Jan. 17, 1928.

1,656,389

P. A. NOTHSTINE

PICTURE PROJECTING APPARATUS

Filed May 28, 1923

3 Sheets-Sheet 1

Fig. 1

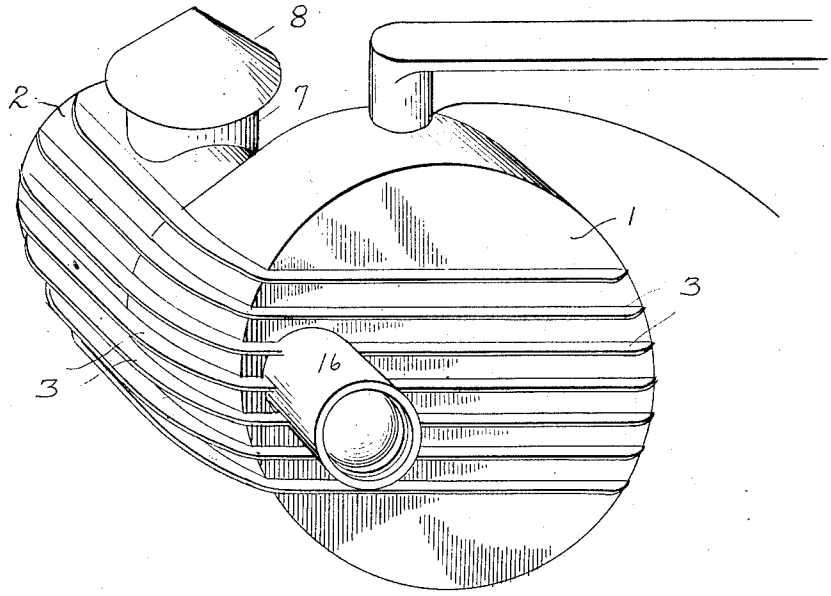
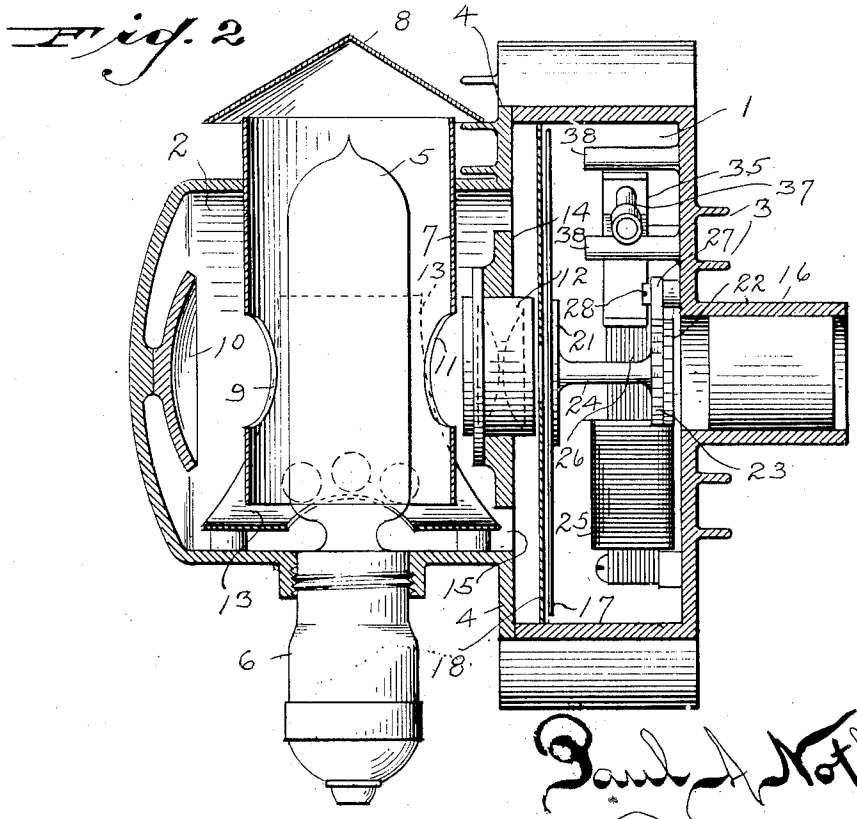


Fig. 2



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3 Sheets-Sheet 2

Fig. 3

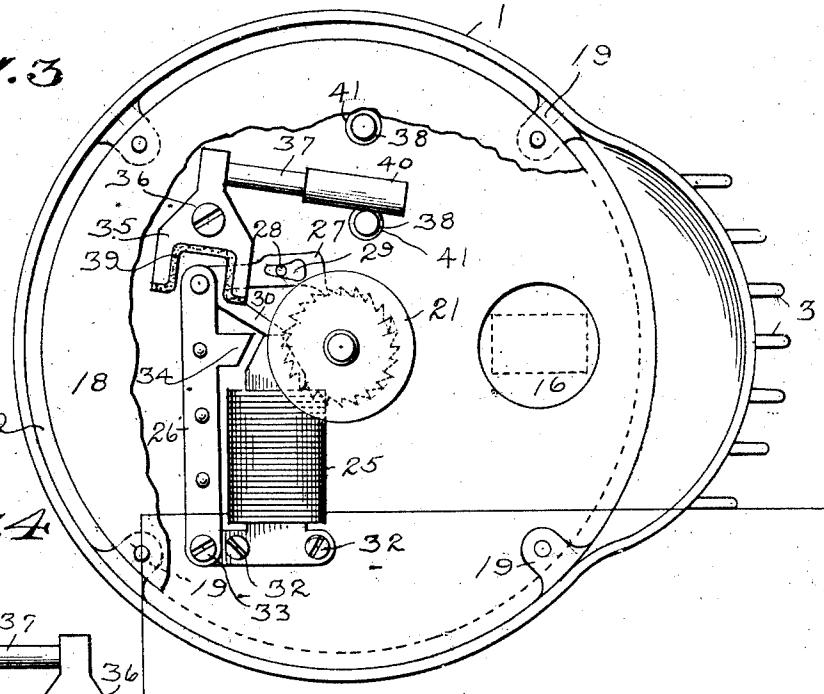
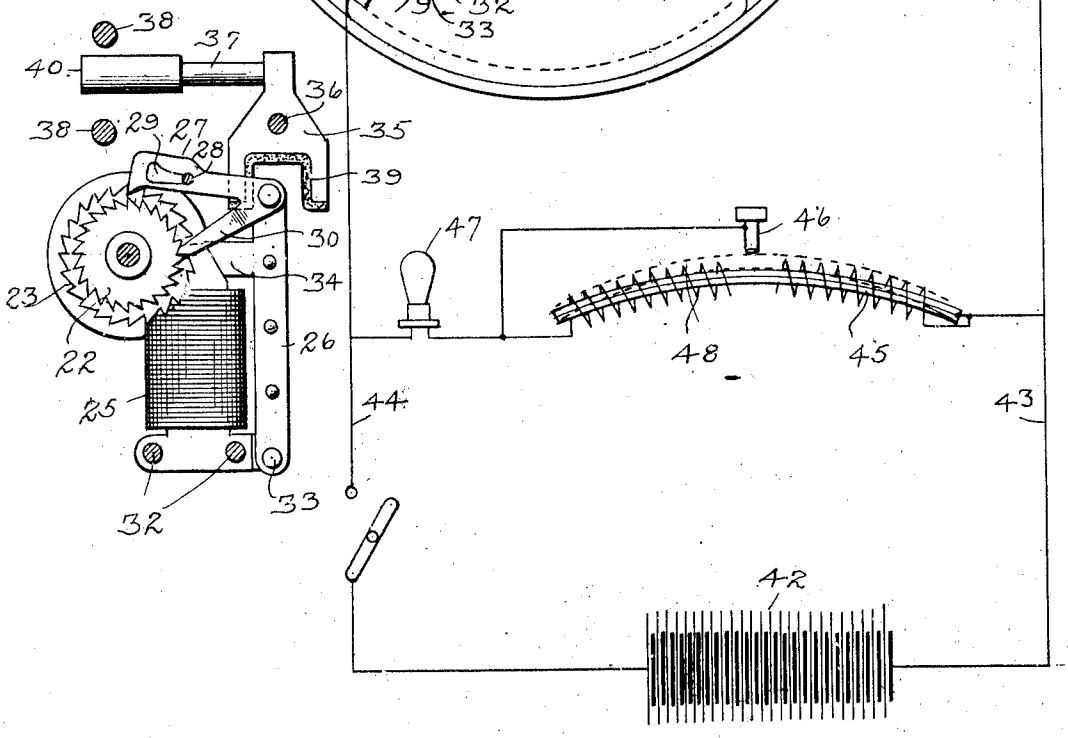


Fig. 4



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Filed May 28, 1923

3 Sheets-Sheet 3

Fig. 6.

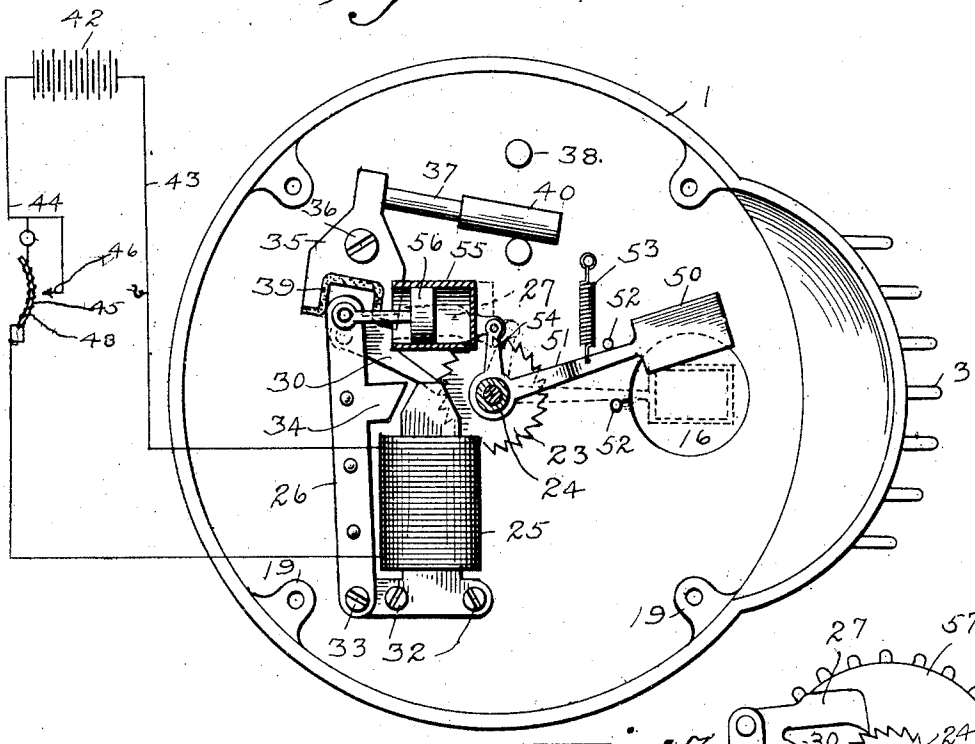


Fig. 7

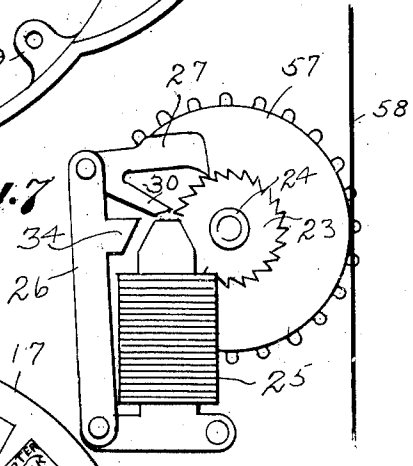
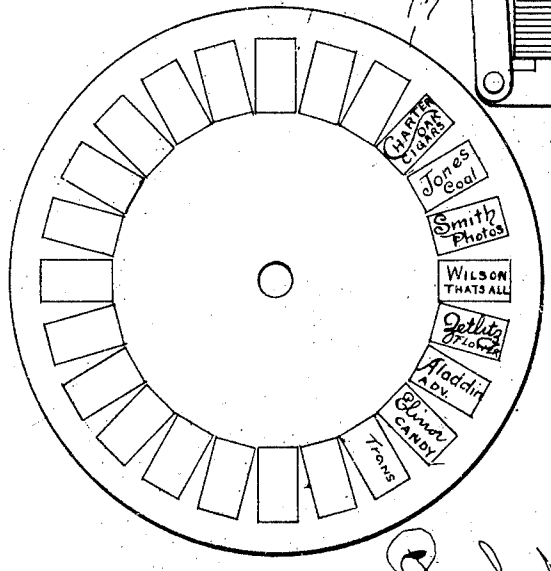


Fig. 5



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Patented Jan. 17, 1928. 1,656,389

UNITED STATES PATENT OFFICE.

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PICTURE-PROJECTING APPARATUS.

Application filed May 28, 1923. Serial No. 641,912.

My invention relates to optical projecting apparatus and more particularly to an automatic apparatus for displaying upon a screen a repetitious program of enlarged pictorial illustrations and reading matter.

The invention contemplates a projecting apparatus of the magic lantern type as distinguished from cinematographic projection, wherein a continuous succession of transparencies upon either an endless belt or revoluble disc carrier are succesively projected, the transparency carrier being intermittently advanced through step by step movement by electromagnetic means controlled by periodic interruptions of the energizing circuit by either a make and break switch or thermostatic governor of the commerical flasher type. The specific disclosure is that of a pawl and ratchet drive device, in which the pawl is mounted upon the movable armature of the electromagnet, the magnet circuit having therein a commerical thermostatic flasher by which the magnet is intermittently energized, there being provided a gravity operated governor, engaged by the armature at each impulse which serves to absorb the momentum of the armature and also insure its return preparatory to engagement of the actuating pawl with the next tooth of the ratchet.

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 entirely the usual type of driving motor or power transmission element.

A further object of the invention is to provide operating means which will be wholly electrical in its actuation and control and capable of continuous operation for long periods of time without attention.

A further object of the invention is to provide an improved form of gravity governor for the electromagnetic actuator whereby its action will be equalized, excessive momentum absorbed and noisy operation obviated.

A further object of the invention is to afford a compact, simple but easily accessible arrangement of projecting lamp parts.

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 apparatus 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 looking forwardly and illustrating the step by step actuating mechanism for the traveling transparency. Fig. 4 is a detail view of the actuating means, viewed in a direction opposite that shown in Fig. 3. Fig. 5 is a front elevation of the transparency disc. Fig. 6 is a view simular to Fig. 3 showing the addition of an automatic shutter. Fig. 7 is a detail view of a form of actuating means for the intermittent advancement of a strip film.

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

The projection lantern herein shown and described is designed primarily as an automatic advertising device for window display purposes, for use in hotels and public buildings, for announcing train schedules and directions, 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 exteriorly 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 pur-

poses, 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 transparencies arranged in an endless annular series upon a rotary disc 17. This disc 17 in the present instance is pivotally mounted concentric with the projection chamber 1, with the transparencies so arranged thereon that upon rotation of the disc the transparencies will successively pass intermediate the condensing and projecting lenses, and will be intersected by the beam of light therethrough. Interposed between the revoluble transparency disc 17 and the rear wall 4 of the projection chamber is a disc 18 having therein a small opening registering with the axis of the condensing and projecting lenses and which forms a mask or frame for the transparencies, advanced to projection position by the rotation of the disc. This interposed disc is preferably of metal and is stationarily mounted upon supporting lugs 19 in such relation as to afford an annular ventilating space 20 about the periphery of such stationary mask or framing disc 18.

The rotary transparency disc 17 is detachably mounted upon a revoluble spool having at one end a circular disc or head 21 for engagement of the transparency disc 17 at its opposite end and in spaced relation with such transparency supporting head, a ratchet wheel having a double series of ratchet teeth 22 and 23, the teeth being arranged in reverse relation. The transparency supporting head 21 and the ratchet head are integrally connected by an intermediate sleeve portion 24, having revoluble bearing upon a supporting stud projecting inwardly from the forward wall of the projecting chamber 1.

To intermittently advance the transparency disc through a step by step movement which at each operation will bring the succeeding transparency into registry with the projection apparatus, there is provided an electromagnet 25 having a movable armature 26, which carries at its extremity a pawl 27, engaging the teeth of the ratchet 23. To insure the accurate movement of the actuating pawl 27 whereby it will be lifted from the ratchet wheel upon its retrograde stroke and will be held in firm engagement with the wheel during its operative stroke after engaging the succeeding tooth of the wheel there is provided a stud 28 projecting from the forward wall of the projecting chamber, which engages in a cam slot 29 in the head of the pawl 27. The shape of the cam slot 29 is such that the pawl is depressed toward the ratchet during its forward or operative movement and is slightly elevated in its retractive movement. To prevent overthrow of the ratchet and with it the rotary transparency disc and to positively lock the disc in its operated position at each successive step, the actuating pawl 27 is provided with a stop arm 30, which at the forward limit of the stroke of the armature 26 and pawl 27 engages with a tooth of the second series 21 of the ratchet head which series of teeth are turned in reverse direction in relation with those engaged by the actuating pawl 27. Thus the movement of the armature 26 moves the ratchet head and with it the transparency disc, one step and only one step at each operation. As the armature is retracted to retract the actuating pawl 27 preparatory to the succeeding step, it also retracts the locking finger or arm 30. It will be understood that the pawl 27 engages and moves the ratchet wheel before the locking arm or finger 30 is brought into engagement with the second series 21 of ratchet teeth and that the parts are so proportioned and arranged that the stop tooth engages the finger 30 only as the actuating pawl 27 completes its stroke and registers the succeeding transparency with the projection lenses. The core of the electromagnet 25 is of the laminated type and for economy of manufacture, the laminæ are of substantially T shape, the stem being upturned and the coil of the magnet encircling the upturned stem upon which it is slipped after being wound upon a suitable separate form. The laminæ are held together in assembled relation by the coil and by the screws 32 by which the core is fixedly secured to the front of the chamber 1. The armature 26 is also

preferably composed of a series of laminæ, interconnected by rivets or other suitable means and is pivoted at 33 and is provided with a laterally projecting arm 34, which is adapted to contact with the extremity of the T shaped magnet core. To equalize the movement of the armature and insure uniformity of operation there is provided a gravity governor, which will absorb the momentum of the armature and will minimize the noise of operation. When the inertia of the armature is once overcome, the armature will naturally move very quickly and will close its contact with the magnetic core with more or less snap. This also transmits to the transparency disc a sudden and accelerated movement. To overcome this difficulty there is provided a gravity governor comprising the bifurcated head 35, pivoted at 36 and having a laterally extending weight arm 37, which vibrates between two stop pins 38. The furcation of the head 35 is lined at 39 with leather, rubber or other cushion material, whereby the engagement of the armature therewith will be substantially noiseless. The weight arm 37 is cushioned by a sleeve 40 of rubber tubing or such rubber tube cushion may be located about the stop studs 38 as indicated at 41. The end of the armature 26 extends quite loosely within the furcation of the head 25. Thus the armature is allowed a limited degree of movement independent of the governor device so that the electromagnet does not operate against the governor in overcoming the inertia of the armature. However, as the armature continues to move it engages the governor head 35 and oscillates such head against the weight or gravity of the arm 37, thereby somewhat slowing the movement of the armature and absorbing the momentum and excessive power. The contact points being cushioned, the operation of the electromagnet is rendered practically noiseless. Thus at each operation the armature operates to advance the ratchet and with it the transparency disc a distance of one step, effecting such movement against the influence of the weight arm 37, which is raised by such armature movement. At the termination of the energizing impulse, the gravity governor operates to positively return the armature to its inoperative or open position, preparatory to the next disc feeding movement. That is to say, upon the release of the armature by the electromagnet the weight of the arm 37 exerted on the armature through the bifurcated head 35 will move the armature away from the magnet and so withdraw the operating pawl 27 preparatory to the next succeeding movement.

Any suitable impulse transmission means such as the motor operated make and break switch or an alternating switch of any kind, by which the circuit is intermittently opened and closed, may be employed. However, the actuation is preferably through a constantly closed circuit, having therein a resistance shunt, intermittently bridged across the electromagnet circuit. The preferred control shunt is merely a commercial form of automatic flasher, such as is ordinarily used for intermittent advertising signs.

In Fig. 3 there is diagrammatically illustrated the electrical control circuit, wherein 41 is the source of electrical supply of whatever nature. The apparatus is preferably connected to an ordinary lighting system lamp socket. From such source of electrical supply 42, there extends to the coil of the electromagnet 25 the opposite side of the circuits 43 and 44. The circuit lines 43 and 44 are continuous or unbroken. Bridged across this circuit intermediate the source of supply and the electromagnet is a commercial type of automatic flasher. The flasher illustrated in the drawings, comprises a thermostatic bar 45 electrically connected to one side of the circuit and adapted when flexed by variation of temperature to make contact with a contact point 46, connected to the opposite side of the circuit. In order to equalize the flow of current through the shunt circuit, closed by a thermostatic bar 25, a resistance lamp 47 is interposed in the shunt between the contact 26 and the side 44 of the main control circuit. This resistance member shown as a lamp bulb, but which may be any other electrical resistance element, counterbalances the electromagnet 25 in the circuit, consuming in the interval between operations of the magnet the current which would otherwise be consumed by the magnet thereby preventing current fluctuations or current surge. A heat coil 48 is wrapped about the thermostatic bar 45, with one end permanently connected to the thermostatic bar or otherwise connected therewith to the side 43 of the main circuit, with its opposite end connected through the resistance element or lamp 47 with the side 44 of the circuit. Thus the shunt is permanently closed through such resistance or heat coil 48. When the apparatus is at rest or out of operation, the thermostatic bar 45 is of course cool and it does not normally make contact with the contact point 46. Current being admitted to the circuit will traverse the electromagnet coil 25, causing the armature 26 to be attracted and transmitting to the transparency disc a limited advance movement sufficient to bring the succeeding transparency to registry with the projection lenses. At the same time the small amount of current will flow through the permanently connected shunt including the heating coil 48, thereby raising the temperature of the thermostatic bar 45 causing the bar to warp into closed contact with the contact point 46.

This will close the shunt directly from one side 43 to the other side 44 of the main circuit, through the resistance element 47, but independent of the heating coil 48. This will allow a greater portion of the current to flow through the shunt and diminish the flow of the current to the electromagnet below the operating requirement. Consequently the magnet will release its armature, which is retracted by the gravity operated governor arm 37. The flow of current through the thermostatic connection independent of the heat coil will allow the heat coil and with it the thermostatic bar to cool causing the bar 45 to break its connection with the contact points 46, bringing into the shunt the additional resistance of the heat coil 48, which will divert the preponderance of current again to the magnet coil to again energize it to advance the transparency. Thus the flasher mechanism closes the shunt, first through the heat coil and then independent of the heat coil, causing a greater and less quantity of current to alternately flow through the resistance lamp or element 47. This causes the resistance lamp to burn alternating brightly and dimly. The operation of the resistance element or lamp 47 alternates with the operation of the magnet coil. The current energizing the resistant lamp 47 when the shunt is directly closed, serves to actuate the magnet coil when the shunt is closed through the resistance of heat winding 48. Thus there is no interruption of the flow of current and no current surge or fluctuation, and the current flow is automatically equalized. It will be obvious that the thermostatic switch might be introduced into one of the supply lines of the electromagnet, so that such magnet circuit will be intermittently opened and closed. While such installation, which would be the natural and obvious one would successfully operate the electromagnet actuating means for the projecting apparatus, the form of installation shown in the diagram, Fig. 3 is to be preferred. While the electromagnetic apparatus is herein shown and described as actuating a rotary disc, it will be understood that it is equally applicable to the intermittent advancement of a strip film, whether in the form of an endless belt or otherwise, as has been illustrated in simple form in Fig 7.

For ordinary operation of the device, no shutter or interceptor will be required. The transparency is advanced quickly into each succeeding position, and the use of a shutter may be dispensed with. However, for special conditions of use and to meet requirements where such shutter or cut off may be desirable, there has been illustrated in Fig. 6, an automatic shutter which will operate quickly into closed position in advance of the movement of the transparency, and will recede slowly. That is, it has an instantaneous movement in one direction toward its closed or operated position, while its retrograde movement is effected gradually. To this end the shutter or interceptor 50 is carried upon an oscillatory arm 51, which may be pivoted to a suitable stud at any convenient location, within the chamber 1. In the present instance for convenience, this shutter arm 51 has been shown loosely journalled upon the intermediate portion of the sleeve or hub 24. The oscillatory movement of the shutter member 50 into and out of operative position is limited by two spaced studs 52. The shutter is oscillated into closed position against the tension of a retracting spring 53. The shutter arm 51 is provided with a rock arm 54 having a differential operative connection with the oscillatory armature 26 of the magnet 25. There is interposed between the arm 54 and armature 26 a small air cylinder and piston or dash pot. In the present instance the cylinder or chamber 55 is shown connected with the arm 54, while the reciprocatory piston 56 within such cylinder is operatively connected with the armature 26. As a matter of economy of manufacture, the piston 56 is made to fit somewhat loosely within the cylinder 55 to permit gradual leakage of air compressed within the cylinder, by the movement of the piston. It is obvious that any suitable valve or breathe hole construction would accomplish the same result. The actuating pawl 27 shown in dotted lines behind the cylinder 55 in Fig. 6, is shown proportioned that it has a limited amount of lost motion before picking up and moving the ratchet wheel 23. That is to say, when the armature 26 is in retracted position the pawl 27 is retracted somewhat beyond the succeeding tooth to be engaged thereby so that during the initial movement of the armature, the pawl 27 will move idly into engagement with the succeeding tooth of the ratchet 23. Thereafter during subsequent movement of the armature it will actuate the ratchet 23 and transparency connected therewith. Such initial idle movement of the armature is utilized to actuate the shutter into closed position. The movement of the armature carries with it the piston 56, exerting pressure upon the entrapped body of air within the cylinder 55, thereby carrying with it the cylinder 55 which is free to move axially. The cylinder 55 being pivotally connected to the rock arm 54, moves such rock arm to the position shown by dotted lines in Fig. 6, thereby shifting the shutter 50 into closed position. The leakage of air from the cylinder 55 around the loose fitting piston 56 or through a breathe hole or the like, permits the armature 26 to continue its movement under the attractive influence of the magnet 25, thereby holding the shutter in closed position and causing the pawl 27 to actuate the ratchet

wheel 23 and the transparency disc. However, the shutter 50 does not await the retraction of the armature 26, but under influence of the retracting spring 53 the shutter blade effects a slow or gradual retractive movement as the air leaks out of the cylinder 55, wholly independent of the retractive movement of the armature 26. Thus the shutter is given a quick operative movement in unison with the movement of the armature, but is slowly retracted wholly independent of the armature. This cylinder and piston construction for actuating the shutter will also serve as a cushioning device to cushion the stroke of the armature, and minimize noise of operation, and will function to some extent as the governor. In view of this the gravity governor 35 may be omitted or it may be employed conjointly with the shutter control piston and cylinder, as shown in Fig. 6. In this disclosure the actuating pawl 27 is pivoted to one side of the armature 26, while the piston 56 is pivoted to the opposite side of the armature with the governor head 35 straddling the end of the armature intermediate the pawl 27 and the cylinder 50.

There is illustrated in Fig. 6 the simple form of make and break flasher circuit heretofore referred to. The parts are those shown in Fig. 3, but are arranged wholly in one side of the circuit in lieu of being bridged across the circuit. The operation is similar to that before described except that the current flow is not balanced or equalized to the same extent.

In Fig. 7 there is illustrated a sprocket wheel 57, for feeding a continuous strip 58 of film. The film strip 58 may be either an endless band, or may be fed from one reel to another as in cinematographic machines. The feeding sprocket 57 is directly connected with the ratchet wheel 23, so that it receives a partial rotation to advance the strip 58 through a step by step movement at each action of the operating pawl 27 under the influence of the magnet 25.

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 machine wherein a transparency is intermittently advanced through a step by step movement intermediate a projecting lens and a source of illumination, a pawl and ratchet mechanism for intermittently advancing the transparency, an electro-magnet actuating the pawl and ratchet mechanism, an electrical circuit in which the magnet is located, and an electrical "flasher" bridged across said circuit whereby it is connected in multiple with the magnet which intermittently interrupts the flow of current through said magnet.

2. A projecting lantern wherein a transparency is intermittently advanced through a step by step movement past projecting position, characterized by electromagnetic means for intermittently advancing the transparency, an electrical circuit including said electromagnetic means, and a thermostatic switch bridged across said circuit by which the current is intermittently shunted around said electro-magnetic means causing said electromagnetic means to be intermittently energized.

3. A projecting lantern wherein a transparency is intermittently advanced through a step by step movement past a projecting point, characterized by a non-break electrical circuit, electrically energized actuating means for the transparency in said circuit, an electrical resistance element bridged across said circuit means for automatically alternating the current flow through said transparency actuating means and through said resistance element.

4. A projecting lantern wherein a transparency is intermittently advanced through a step by step movement past a projecting point, characterized by a non-break electrical circuit, electrically operated means for advancing the transparency controlled by said circuit, a shunt in said circuit and a thermostatic switch for alternating the flow of current through said shunt and through said transparency actuating means.

5. A projecting lantern wherein a transparency is intermittently advanced through a step by step movement past a projecting point, characterized by a non-break electrical circuit, electrically operated means for advancing the transparency controlled by said circuit, a shunt in said circuit, and means for automatically alternating the flow of current through said shunt and through said transparency operating means.

6. In a projecting lantern, wherein a transparency advancing means is intermittently advanced through a step by step movement

past projecting position, a movable shutter interposed during the advance of the transparency, spring means for retracting the setter and a yielding operating connection for the shutter initially actuating the shutter to operative position against the tension of a retracting spring and subsequently yielding to the influence of said spring to permit a slow return movement of the shutter.

7. In a projecting lantern, a traveling transparency, a ratchet wheel having operative connection with the transparency, an electromagnet, a movable armature therefor, a pawl carried by the armature and engaging the ratchet wheel, a toothed wheel concentric with said ratchet wheel and moving in unison therewith, and a stop finger carried by the pawl and engaging with the toothed wheel as the pawl approaches the limit of its actuating movement to lock said wheel against overthrow, and means to intermittently energize the electromagnet to advance the ratchet wheel through a step by step movement through the medium of the armature and pawl.

8. In a projecting lantern, a traveling transparency, a ratchet wheel having operative connection with the transparency to advance the same through an intermittent step by step movement, an actuating pawl for said ratchet wheel, a toothed wheel movable in unison with said ratchet wheel, a second pawl engageable with the toothed wheel as the ratchet pawl approaches the limit of its actuating stroke to arrest the mechanism after predetermined degree of movement, electromagnetic means common to both pawls for simultaneously actuating the pawls, and means to intermittently energize the electromagnetic means.

9. A projecting machine or the like wherein a shutter is intermittently moved into and out of operative position, characterized by a telescopic operating link for said shutter, and means for actuating the link to move the shutter in one direction, the telescopic portions of the link being adapted to yield to permit the return movement of the shutter independent of the operation of the actuating means.

10. A projecting machine or the like wherein a shutter is intermittently moved into and out of operative position, and actuating means therefor, characterized by operative connections between the actuating means and shutter, including a movable dash pot adapted by its bodily movement to actuate the shutter, the subsequent yielding of the dash pot permitting the return of the shutter, the subsequent yielding of the dash pot permitting the return of the shutter independent of the actuating means.

11. A projecting machine or the like, wherein a shutter is intermittently moved into and out of operative position, and intermittently operated actuating means therefor, by which the shutter is quickly moved into operative position, and means governing the subsequent movement of the shutter whereby the shutter is moved slowly out of its operative position.

12. A projecting machine or the like wherein a shutter is intermittently moved into and out of operative position and intermittently operated actuating means therefor, characterized by a cylinder operatively connected with one of said members and a piston within the cylinder and operatively connected with the other of said members, said construction being arranged to permit the gradual escape of fluid from between the piston and cylinder head, the operating movement of the actuating member being transmitted through the body of entrapped fluid within the cylinder, the subsequent escape of which permits the gradual return of the shutter independent of the actuating member.

13. A projecting machine or the like wherein a shutter is intermittently moved into and out of operative position and intermittently operated actuating member therefor, characterized by a yielding link connecting the shutter and actuating member, and means initially tending to resist the yielding movement of the link during the operative movement of the actuating member, but subsequently permitting the gradual yielding thereof to enable a slow return movement of the shutter.

14. A projecting machine or the like wherein a shutter is intermittently moved into and out of operative position and intermittently operated actuating member therefor, characterized by an operative connected between the shutter and actuating member, including an air cushion through which the movement of the actuating member is transmitted to the shutter to effect its movement to operative position, the air cushion being vented to permit the gradual escape of the cushioning body, thus enabling the gradual return movement of the shutter independent of the operation of the actuating member.

15. In a construction of the character described, an electromagnet, a movable armature therefor, a governor therefor comprising a pivoted weight arm having a bifurcated head straddling the armature and oscillated by the movement of the armature affording yielding resistance to the movement of the armature.

16. In a construction of the character described, an electromagnet, an oscillatory armature therefor, and a weighted member to be moved by the attraction of the armature, said armature being capable of an initial movement independent of the weighted member by which the inertia of the armature is overcome, the subsequent movement of the

armature being against the yielding resistance of the weighted member.

17. In a projecting apparatus, the combination with a projecting lantern, and a movable transparency, of means for actuating the transparency through an intermittent step by step movement, including a vibratory pawl and ratchet mechanism, and a yielding weight governor independent of which the actuating pawl effects the initial movement, the subsequent movement of the actuating mechanism being effected against the yielding resistance of the weight governor.

18. In a projecting apparatus, the combination with a projecting lantern, and a movable transparency, of means for actuating the transparency through an intermittent step by step movement, including a vibratory pawl arm, a ratchet member operatively connected with the transparency, a pawl carried by the vibratory arm and having operative engagement with the ratchet member to intermittently advance the transparency, means for oscillating the pawl arm, a pivoted weight arm projecting into the path of the vibratory arm in spaced relation with the arm when in retracted position, said weighted arm being engaged and oscillated by the vibratory arm in its actuating movement, said weighted arm being adapted to insure the return movement of the vibratory arm at the completion of its actuating movement.

In testimony whereof, I have hereunto set my hand this 26th day of April, A. D. 1923.

PAUL A. NOTHSTINE.