46 to enter the slots 44 in said driven member and thus rotate said member. The periphery of said driving member is recessed at 48 adjacent to the pin 47 to permit said driven member to be moved when in engagement with said pin, while the curved periphery engaging the concaved portions 45 of said driven member positively prevents the movement of said driven member when said pin is not in engagement therewith.

The pin 47 is attached to one face of the gear 49, said gear being attached to the driving member 43. A continuous rotary motion is imparted to the gear 49 through a pair of spur gears 50 and 51 and a worm gear 52 and a worm 53. The worm gear 52 and the spur gear 51 are attached to a counter shaft 54 and the worm gear 53 is attached to the arbor 55 of an electric motor 56. The worm 53 and the worm gear 54 are arranged within a casing 57 and completely inclosed, said casing being filled with lubricant, while the shaft 54 extends downwardly through suitable packing 54', the gear 51

being attached to the shaft outside of and preferably below said casing. The arrangement of the gearing just described is such that the rotary member 12 always comes to a stop with one of the containers alining with the luminous rays and with the transparencies therein out of the range of said rays, in other words below said rays, one of said transparencies being disposed in proper alinement with the optical center 9 of the lenses. It then remains for the transparency alining with said optical center to be moved from said container into a position to intercept said rays.

For this purpose a pusher or elevator 58 has been provided, said pusher preferably consisting of a frame 59 to which is secured a pair of vertically disposed rods 60, 60 arranged in alinement with the depending members 41 of the transparency holder alining with the optical center 9. The upper ends of the rods 60 terminate slightly below the ends of the depending members 41 so as to provide sufficient clearance to permit the carrier to be rotated without interference. The rods 60 reciprocate in a fixed guide member 61 and the frame 59 preferably slides upon fixed guide rods 62, 62 secured at their upper ends to the member 61 and at their lower ends in the base 63 of the apparatus.

A cam lever 64 is pivoted at 65 to a fixed bracket 66 mounted upon the base 63. The opposite end of said lever 64 engages the frame 59 at 67. A cam roll 68 is attached to said lever 64 and engages a cylindrical cam 69 secured with one end or edge on the gear 49 and adapted to rotate therewith, the roll 68 traveling on the upper end or cam edge to elevate the pusher 58 and thus move the holder and transparency alining with said pusher into intercepting relation with said rays, as illustrated in Figs. 1 and 6.

A spring 70 attached to said lever 64 returns said pusher to its normal position against buffers 71 which check the downward movement of said pusher and at the same time prevent any noise when said frame 59 reaches the end of its downward movement. As the holder containing the transparency is being elevated by the pusher 58 the upper edge of said holder is arranged to engage resilient buffers 72 attached to a cross-bar 73 arranged to slide on vertical rods 74.

Above said cross-bar 73 and encircling the rods 74 are springs 75 adapted to exert a slight resistance to the upward movement of said cross-bar, whereupon said holder will be firmly held against the upper ends of the elevator rods 60, while the pressure upon said holder also prevents any lateral movement of said holder when said holder is in its uppermost position and the greater portion thereof is out of engagement with the

guides of the container. The springs 75 also insure a quick return of said holders to the container when the cam lever 64 is retracted by means of the spring 70 by overcoming any tendency which might exist that would cause the holder 20 to stick and prevent it from dropping back into the container 10.

After a transparency has been moved to the position 9 where it intercepts the rays of light and the image thereon is projected upon the screen the next transparency in said container must be advanced to the same position and after the second transparency the third, and so on, until all of the transparencies therein have been shown upon the screen. To accomplish this result a step by step advance of the container takes place to successively aline said transparencies with the pusher 58. The advancement of said containers is automatic and the instrumentalities for accomplishing this result preferably embody a stationary cam 76 arranged beneath but in close proximity to the rotary member 12, said cam being mounted upon supports 77 extending upwardly from the base 63 of the apparatus.

In the upper face of the cam 76 is a spirally formed groove 78. Each of the slides 17 is provided at its inner end with a vertically disposed rod 79 adapted to reciprocate in guides 80, 80 carried by said slide. A collar 81 attached to said rod limits the downward movement of said rod and a spring 82 disposed between the bearings 80 and engaging a collar 83 fast to said rod exerts a yielding pressure downwardly on said rod. The lower end of said rod is extended downwardly through a slot 84 in the radial arm 16 and engages the cam 76 within said spirally formed groove and constitutes a follower, whereupon a movement of said slide and container radially with respect to said carrier is effected upon the creation of a relative movement between said carrier 12 and said cam.

The pitch of the spiral groove or the distance which the follower is advanced during one complete rotation of the rotary member 12 and the traveling of said follower through one complete convolution of said spiral is equal to the distance between successive transparencies in the containers 10. In the present embodiment each container is adapted to hold ten transparencies, therefore the cam must have ten complete convolutions as shown in Figs. 1 and 5. The step by step advance of said containers is from the inner portion of said groove to the outer portion thereof.

In the present arrangement forty transparencies may be projected upon the screen successively and automatically and when the apparatus is used as an advertising device it is often desirable to repeat the exhibition

an indefinite number of times. This must be automatic so as not to require the attention of the operator after the apparatus has been set into operation until it is desired to change the transparencies. To effect the transferal of the following 79 from the outer portion of the spiral groove to the inner portion thereof which is the starting point as hereinbefore stated, a switch 84' is provided, said switch being pivoted at 85 to the outer edge of the upper face of said cam. The switch 84' has a groove 86 in its upper face which groove is curved to aline with the outer portion of said spiral groove at 87 and with the inner portion of said spiral groove at 88, when said switch 84' occupies the dotted line position shown in Fig. 5, extending transversely of the intermediate portions of said spiral as shown in dotted lines, Fig. 5.

An incline 89 is arranged in the outer portion of said cam groove 79 at the point where it is desired to start the follower inwardly, said incline extending from the bottom of said groove to a point on the level with the end 87 of the groove in said switch, thus when the follower 79 engages said incline it is forced upwardly to the level of the bottom of the groove 86. The grooved portion of the switch 84' is normally positioned outside of the path of the follower 79 as indicated in full lines, Fig. 5, and to automatically place said grooved portion in its operative position as shown in dotted lines, the container containing the first transparency to be projected is provided with a depending finger 90 disposed so as to engage a projection 91 when the follower for the container having said finger is traveling in the outer portion of the spiral groove and is in contact with the incline 89.

The projection 91 is a part of the lever 92 pivoted at 93 to an arm 94 of said switch. A spring 95 normally retains said lever in contact with a stop 96 secured to the arm 94. The finger 90 engages the projection 91 and rocks said switch 84' upon its pivot until the free end of said switch engages a stop 97. The continued movement of said finger rocks the lever 92 about its pivot against the action of the spring 95 until said finger escapes from said projection, whereupon the spring causes said lever to return to its normal position against the stop 96. The switch 84' is maintained in its inner dotted line position as shown in Fig. 5, by means of a latch 98 pivoted at 99 to the upper face of the cam 76. The outer end of the latch 98 is rounded at 100 and so also is the outer end 101 of the switch 84'.

A spring 102 yieldingly retains the latch 98 against the stop 97 in a position to be engaged by the rounded portion 101 of the switch 84' when said switch is swung inwardly and thus automatically locks said

switch in its inner position. The switch is held by said latch until all of the followers in the series have been transferred to the inner portion of the cam groove. After all of said followers have been transferred to the inner portion of said groove the switch is automatically released by the operation of a lever 103 connected by a link 104 to the latch 98; said lever 103 projects over the portion of the groove which is traversed by the follower 79 of the first container in the series and is engaged by said follower which rocks the same upon its pivot and disengages the latch 98 from the end of the switch.

A spring 105 which is placed under tension by said switch when the same is moved into engagement with the latch 98 is adapted to move said switch outwardly during the movement of said latch so as to remove the end thereof from engagement with said latch. The switch 84' will be gradually pushed to its outermost position by the followers as they advance along the cam groove and until the finger 90 is moved outwardly from said groove far enough to engage the projection 91, whereupon said switch would again be swung inwardly and the followers transferred as before.

It is desirable that the rays of light be automatically turned on and shut off during the changing of the transparencies, therefore a switch has been provided which cooperates with the instrumentalities for changing the transparencies, said switch preferably embodying in its construction a disk 106 secured to the shaft 107 which extends upwardly from the gear 49 and driving member 43, said shaft 107 being preferably a continuation of the shaft constituting the pivot for said members 49 and 43 and arranged to rotate therewith.

A brush 108 is mounted upon a stationary portion 109 of the base 63 and is insulated therefrom. To the brush 108 is attached one wire including one terminal of the electric circuit including the light 2; the end of said wire being illustrated at 110. Another terminal is attached directly to the support 109 as shown at 111, the last mentioned wire being grounded through the frame and the shaft 107 to the disk 106. Consequently, when the brush 108 is in contact with the disk a circuit will be completed through the wires 110 and 111. To break said circuit at the proper time a notch 112 is provided in said disk which is of a sufficient length to permit the changing of the transparencies.

In Fig. 12 is shown a modified form of cam in which the switch 84' of the form illustrated in Fig. 5 is dispensed with and in its place a cross-groove 113 is provided which extends from the outer portions of the spiral groove 115 similar in form to

the spiral groove 78, to the inner portion 116 of said groove. The lower ends of the cam follower 79 are provided with elongated followers 117, said followers being of sufficient length to extend across the gaps formed in the spiral groove by the transverse or cross-groove 118, thus preventing said followers from being turned into said cross-groove until they have arrived at the outermost portion thereof.

This arrangement consists of an endless groove from which the followers are never removed but continue to travel from the inner portion outwardly step by step until all of the transparencies in each container have been projected, after which said followers are quickly transferred to the inner portions of the groove and the display of said series repeated.

During the operation of the apparatus hereinbefore specifically described, the first transparency in the first container of the series is thrown upon the screen; then the carrier is rotated one quarter of a turn and the first transparency of the second container of the series is projected; then the first transparency of the third container is presented and so on until the four containers have been alined with the rays of light.

During one complete rotation of the carrier which supports said containers, each container is advanced the distance between consecutive transparencies and after the first transparency in each of the containers of the series has been displayed then the second transparency in each of said containers will be displayed and so on in the proper order and sequence until the entire number of transparencies in the four containers have been displayed, after which the operation is repeated if desired or containers with new sets of transparencies may be inserted in their places and operated in the same manner.

While I have herein shown and described the preferred embodiment of my invention for the purpose of illustration, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts nor to the specific applications herein shown, but that extensive alterations may be made in the illustrated form and embodiment of the invention without departing from the principle thereof.

Having thus described my invention what I claim and desire by Letters Patent to secure is:

1. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a carrier constructed and arranged to rotate in a plane substantially parallel with the axis of said rays, a plurality of transparency containers mounted upon said carrier each adapted to hold a

lateral relation to said plane of the rays, means for rotating said carrier to successively move said containers into a plane of said rays, and means for moving the transparencies one at a time from said container into a position to intercept said rays.

2. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a carrier constructed and arranged to rotate in a plane substantially parallel with said rays, a plurality of transparency containers mounted upon said carrier each adapted to hold a plurality of transparencies, means for rotating said carrier to successively move said containers into a plane of said rays, means operated by the rotation of said carrier adapted to move each of said containers radially with respect to the axis of said carrier to successively present the transparencies in said container into a predetermined position relatively to said projecting instrumentalities, and means for moving the transparencies one at a time from said container into a position to intercept said rays.

3. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a rotatable carrier constructed and arranged to rotate in a plane substantially parallel with the axis of said luminous rays, means for supporting a plurality of sets of parallelly disposed transparencies on said carrier, mechanism for intermittently rotating said carrier to move each of said sets of transparencies into a plane of said luminous rays, and means constructed and arranged to move the transparencies of said set one at a time to intercept said luminous rays.

4. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a rotatable carrier constructed and arranged to rotate in a plane substantially parallel with the axis of said luminous rays, a plurality of containers each adapted to hold a plurality of transparencies in parallel relation, mechanism adapted to rotate said carrier to move each of said containers into a plane of said luminous rays, and mechanism for moving said transparencies one at a time from said container into a position to intercept said luminous rays.

5. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a rotatable carrier constructed and arranged to rotate in a plane substantially parallel with the axis of said luminous rays, a plurality of containers each adapted to hold a plurality of transparencies, mechanism adapted to rotate said carrier to move each of said containers into a plane of said luminous rays, a pusher adapted to aline with one of the transparencies in a container when said container is in a plane of said luminous rays, and means for operating said

pusher to engage a transparency and move the same from said container into intercepting relation with respect to said rays.

6. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a rotatable member constructed and arranged to rotate in a plane substantially parallel with the axis of said luminous rays, a plurality of containers, means adapted to rotate said member to move each of said containers into a plane of said luminous rays, a pusher adapted to aline with one of the transparencies in a container when said container is alining with said luminous rays, means for operating said pusher to engage the transparency alining therewith and for moving the same from said container into intercepting relation with said rays, and means for starting the return of said transparency to said container upon the withdrawal of said pusher.

7. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a rotary member, a plurality of transparency containers supported by said member, mechanism for rotating said carrier to move the several containers supported thereby into a plane of said luminous rays, a cam, followers coöperating with said cam adapted to move said containers radially with respect to the axis of said carrier, and means for moving the transparencies in the container lying in said plane of said luminous rays to intercept said rays.

8. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a rotary carrier, a plurality of transparency containers supported by said carrier, mechanism for rotating said carrier to move the several containers supported thereby into a plane of said rays, a stationary cam arranged adjacent to said carrier, means connected with said containers adapted to engage said cam during the movements of said carrier and move said containers radially with respect to the axis of said carrier, and means for moving the transparencies in the container lying in the plane of said luminous rays to intercept said rays.

9. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a rotary carrier, a plurality of transparency containers supported by said carrier, mechanism for rotating said carrier to move the several containers supported thereby with said rays, a stationary cam arranged adjacent to said carrier, said cam having a spirally formed groove, a follower connected with each of said containers adapted to project into said groove and affect the movement of said containers radially with respect to the axis of said carrier during the rotation of said carrier, and means for moving the transparencies in the

container lying in the plane of said luminous rays to intercept said rays.

10. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a rotary carrier, a plurality of transparency containers supported by said carrier, mechanism for rotating said carrier to move the several containers supported thereby with said rays, a cam adapted to coöperate with said carrier during the rotary movements thereof to effect a step by step movement of each of said containers radially with respect to the axis of said carrier, and means for moving the transparencies in the container lying in the plane of said luminous rays to intercept said rays.

11. An apparatus of the class described having, in combination, a movable container adapted to hold a plurality of transparencies, a cam provided with a spirally arranged groove, means for creating a relative revolving movement between said cam and said container, means connected with said container adapted to project into said groove and effect a step by step movement of said container radially of said cam during said relative revolving movement to successively advance the transparencies carried thereby into a display position, and means for automatically effecting the return movement of said container radially with respect to said cam.

12. An apparatus of the class described having, in combination, a rotary member, means for rotating said member, a plurality of slides supported on said member to move radially relatively to the axis thereof, a container detachably mounted upon each of said slides, means for imparting a step by step radial movement to said slides, and means for returning said slides to their initial positions.

13. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a container adapted to hold a plurality of transparencies in parallel relation, a cam provided with a spirally arranged groove, a follower adapted to be moved by said cam to effect a step by step advance of said container to successively move the transparencies carried thereby into a predetermined position with respect to said luminous rays, means for moving the transparency occupying said predetermined position to intercept said rays, and means for returning said container to its initial position.

14. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a container adapted to hold a plurality of transparencies in parallel relation, a cam provided with a spirally arranged groove, a follower traveling in said groove from one end thereof to the other adapted to effect a step by step advance of

said container, whereby the transparencies carried thereby may be successively moved to a predetermined position relatively to said rays, and means for automatically returning said follower to the opposite end of said groove, whereby the step by step advance of said container may be repeated.

15. A projecting apparatus having, in combination, instrumentalities for projecting luminous rays, a plurality of transparency containers disposed about a common axis, mechanism for revolving said containers about said axis whereby said containers may be presented one at a time into alinement with said luminous rays, means rendered operative by the revolving movements of said containers adapted to effect a step by step advance of said containers to move the transparencies carried thereby successively into a predetermined position with respect to said luminous rays, means for moving the transparency alining with said position from said container into a position to intercept said luminous rays, and means operated by the revolving of said containers adapted to automatically return said containers to their initial positions with respect to said common axis whereby the step by step advance of said container may be repeated.

16. In an apparatus of the class described, a rotary member, a plurality of transparency containers mounted upon said rotary member and movable radially with respect thereto, a stationary cam provided with a spirally arranged groove, a follower extending from each of said containers into said groove, means for imparting an intermittent rotary motion to said rotary member relatively to said cam to effect a step by step advance of each of said containers, and a switch mounted above said cam adapted to be automatically moved by one of said containers into a position above and extending transversely of the groove of said cam, said switch being constructed and arranged to transfer said followers from one portion of said groove to the other, whereby the step by step advance of said containers may be repeated.

17. In an apparatus of the class described, a rotary member, a plurality of transparency containers mounted upon said rotary member to move radially with respect to the axis of said rotary member, a cam provided with a spirally formed groove, a follower connected with each of said containers adapted to project into said groove, means for rotating said rotary member relatively to said cam to effect a step by step movement of said containers relatively to the axis of said rotary member and to successively move said containers into a predetermined position, a switch constructed and arranged to transfer said followers from one end portion of said cam groove to the other end portion thereof,

means carried by one of said containers adapted to move said switch into its transferring position when said followers reach a predetermined position in said groove, means adapted to hold said switch in said transferring position, and means for automatically releasing said switch after all of said followers have been transferred.

18. A projecting apparatus having, in combination, a lens, instrumentalities for projecting rays of light through said lens, a rotary member provided with a plurality of radial arms adapted to revolve in a plane substantially parallel with said rays of light, a slide mounted upon each of said arms, a transparency container detachably mounted upon each of said slides adapted to contain a plurality of transparencies, means for intermittently rotating said rotary member to successively move said containers into a position beneath and alining with said rays of light, means constructed and arranged to move said containers radially on said arms to successively aline the transparencies carried thereby with the optical center of said lens, and means for elevating the transparency alining with said optical center into a position to intercept said rays of light.

19. A projecting apparatus having, in combination, a lens, instrumentalities for projecting rays of light through said lens, a rotary member provided with a plurality of radial arms adapted to revolve in a plane substantially parallel with said rays of light, a slide mounted upon each of said arms, a transparency container detachably mounted upon each of said slides adapted to contain a plurality of transparencies, means for intermittently rotating said rotary member to successively move said containers into a position beneath and alining with said rays of light, means constructed and arranged to move said containers radially on said arms to successively aline the transparencies carried thereby with the optical center of said lens, means for elevating the transparency alining with said optical center into a position to intercept said rays of light, and a switch adapted to automatically shut off and turn on said rays of light.

20. A projecting apparatus having, in combination, a lens, instrumentalities for projecting rays of light through said lens, a rotary member provided with a plurality of radial arms adapted to revolve in a plane substantially parallel with said rays of light, a slide mounted upon each of said arms, a transparency container detachably mounted upon each of said slides adapted to contain a plurality of transparencies, means for intermittently rotating said rotary member to successively move said containers into a position beneath and alining with said rays of light, means constructed and arranged to move said con-

ainers radially on said arms to successively align the transparencies carried thereby with the optical center of said lens, means for elevating the transparency alining with said optical center into a position to intercept said rays of light, and means for substantially shutting off said rays of light previous to the movements of said transparencies and turning on said rays of light after said transparencies have been moved into a position to intercept said rays of light.

21. A projecting apparatus having, in combination, a lens, instrumentalities for projecting rays of light through said lens, a container adapted to hold a plurality of transparencies in parallel relation, a cam provided with a spirally arranged groove, a follower connected with said container adapted to yieldingly engage said cam within said groove, mechanism for creating a

relative movement between said container and said cam to effect a step by step advance of said container, whereby the transparencies therein may be successively moved into alinement with the optical center of said lens, means for moving the transparency in said container from said container into a position to intercept said rays of light, and means for lifting said follower from said groove and transferring the same to the opposite end portion thereof, whereby the step by step advance of said container may be repeated.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE L. W. PALMER.

Witnesses:

CHARLES S. GOODING,  
SYDNEY E. TAFT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."