Oct. 11, 1927. 1,645,204

P. A. NOTHSTINE

PICTURE PROJECTING MACHINE

Filed June 29, 1923 4 Sheets-Sheet 1

Fig. 1

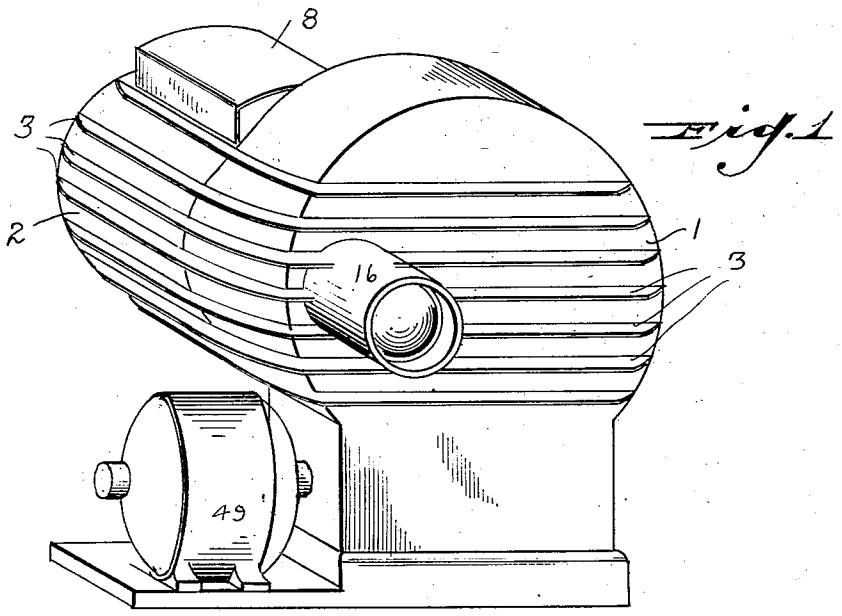
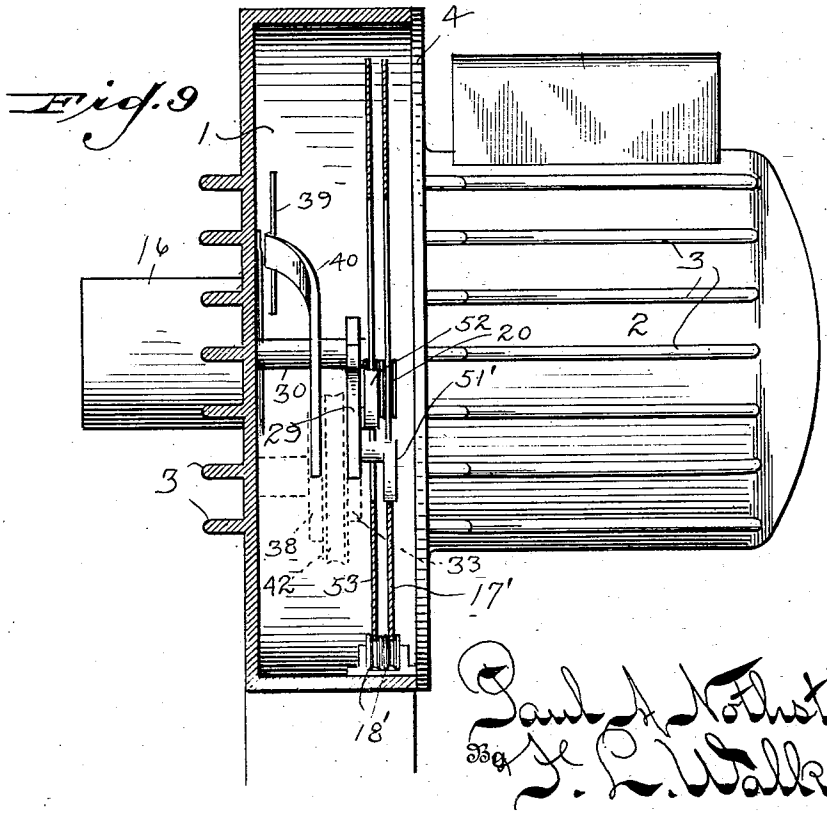


Fig. 2



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P. A. NOTHSTINE

PICTURE PROJECTING MACHINE

Filed June 29, 1923 4 Sheets-Sheet 2

Fig. 2

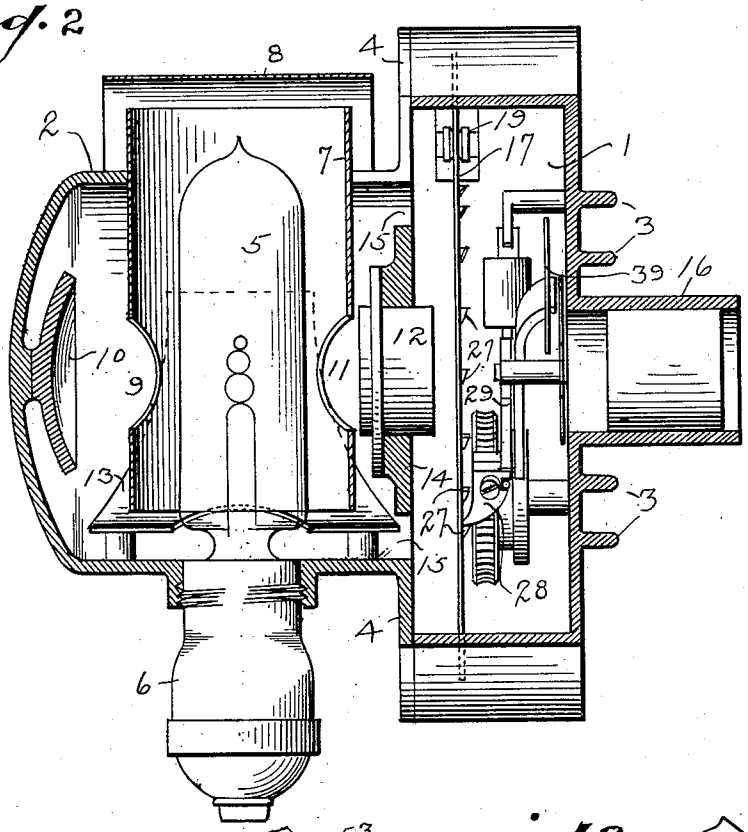


Fig. 7.

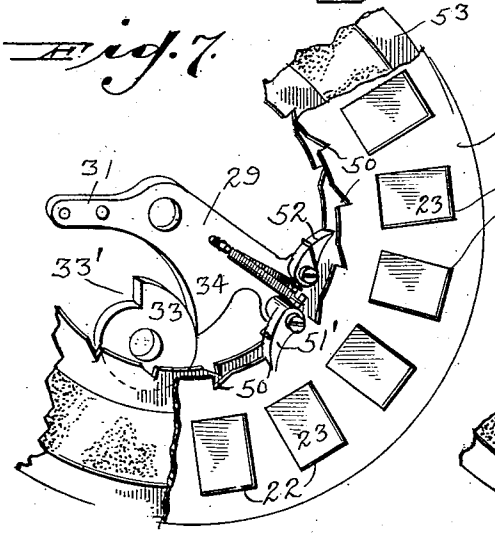
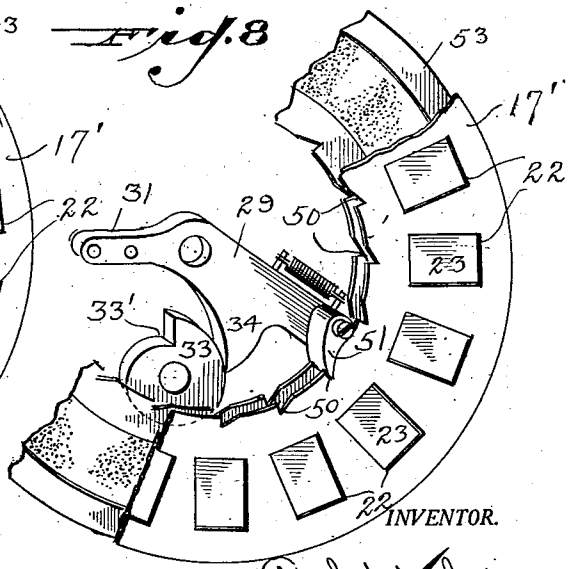


Fig. 8



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PICTURE PROJECTING MACHINE

Filed June 29, 1923 4 Sheets-Sheet 3

Fig. 3

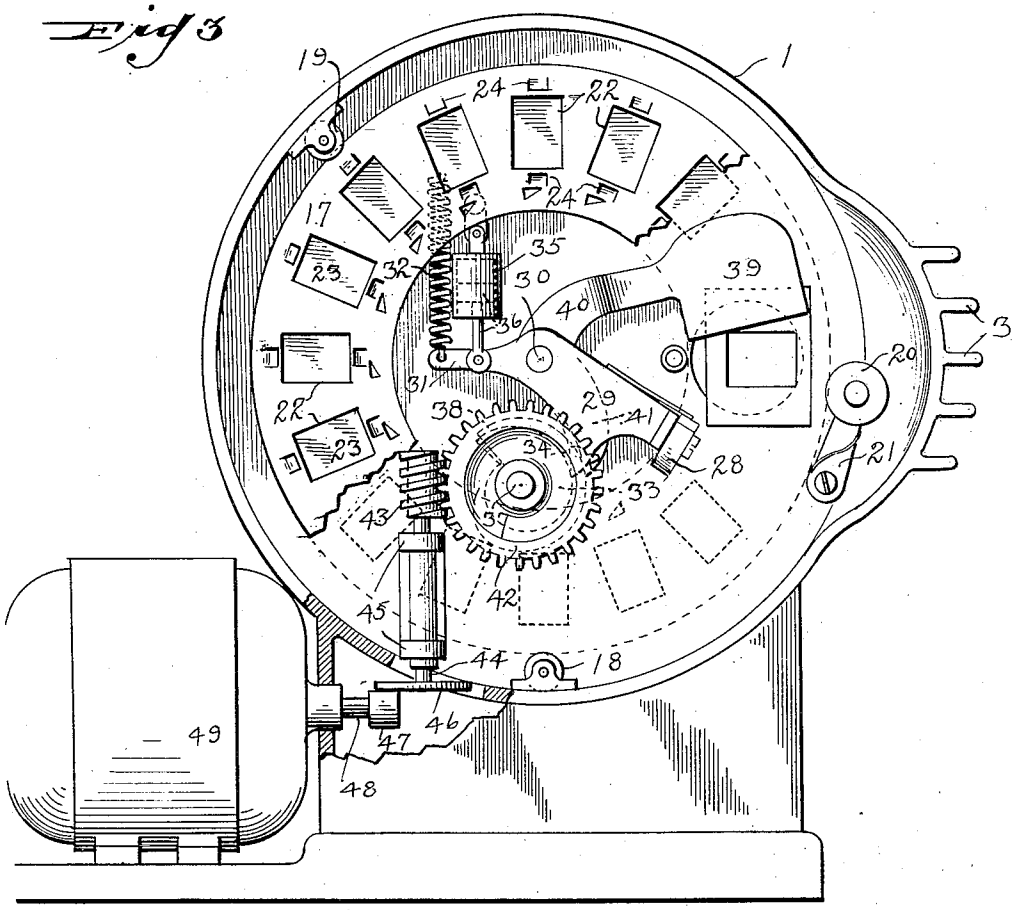


Fig. 5

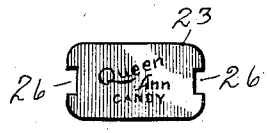


Fig. 4.

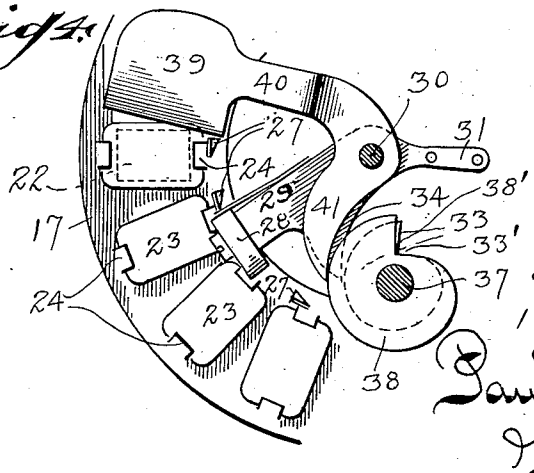
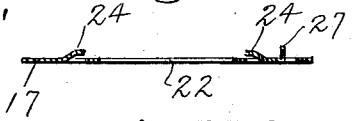


Fig. 6



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PICTURE PROJECTING MACHINE

Filed June 29, 1923 4 Sheets-Sheet 4

Fig. 10

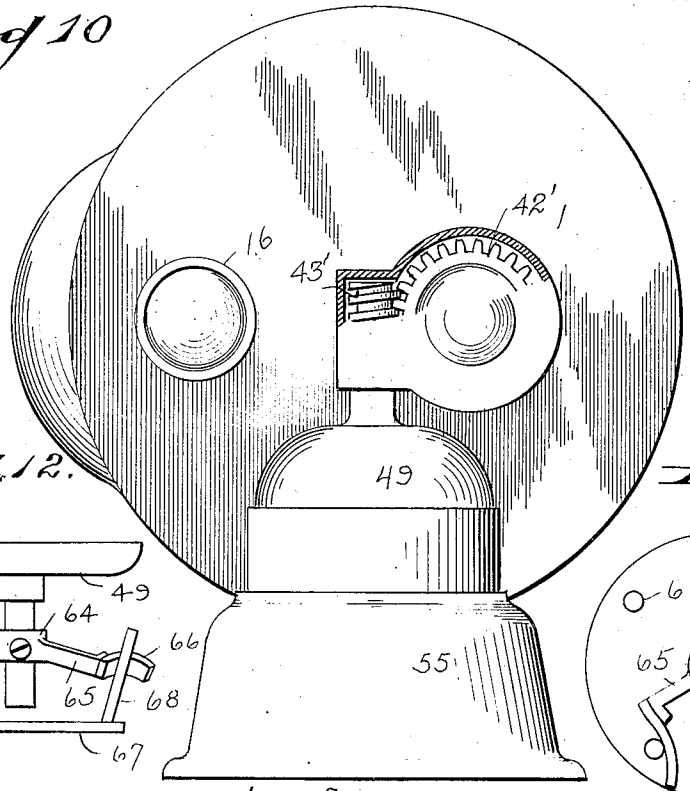


Fig. 12.

Fig. 13

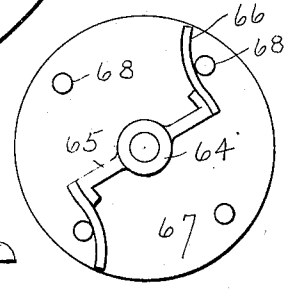
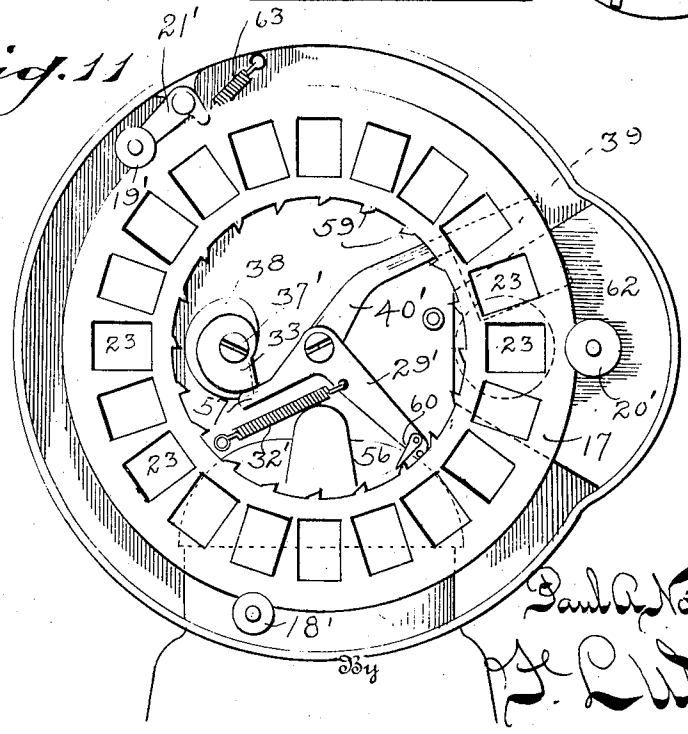


Fig. 11



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Patented Oct. 11, 1927. 1,645,204

UNITED STATES PATENT OFFICE.

PAUL A. NOTHSTINE, OF DAYTON, OHIO.

PICTURE-PROJECTING MACHINE.

Application filed June 29, 1923. Serial No. 648,416.

My invention relates to optics and more particularly to a projecting lantern for automatically displaying upon a screen a repetitious program of enlarged pictorial illustrations, reading matter, advertisements and the like.

The invention contemplates a projecting apparatus of the magic lantern type as distinguished from cinematographic projections, wherein a continuous succession of transparencies upon either an endless belt or revoluble disc carrier are successively projected, the transparency carrier being intermittently advanced through step by step movement. In the present embodiment the miniature transparencies are detachably and interchangeably mounted upon the carrier to which movement is imparted by a pawl and ratchet mechanism. In the present instance, the actuating pawl has direct engagement with ratchet teeth upon the transparency carrier to intermittently advance the same under the influence of a constantly operating driving motor. The transparencies are employed either in combination with or independent of a color screen, likewise advanced by the pawl and ratchet movement, but out of time with the movement of the transparencies whereby the color or tinge of the displayed matter may be varied. The carrier disc is mounted upon peripheral guide rollers in such manner as to be readily removable for the substitution of a different carrier and the moving power is applied in such way as to minimize the tendency for overthrow due to acquired momentum. An automatic shutter operates quickly to its cut-off position when the transparency is to be advanced, but is retracted quite slowly in relation with its cut-off movement.

The object of the invention is to simplify the structure as well as the means and mode of operation of automatic projecting apparatus, whereby it will not only be cheapened in construction, but will be more efficient in operation, uniform in action, automatically controlled and unlikely to get out of repair.

A further object of the invention is to provide an improved form of step by step actuating mechanism, for the traveling transparency, which will be simple but efficient, having minimum number of parts and eliminating tendency for overthrow.

A further object of the invention is to provide a step by step operating mechanism having direct engagement with the transparency carrier, and capable of continuous operation for long periods of time without attention.

A further object of the invention is to provide means for combining with changeable display transparencies a variable color screen, by which the monotony of a repetitious program may be relieved through constantly changing color combinations, with the projected matter.

A further object of the invention is to provide an improved form of cut-off shutter operable at different speeds in its different directions of movement.

A further and important object of the invention is to provide an improved form of mounting the traveling transparency carrier.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation or their equivalents as hereinafter described and set forth in the claims.

Referring to the drawings, Fig. 1 is a perspective view of the assembled projecting device forming the subject matter hereof. Fig. 2 is a longitudinal sectional view on the axis of the lamp housing and projecting lens. Fig. 3 is an interior view or rear elevation looking forwardly and illustrating the step by step actuating mechanism for the traveling transparency. Fig. 4 is a detail view of the motion transmitting means illustrated in Fig. 3, but viewed in reverse direction. Fig. 5 is a detail view of one of the transparencies removed from the carrier. Fig. 6 is a transverse sectional view, through the transparency carrier on line 6—6 of Fig. 4. Fig. 7 is a detail view of the pawl and ratchet actuating means, wherein the actuator is of duplex form, for actuating the transparency for movement in one direction and actuating a complementary transparency or color screen during its return movement. Fig. 8 is a modification of the actuating means wherein the transparency carrier and color screen or complementary transparency are operated in unison in the same direction. Fig. 9 is a vertical sectional view illustrating the relation of the double disc transparencies and the actuating means shown in Fig. 7. Figs. 10 and 11 are front and reverse views respectively, illustrating further modifications of the op-

erating mechanism. Figs. 12 and 13 are detail views of a modified form of feed governor.

Like parts are indicated by similar characters of reference throughout the several views.

The projection lantern herein shown and described is designed primarily as an automatic advertising device for use in hotels and public buildings, for announcing train schedules and directions, window display purposes, and other purposes of analogous character. However, it is readily adaptable for educational purposes, for displaying a succession of correlated pictures, reading matter and the like. The operating and projecting mechanism is mounted in a compact housing or casing, comprising a circular projection chamber 1, from which extends rearwardly and in eccentric relation therewith a substantially cylindrical lamp housing or illumination chamber 2. For the purpose of heat radiation, the housing which is preferably though not necessarily of metal, is provided with exterior radiating fins 3. The lamp housing 2 is formed integral with the rear wall 4 of the projection chamber 1, to which it is detachably connected by screws, clamps or other locking means.

Located within the lamp housing or illumination chamber 2 is an electric bulb 5, mounted in a standard lamp socket 6, screw threaded in a flanged opening in the bottom of the lamp housing. For ventilating purposes, the lamp bulb is surrounded by a chimney 7, surmounted by a hood or cowl 8. At its rear side the chimney is provided with an opening 9, registering with a reflector 10 secured to the rear wall of the lamp housing. The chimney is provided with a second opening 11 diametrically opposite the opening 9, and registering with a pair of condensing lenses 12, through which the light is projected forwardly from the lamp bulb 5 and reflector 10. For ventilating purposes and to induce circulation of air within the lamp housing by which the walls are kept reasonably cool, there is provided an arcuate or semi-circular shield 13, arranged transversely within the lamp housing and in spaced relation with the walls thereof.

The condensing lenses 12 are mounted in a supporting ring 14, supported concentrically in relation with the lamp housing by radially disposed arms or lugs whereby there is afforded a substantially annular ventilating opening 15, about the periphery of the lens mounting ring 14.

Projecting from the forward wall of the projecting chamber 1 is a hub or sleeve 16, for the projection lenses. This hub or sleeve 16 is eccentrically positioned in relation with the chamber 1, but is axially alined with the lamp housing and with the reflector and condensing lenses.

The matter to be projected, whether of pictorial character or reading matter consists of a succession of independent detachable and interchangeable transparencies of miniature form, arranged in an endless succession upon a rotary disc carrier 17. This carrier is mounted for rotary movement upon grooved rollers 18 and 19 secured to the interior of the housing, with which the periphery of the disc is held in engagement by a third roller 20, carried upon a spring actuated oscillatory arm 21. The construction and relation of the guide rollers is such that upon the retraction of the swinging arm 21 against the tension of its spring, the transparency carrier 17 may be readily disengaged from the supporting and guide rollers 18 and 19. The spring arm 21 causes the roller 20 to bear upon the periphery of the carrier with sufficient pressure or tension to insure the retention of the engagement of such transparency carrier 17 with its guide rollers while still allowing it to rotate reasonably free under the influence of the step by step actuator. As the transparency carrier 17 is advanced the supporting rollers 18, 19 and 20 will rotate thereby minimizing friction. The tension or bearing of the roller 20, however, will afford a slight braking effect, to prevent overthrow or acquired momentum of the carrier. The carrier 17 is preferably constructed of quite light sheet metal and is annular in form. That is to say, is provided with a central circular opening of comparatively large diameter. The annular carrier is provided with a succession of spaced apertures 22 which serve to frame the miniature transparencies 23. These transparencies 23 are of mica, glass or other transparent material to which the illustration or reading matter is applied. The matter to be projected may be applied to such transparency by any suitable means. However, the preferred method is to coat such transparencies with a photographic emulsion and photograph or print prepared display signs or pictorial illustrations on to such transparencies in reduced form. These transparencies may be colored by stains or transparent colors such as are ordinarily employed in producing colored lantern slides. However, in lieu of coloring the slides directly, a preferred method is to employ such slide in conjunction with a variable color screen as will be hereafter described. As a simple and inexpensive method of detachably engaging the transparencies with the carrier, the latter is provided with oppositely disposed tongues or lugs 24, contiguous to the opposite edges of the framing apertures 22. These tongues or lugs 24 are formed by projecting small areas of the sheet metal

comprising the disc carrier, laterally out of the main plane of the disc, as shown in Fig. 6, thus enabling the margins of the detachable transparencies 23 to be introduced beneath such lugs or tongues. To secure the transparencies 23 against displacement, the margins of the transparencies are provided with notches 26, which register with the tongues or lugs 24 upon the carrier. That is to say, the notched margins of the transparencies straddle the outturned lugs or tongues 24, which overhang the inner edges of the notches to a slight degree. By buckling or bending the transparency 23, its notched ends are readily engaged beneath or removed from the retaining tongues or lugs 24. Located inwardly in relation with the circular series of apertures 22, and concentric therewith, is a series of triangular tongues 27, formed from the material of the carrier and projected substantially perpendicular to the plane of such carrier, thereby forming a circular succession of integral ratchet teeth on lateral face of the carrier. The teeth 27 of the carrier are successively engaged by a pawl 28 upon the extremity of an oscillatory actuator arm 29, pivoted upon the stud 30, centrally disposed in the forward wall of the housing. The actuator arm 29 is provided with an extension 31 to which is connected the spring 32, which actuates the arm 29 to move the transparency carrier when permitted to do so by the rotation of the control cam 33. The actuator control cam 33, is peripherally engaged by an extension or finger 34, of the actuator arm, and is so shaped that when the cam reaches a predetermined point in its rotation the actuator arm 29 is projected forwardly quite suddenly, under the influence of its spring 32, and carrying with it the transparency carrier 17. To govern and cushion the stroke of the actuator 29, in order that momentum may not be imparted to the transparency carrier sufficient to effect an overthrow, the extension 31 of the actuator is connected to a dash pot or governor cylinder 35. This cylinder is supported on a suitable stud, projecting from the wall of the housing. The piston 36 is connected to the actuator extension 31, and extends within the cylinder 35, which it fits rather loosely, permitting a limited amount of air leakage about the periphery of the piston. It is obvious that a pin hole port or breathe hole in the cylinder 35 permitting slow escape of the air as the piston enters the cylinder under influence of the spring 32, would accomplish the same result and be the equivalent of the leakage of air about the piston. This dash pot construction or piston governor regulates the movement of the transparency carrier, by retarding the movement of the actuator arm 29 when the finger or extension 34 drops into the notch 33′ of the cam. The cam 33 is of evolute form, causing the actuator arm 29 to be gradually restored or retracted preparatory to its next stroke, after having dropped more or less quickly into the notch or recess 33′ of the cam. The cam 33 is mounted upon a stud 37, which also carries adjacent to the cam 33 and concentric with said cam, a second cam member 38. This cam 38 controls an oscillatory shutter 39, carried by an arm 40, pivoted upon the main stud 30, and having an extension or arm 41, riding upon the periphery of the cam 38. The cam 38 is concentric throughout the greater portion of its periphery, thereby holding the shutter 39 stationary in its elevated or inoperative position. Like the cam 33, the shutter car 38 is notched or recessed at 38′. The arm or extension 41 of the shutter arm 40 rides upon the periphery of the cam 38 until it drops within the notch 38′, upon rotation of the cam, which permits the shutter 39 to fall by gravity across the field of the lens, or into registry with the projecting position of the transparency. The shutter cam 38 is set or timed slightly in advance of the actuator cam 33. By this relation of the cams, the shutter 39 is dropped to its operative position, cutting off the projection just before the actuator arm 29 begins to move the transparency to present the next succeeding transparency of the series in projecting position. The shutter cam 38 is so shaped as to recover or retract the shutter more quickly than the retraction of the actuator arm 29. However, the retraction of the shutter 39 will be comparatively slow in relation with its movement into operative position. The shutter drops quite suddenly to cut off the projection when the arm or extension 41 passes into the notch or recess 38′ of the control cam. The shutter is then retracted more slowly through a limited portion of the rotation of the cam and is maintained in its elevated or inoperative position through the greater portion of the cam rotation or cycle period. The cams 33 and 38 are interconnected one with another for rotation in unison, and are in turn connected with a worm gear 42, mounted upon the stud 30 concentric with the cams. This worm gear 42 is driven by the worm 43, carried by the shaft 44 upon a suitable bearing 45, in the housing 1. At its lower end the shaft 44 carries a friction drive wheel 46, engaged by a driving drum 47 upon the armature shaft 48 of a driving motor 49. The motor 49 drives the shaft 44 and worm 43, continuously, thereby rotating the worm wheel 42, and the control cams 33 and 38 in unison. This continuous movement is translated into intermittent movement of the transparency carrier and the shutter, as the peripherally riding extensions 34 and 41 drop into the respective notches 33′ and 38′.

As the actuator arm 39 is retracted by the continued rotation of the evolute cam 33, the actuating pawl 28 will ride idly over the next ratchet tooth 27, which it will operatively engage to move the transparency disc, upon its succeeding operating stroke.

In lieu of providing the projecting tines or teeth 27 upon the lateral face of the transparency carrier 17, to be engaged by the pawl 28, the ratchet teeth may be provided upon the inner circumference of the annular transparency carrier, by providing a series of internal notches or saw teeth, shown at 50 in Fig. 8. The construction shown in Figs. 7 and 8, facilitates the employment of multiple transparencies to be moved either in unison or alternately to afford different scenic effect, optical illusion, and novelty effects of projection. While in the construction previously described, the actuating pawl 28 is mounted transversely in relation with the plane of oscillation of the actuator arm 29 in order that the pawl 28 may engage the laterally projecting teeth 27 of the carrier, in the construction shown in Fig. 8, the actuating pawl 51 performs its functions in a plane parallel with that of the actuation arm and transparency carrier. By providing a plurality of grooved guide rollers 18, 19 and 20, arranged side by side for the employment of a plurality of transparency discs, such discs may be employed in multiple. For instance a succession of transparencies of scenic character or pictorial views, may be employed in combination with a second carrier having a succession of lettered or advertising transparencies, by which the projection of one transparency might be imposed upon the reproduction of the other to afford novel screen effects. These multiple transparencies being located closely adjacent, one to the other, and operated by a single pawl 51, which in such case is made sufficiently broad to simultaneously engage two or more of such transparencies arranged in proximate relation to each other. In lieu of operating the transparency screens in unison and in the same direction, each of two such screens may be advanced intermittently in opposite directions by providing ratchet teeth 50 of the respective carrier in reverse relation and providing upon the actuator arm 29, a second pawl 52, turned in direction opposite to that of the pawl 51, as shown in Fig. 7. In such construction, the main transparency carrier 17′ will be advanced in the normal direction of movement as the actuator arm 29 performs its operative stroke when released by the control cap 33. During such movement, the second pawl 52 will ride idly over the ratchet teeth 50 of the second transparency carrier 53. However, upon the return or retractive movement of the actuator arm 29, the pawl 52 engaging with the teeth 50 of the second transparency carrier 53, will advance such carrier a like step in the reverse direction. In such construction, the second transparency carrier 53 is preferably a color screen of a mottled character, wherein the different color areas blend or merge one to another. The effect of such moving mottled color screen would be to cause a constantly changing appearance of the advertising matter or other material projected upon the display screen. Such color changing feature would not only tend to attract attention and hold the interest of an observer, but would also relieve the monotony of the repetitious program. Such multiple transparency feature affords possibility of endless change and variation of program.

The construction illustrated in Figs. 10 and 11 differs from that in the preceding figures in that the driving motor is directly connected with the cam shaft by means of the worm drive, without the intermediary of the friction disc and drum. The actuating cams have been shifted to a different position in relation with the center of oscillation of the actuator arm and shutter arm and operate upon these arms at the opposite side of said pivotal center from that shown in the preceding figure. The releasable guide roller for the transparency carrier is differently located to insure the transparency being maintained in its proper plane during the projection period.

Referring to Figs. 10 and 11, the driving motor 49 is shown upended and seated in the base or pedestal 55, which projects forwardly beyond the front of the projection chamber 1, the wall of the projection chamber being indented as at 56 Fig. 11 to accommodate the rear side of the motor. The driving worm 43′ is carried directly upon the armature shaft of the motor and engages with the worm gear 42′ upon the rotary cam shaft 37′, which carries the cams 33 and 38. The worm drive is enclosed in a compartment or hollow boss projecting forwardly from the wall of the projection chamber.

Whereas the preceding figures show the actuating arm and shutter arm as levers of the third class, in Fig. 11 these members are shown as levers of the first class. The operating cams 33 and 38 have been shifted from a position below the center of oscillation to one in horizontal relation therewith and these cams engage arms or tails 57 of the actuating lever 29′ and shutter arm 40′.

In the present instance, the actuating arm cam 33, is shaped slightly different from that in the preceding figures, so that it retains slight control of the actuating arm 29′ during its operative stroke. To this end the shoulder or offset of the evolute cam is not so abrupt as that shown in preceding figures, but the releasing portion of the cam

is directed at a slight inclination to the radius so that the tail 57 of the actuating arm does not drop free of the cam, but the arm is permitted to move forward only as the cam rotates. The spring 32′ is connected directly to the actuating arm 29′, and serves to oscillate the arm when permitted to do so by the rotation of the control cam 33. With the exception noted, the shutter arm 40′ operates exactly as before described. The inner circumference of the transparency disc or carrier is provided with marginal triangular teeth 59, in lieu of the notches 50, previously described. These teeth 59 are engaged by a pawl or pivoted finger 60, carried by the end of the actuator arm 29′ to advance the carrier disc at each oscillation of the arm. This actuating pawl 60 is supported free of that portion of the carrier margin intermediate the teeth 59, by the pin 61 upon the arm 29′. Thus the pawl finger 60 engages only the projecting teeth 59 and during its retrograde movement and its initial advance into engagement with the tooth, it is not permitted to ride upon the inner marginal edge of the carrier. The purpose of this is not only to avoid wear but also to prevent any frictional retraction of the carrier and particularly to prevent the pawl from engaging with a burr or any slight roughness of the carrier margin, which might effect an untimely movement of the carrier disc.

Coincident with the projecting position, there is stationarily mounted in the housing 1, a mask or framing plate 62, having an aperture therein, with which the transparencies 23 to be projected are registered at each operation. A corresponding framing plate or mask is also found in the construction shown in preceding figures. However, in the present instance, a guide roller 20′ is mounted upon a fixed pivot upon this plate 62, and engages the peripheral edge of the carrier disc 17. The carrier guide roller 19′ in the present instance is mounted upon an oscillatory lever 21′, actuated by the spring 63 to facilitate the engagement and disengagement of the carrier disc with the guide rollers. The location of the yielding roller 19′ at a point removed from projecting position and the substitution of the roller 20′ upon a stationary trunnion stud in lieu of the swinging arm shown in the preceding construction insures the maintenance of the disc and transparencies in predetermined plane during the projection period. Otherwise any undue looseness or side play of the swinging arm 21 might permit the transparency to be moved to and fro out of focus.

The several guide rollers for the carrier disc are preferably though not necessarily made of bakelite or other phenolic condensation material and for the purpose of lubrication, are charged with graphite. Such phenolic condensation material will not readily change with different temperature or moisture conditions, and has wear resistant qualities which well adapt the material for this purpose.

In order to insure uniformity of the speed of the driving motor 49, a simple form of governor may be provided such as shown in detail in Figs. 12 and 13. This speed regulator or governor device is located on the lower end of the armature shaft and within the base 55 (Fig. 10). It consists of a collar head 64 carrying integral radial arms 65 attached to the ends of which are short lengths 66 of raw hide, leather or other flexible frictional material. Located on a base plate 67 and concentric with the armature shaft and rotating arms 65 is a series of pins or studs 68 located just beyond the circular path of the ends of the arms 65. These pins or studs 68 may be parallel with each other and with the axis of rotation of the governor but are preferably slightly inclined to each other and to the axis of rotation. The centrifugal influence as the governor arms 65 rotate tends to flex the leather or raw hide strips or fingers outwardly beyond the studs or pins 68 so that these flexible fingers have a wiping contact. An increase of speed throws the flexible fingers outward to greater degree causing them to partially wrap about the studs or pins 68 thereby increasing the yielding resistance. By adjusting the collar or head 64 to higher or lower level upon the motor shaft, the effect of the governor may be regulated by causing the fingers to engage the tapered pins upon longer or shorter radius.

While the apparatus has heretofore been described as adapted for preceding and succession of different advertisements and signs each independent of the other it is to be understood that a succession of transparencies may be inter-related. These may consist of a series of pictures and comprising a succession of screens progressively arranged or each transparency may consist of a single word or a series of words which, with the words on preceding and succession transparencies, form complete sentences. In such event the transparency would be small in size and the carrier would be advanced with greater rapidity. The shutter might be omitted. The result would be a continuous movement of words upwardly on the screen. The words preferably though not necessarily appear at the bottom of the screen and passing off at the top. Such matter might be in the form of announcements, advertising directions or other data.

From the above description it will be apparent that there is thus provided a device of the character described, possessing the particular features of advantage before

enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific details shown, but that the means and construction herein disclosed comprises the preferred form of several modes of putting the invention into effect and the invention is, therefore, claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. In a projecting apparatus of the character described, the combination with a projection lantern, a projection lens and a source of illumination of an annular rotary transparency carrier rotating in a vertical plane, means for peripherally supporting the rotary carrier, a continuous succession of independent transparencies detachably mounted upon the carrier, a vibratory actuating arm mounted concentrically with the carrier, means for actuating the arm for automatically rotating the carrier through a step by step movement, by which the transparencies are successively presented in projecting position, a motor driven continuously rotating cam actuator for the vibratory arm, and means for retarding the actuating stroke of the vibratory arm.

2. In a projecting apparatus, the combination with a projecting lantern, including a projection lens, and a source of illumination, of a traveling carrier for a plurality of transparencies, a series of independent transparencies detachably mounted upon the carrier, a spring actuated oscillatory arm, and an actuating spring therefor for intermittently advancing the carrier to present the transparencies in predetermined sequence in projecting position and a rotating cam for retracting the arm against the tension of the spring, said actuating mechanism being located wholly within the periphery of the carrier, and a governor member regulating the advance movement of the carrier.

3. In a projecting apparatus, the combination with a projecting lantern, including a projection lens, and a source of illumination of a plurality of independent interchangeable transparencies, an annular revoluble carrier for such transparencies, means for peripherally supporting the carrier, an oscillating arm mounted concentrically with the carrier for intermittently adjusting the carrier to present the transparencies in predetermined sequence in projection position relative to said lens and source of illumination and a motor driven cam located within the periphery of the carrier for retracting the arm, an actuating spring for the arm, and means for yieldingly resisting the actuating spring and confining the arm to slow movement.

4. In a projecting apparatus, the combination with a projecting lantern, including a projection lens, and a source of illumination, a carrier having therein a plurality of framing apertures for transparencies, and relatively fixed retaining tongues located in approximate relation with the opposite edges of the framing apertures and engageable in terminal notches of a removable transparency overlying the framing aperture and projecting beneath such tongues to hold the transparency in adjusted relation with the opening, and means to adjust the carrier to present the transparencies in sequence in projecting position.

5. In a projecting apparatus, the combination with a projecting lantern, including a projection lens, and a source of illumination, a carrier having therein a plurality of framing apertures for flexible transparencies, a plurality of independent transparencies, and overhanging stop projections for detachably securing a transparency in registry with each of the framing apertures beneath which the opposite ends of a transparency are engageable by flexing the transparency, and means to adjust the carrier to present the transparencies in predetermined sequence in projecting position.

6. In a projecting apparatus, the combination with a projecting lantern, including a projection lens, and a source of illumination, a carrier having therein a plurality of framing apertures for transparencies, projections at opposite sides of the respective apertures for engagement of the transparencies, and a plurality of independent transparencies each having marginal notches to straddle said projections to detachably support the transparencies upon the carrier, and means to adjust the carrier to present the transparencies in predetermined sequence in projecting position.

7. In a projecting apparatus, the combination with a projecting lantern including a projection lens and a source of illumination, of a carrier for transparencies having therein a plurality of framing apertures a plurality of independent transparencies detachably mounted upon the carrier, retaining tongues on the carrier overhanging the opposite edges of the detachable transparencies said transparencies being marginally notched coincident with the points of engagement of the overhanging tongues whereby the adjacent marginal portions of the transparencies straddle such overhanging tongues to

interlock the transparencies in registry with the framing apertures and means for adjusting the carrier to present the transparencies in predetermined sequence in projecting position.

8. In a projecting apparatus, the combination with a projecting lantern including a projection lens and a source of illumination, of an annular carrier for transparencies having therein a plurality of framing apertures, a plurality of independent transparencies detachably mounted upon the carrier, in registry with the framing apertures, and presented in projection position by the adjustment of the carrier, the carrier being opened interiorly of the plurality of apertures, and means for peripherally supporting the annular carrier for rotation in a vertical plane, a succession of ratchet teeth upon the carrier, an oscillatory arm pivoted substantially concentrically with the carrier, a pawl carried by the arm and operatively engaging the ratchet teeth to advance the carrier, and means for oscillating the arm.

9. In a projecting apparatus, the combination with a projecting lantern including a projection lens and source of illumination, of an annular revoluble carrier for transparencies, a succession of images to be projected carried thereby, and presented in projecting position by the adjustment of the carrier, means for peripherally supporting the annular carrier for rotation in a vertical plane, an oscillatory actuator arm pivoted within the circle of such annular carrier, an actuating pawl carried by the arm, a series of ratchet teeth located in proximity to the inner circumference of the carrier and progressively engaged by the pawl, a rotary evolute cam controlling the movement of the arm and means for rotating the cam.

10. In a projecting apparatus, the combination with a projecting lantern including a projection lens and source of illumination, of a movable carrier for transparencies, a succession of images to be projected carried thereby, and presented in projecting position by the adjustment of the carrier, an oscillatory actuator arm, an actuating pawl carried by the arm, a series of ratchet teeth upon the carrier and progressively engaged by the pawl, a dash pot governor for said arm, governing the operative stroke of the arm, and means for retracting the arm for each succeeding operation.

11. In a projecting apparatus, the combination with a projecting lantern including a projection lens and source of illumination, of a movable carrier for transparencies, a succession of images to be projected carried thereby, and presented in projecting position by the adjustment of the carrier, an oscillatory actuator arm, an actuating pawl carried by the arm, a series of ratchet teeth upon the carrier and progressively engaged by the pawl, an actuating spring for the arm, yielding means for governing the stroke of the arm under influence of its spring when released, and means for retracting the arm against the tension of the spring after each actuation of the carrier preparatory to the next operation.

12. In a projecting lantern, the combination with a projecting lens and a source of illumination of a traveling carrier for images to be projected, means for intermittently advancing the carrier through a step by step movement, including an oscillatory actuating arm, means for operatively engaging the arm with the carrier during its movement in one direction, the retrograde movement of the arm being independent of the carrier, means for controlling said arm by which its speed in one direction is greater than its speed in the reverse direction, and yielding means governing the operative stroke of said arm.

13. In a projecting apparatus, the combination with a projecting lantern including a projection lens and a source of illumination, a plurality of concentrically disposed revoluble transparency carriers, an oscillatory actuator arm common to the plurality of carriers, means for actuating the arm and means for operatively engaging the arm alternately with the respective carriers to advance the carriers, each through a step by step movement past the point of projection.

14. In a projecting lantern, the combination with a projecting lens and a source of illumination, of a traveling carrier for images to be projected, means for intermittently advancing the carrier through a step by step movement to present the images progressively in projecting position, a shutter interposed in the line of projection during the change of position of said images by the adjustment of the carrier, an oscillatory arm upon which the shutter is carried and rotary cam controlling said arm so contoured and timed as to permit the shutter to drop quickly into its operative position in a direction corresponding to the movement of the carrier and is subsequently slowly retracted therefrom in a direction the reverse of the movement of the carrier, and means to rotate the cam.

15. In a projecting lantern, the combination with a projecting lens and a source of illumination, of a traveling carrier for images to be projected, means for intermittently advancing the carrier through a step by step movement to present the images progressively in projecting position, a shutter interposed in the line of projection during the change of position of said images by the adjustment of the carrier, and means controlling the movement of the shutter into and out of operative position through a path

of movement substantially co-incident with that of the carrier by which the shutter is permitted to move quickly in the direction of movement of the carrier and is retracted slowly in a direction opposite that of the carrier movement.

16. In a projecting lantern, the combination with a projecting lens and a source of illumination, of a traveling carrier for images to be projected, an oscillatory actuating arm intermittently advancing the carrier through a step by step movement to present the images progressively in projecting position, a shutter interposed in the line of projection during the change of position of said images by the adjustment of the carrier, and a second oscillatory arm mounted concentrically with the oscillatory actuating arm operatively connected with the shutter by which the shutter is moved in a path substantially parallel with that of the carrier, and means common to both arms for retracting the arms and releasing them for independent movement in predetermined timed relation.

17. In a projecting apparatus, the combination with a projecting lantern, including a projection lens and a source of illumination, a plurality of concentrically disposed revoluble transparency carriers, an oscillatory actuator arm common to the plurality of carriers, and means engaging the arm alternately with the respective carriers for advancing the carriers in reverse directions through a step by step movement past the point of projection.

18. In a projecting apparatus, the combination with a projecting lantern including a projection lens and a source of illumination, a plurality of concentrically disposed revoluble transparency carriers, an oscillatory actuator arm common to the plurality of carriers, means for actuating the arm and means operatively engaging the arm with the carriers to intermittently advance the carriers through step by step movements, one by movement of the arm in one direction and another by the return movement of the arm, to present successive portions of the carriers past the point of projection.

19. In a projecting apparatus, the combination with a projecting lantern including a projection lens, and a source of illumination, two traveling transparency carriers movable in parallel paths of travel, and means for intermittently advancing the carriers through a step by step movement, past the point of projection in superposed relation, whereby the projected light beam passes successively through transparencies carried by each carrier.

20. In a projecting apparatus, the combination with a projecting lantern including a projection lens, and a source of illumination, two traveling transparency carriers movable in parallel paths of travel, and means for alternately advancing the carriers through a step by step movement past the projection point in superposed relation whereby the projection light beam passes successively through transparencies carried by each carrier.

21. In a projecting apparatus, the combination with a projecting lantern including a projection lens, and a source of illumination, two traveling transparency carriers movable in parallel paths of travel, and means for advancing said carriers in opposite directions through a step by step movement past the projection point in superposed relation whereby the projection light beam passes successively through transparencies carried by each carrier.

22. In a projecting lantern, the combination with a projecting lens and a source of illumination, of a circular carrier for images to be projected, a series of rollers upon which the periphery of the carrier rests for rotary motion, one of said rollers being yieldingly mounted to facilitate the disengagement and engagement of the carrier therewith, and means for transmitting motion to said carrier.

23. In a projecting lantern, the combination with a projecting lens, and a source of illumination, of two movable transparencies positioned one before the other in the line of projection, and intermittently operative actuating means common to both transparencies for moving the transparencies into and out of projecting position.

24. In a projecting lantern, the combination with a projecting lens, and a source of illumination, of two circular transparency carriers located side by side, each in parallel proximate relation to each other, and means for actuating said carriers alternately to present different portions of the respective transparencies carried thereby simultaneously in projecting position.

25. The combination with a projecting lantern, of a plurality of independent transparencies simultaneously presented in projecting position, in superposed relation whereby the projecting light beam passes successively through each of the transparencies and means common to both transparencies for moving said transparencies into and out of projecting position.

26. The combination with a projecting lantern, of a plurality of independent transparencies simultaneously presented in projecting position, in superposed relation whereby the projecting light beam passes successively through each of the transparencies, and means for alternately shifting said transparencies into and out of projecting position.

27. The combination with a projecting lantern, of a plurality of independent transparencies simultaneously presented in projecting position, in superposed relation whereby the projecting light beam passes successively through each of the transparencies, and intermittently operative means for actuating said transparencies in reverse directions through step by step movement into and out of projecting positions.

In testimony whereof, I have hereunto set my hand this 12th day of June A. D. 1923.

PAUL A. NOTHSTINE.