

Aug. 12, 1924.

H. C. SCHLICKER
MOVING PICTURE PROJECTOR

1,504,722

Filed Oct. 17, 1919

6 Sheets-Sheet 1

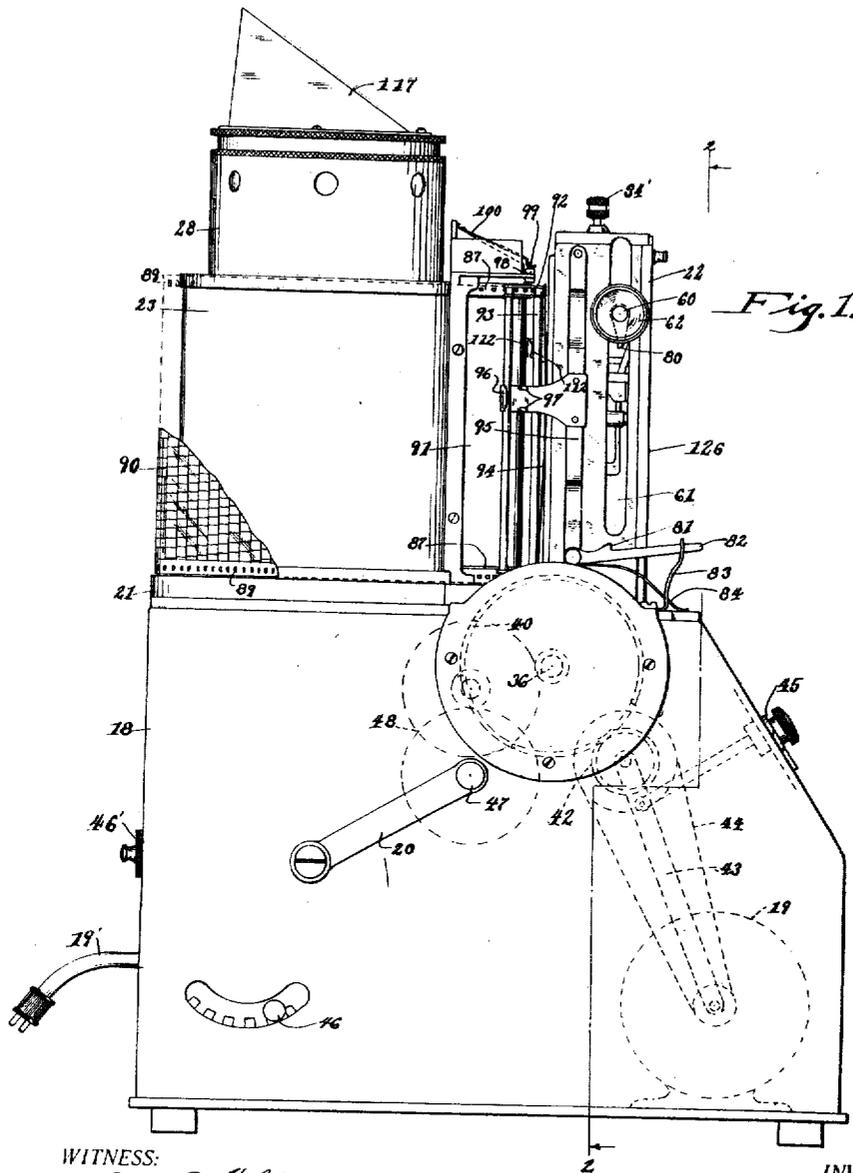


Fig. 1.

WITNESS:
Eng. E. Koller

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Herman C. Schlicker
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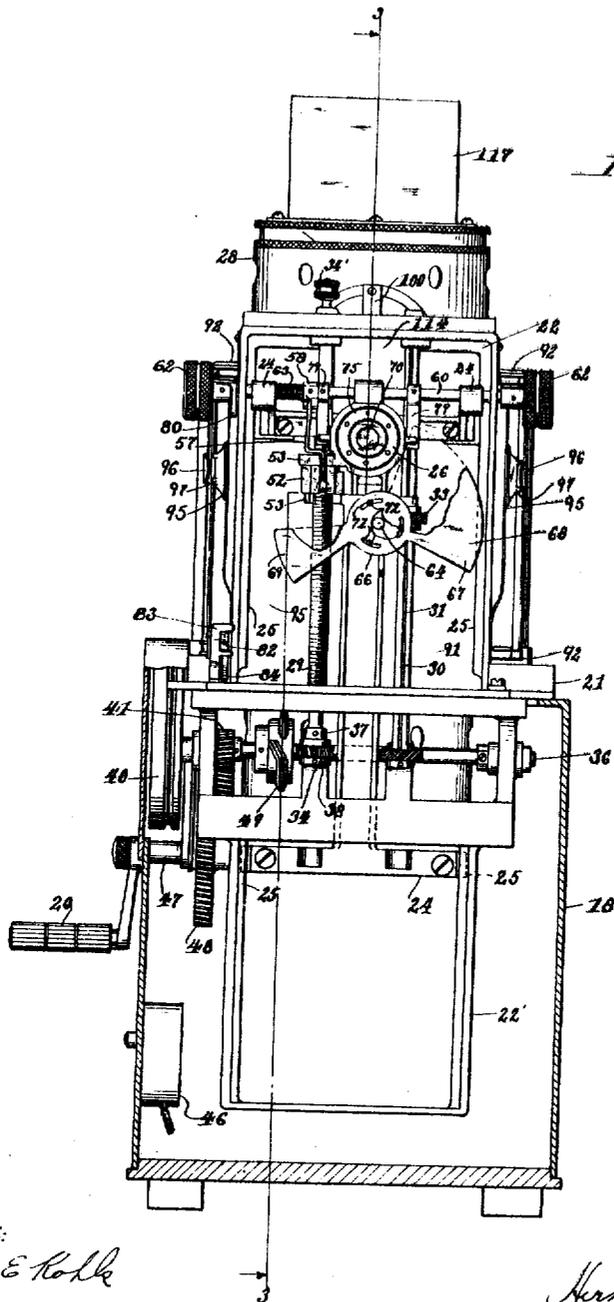
Aug. 12, 1924.

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6 Sheets-Sheet 2



WITNESS:

Eug. E. Kollb

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Aug. 12, 1924:

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H. C. SCHLICHER
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6 Sheets-Sheet 3

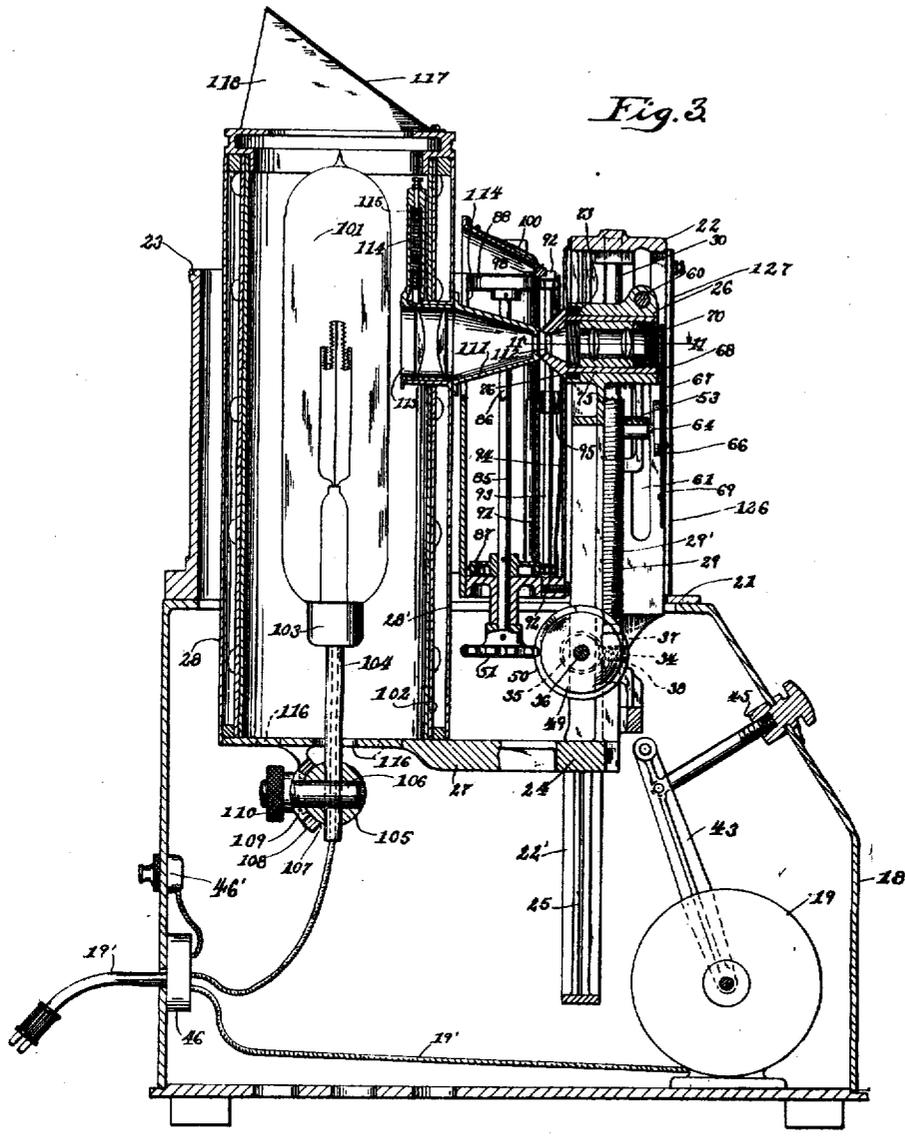


Fig. 3

WITNESS:
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Aug. 12, 1924.

1,504,722

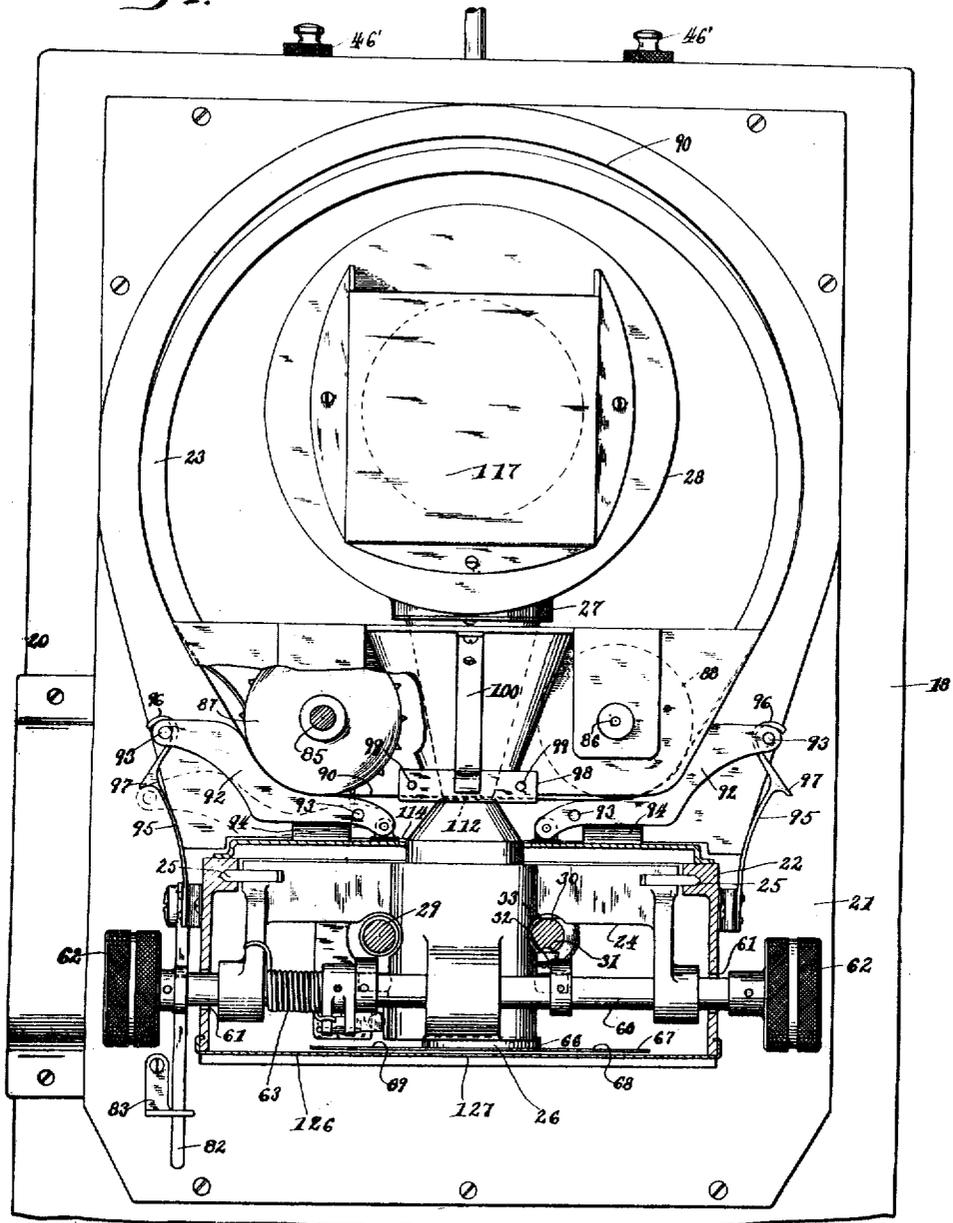
H. C. SCHLICHER

MOVING PICTURE PROJECTOR

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6 Sheets-Sheet 4

Fig. 4.



WITNESS:

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1,504,722

H. C. SCHLICHER
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Fig. 5.

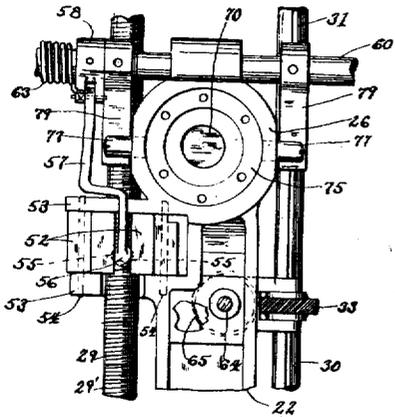


Fig. 6.

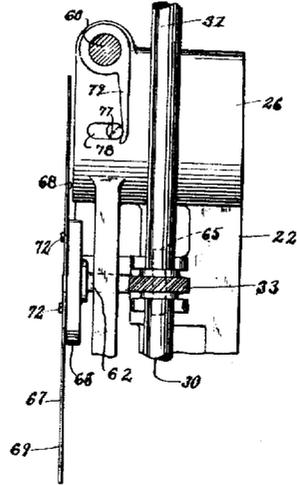


Fig. 7.

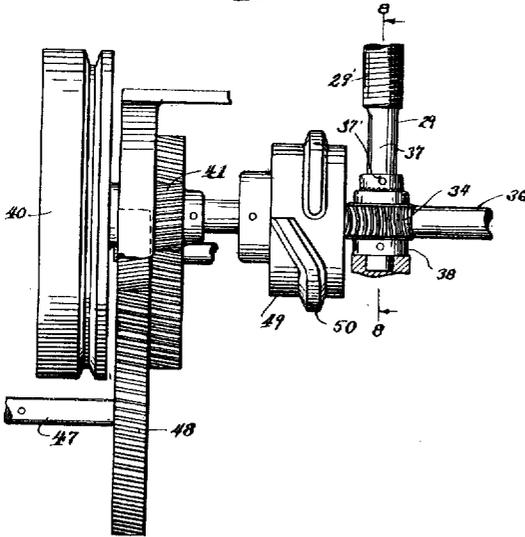
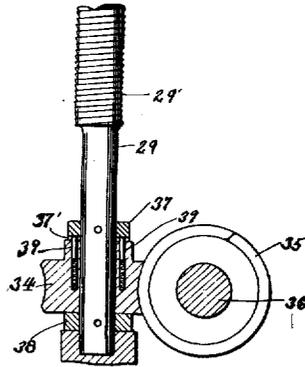


Fig. 8.



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MOVING PICTURE PROJECTOR
Filed Oct. 17, 1919

1,504,722

6 Sheets-Sheet 6

Fig. 14.

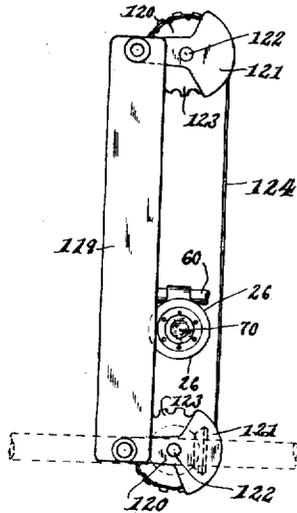


Fig. 15.

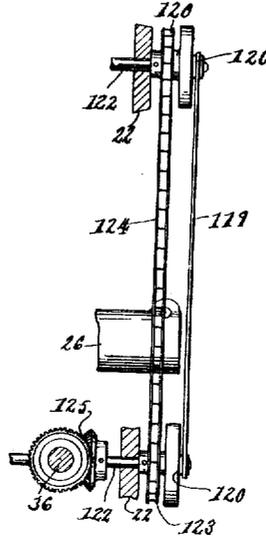


Fig. 13.

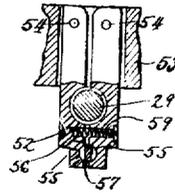


Fig. 9.

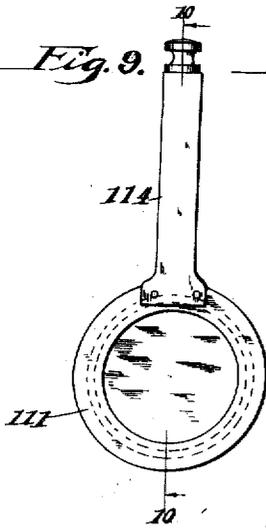


Fig. 10.

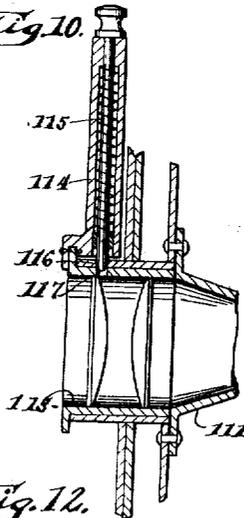


Fig. 11.

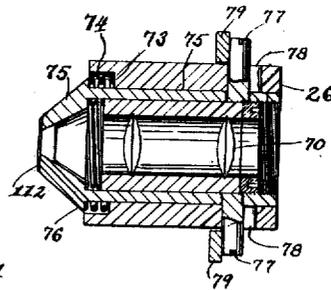
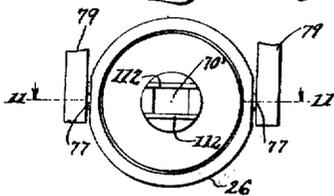


Fig. 12.



WITNESS:
Eug. E. Hohl

INVENTOR.

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UNITED STATES PATENT OFFICE.

HERMAN C. SCHLICKER, OF MILWAUKEE, WISCONSIN, ASSIGNOR OF ONE-HALF TO
JOHN R. FREULER, OF MILWAUKEE, WISCONSIN.

MOVING-PICTURE PROJECTOR.

Application filed October 17, 1919. Serial No. 331,499.

To all whom it may concern:

Be it known that I, HERMAN C. SCHLICKER, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Moving-Picture Projectors, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to improvements in moving picture projectors more particularly, although not solely, adapted for home or amateur use.

Moving picture projectors now in use are of a complex type and are comparatively of such size, weight and cost as to be undesirable, if not prohibitive, for amateur or home use. Furthermore, the ordinary moving picture films consist of strips of material of hundreds of feet in length and are expensive to buy and difficult to thread up and expose in the ordinary moving picture camera, and also on account of their length are difficult to properly develop and fix.

It is one of the objects of the present invention to overcome the beforementioned objectionable features and provide a moving picture projector which is of comparatively small size, light weight and inexpensive to manufacture and is well adapted for amateur or home use.

A further object of the invention is to provide a moving picture projector adapted for use with a flexible film formed into an endless strip or band having transparent pictures arranged to form a continuous helically trending line around the band.

A further object of the invention is to provide a moving picture projector in which the film is moved intermittently circumferentially and the lenses are moved axially with relation to the movement of the film to project the pictures of the film.

A further object of the invention is to provide a moving picture projector in which the different parts may be actuated by a motor mounted within the projector casing or the parts be actuated manually.

A further object of the invention is to provide a moving picture projector in which the axial movement of the lenses with rela-

tion to the circumferential movement of the film is so timed as to align the center portion of the lenses with the center portion of each picture in sequence of movement.

A further object of the invention is to provide a moving picture projector within which is contained an electric lamp and a set of condensing lenses for concentrating the rays of light from the lamp directly through the portion of the film projected and the projecting lenses therefor.

A further object of the invention is to provide a moving picture projector in which the lamp and the condensing lenses move simultaneously with and are maintained in alinement with the projecting lenses of the apparatus.

A further object of the invention is to provide a moving picture projector having a shutter of novel formation which is positioned adjacent the projecting lens to intercept the pencil of light projected on the view screen during the momentary intermittent period the film is moving to expose the next picture, and further to intercept the pencil of light while the film is momentarily at rest to eliminate the appearance of flicker or vibration of the projected picture.

A further object of the invention is to provide a moving picture projector in which an intermittently moving film and continuously moving lenses moving at right angles to the movement of the film are employed for accurately projecting pictures on a screen.

A further object of the invention is to provide a moving picture projector in which the lenses, the lamp and the shutter are moved axially with relation to the film, as a unitary structure and may be easily adjusted to align with the pictures on the film in a very simple manner without stopping the operation of the apparatus.

A further object of the invention is to provide a moving picture projector in which the apertured part of the projecting lens and the lens are automatically moved away from the film in order not to scratch the same while the parts combined as a unitary structure are being adjusted to align with the pictures on the film.

A further object of the invention is to

provide a moving picture projector in which the projecting lens including its aperture is automatically maintained in its outer position away from the film when said apertured portion is in its initial or starting position to permit the removal or insertion of a new film.

A further object of the invention is to provide a moving picture projector in which the apertured portion of the lens enclosing the successive pictures projected is yieldingly held against the film to assure a perfect focus always, once the aperture and lens have been focused and moved away from or towards the film surface as a unit.

A further object of the invention is to provide a moving picture projector in which the endless film is supported in a vertical position axially to permit the formation of a vertically extending electric lamp enclosure and a circulation of air to eliminate heating the film.

A further object of the invention is to provide a moving picture projector in which the lamp socket or support may be adjusted to properly focus the light rays more particularly when a new lamp is inserted in the projector.

A further object of the invention is to provide a moving picture projector in which the film is held in a firm and steady position while being projected.

A further object of the invention is to provide a moving picture projector in which the lenses may be easily and quickly removed for cleaning or replacement.

A further object of the invention is to provide a moving picture projector which is of simple construction, is strong and durable and is well adapted for the purpose desired.

With the above and other objects in view the invention consists of the improved moving picture projector and its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawings in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a side view of the improved moving picture projector showing a portion of the film mounted thereon;

Fig. 2 is a vertical sectional view thereof taken on line 2—2 of Fig. 2;

Fig. 3 is a vertical sectional view thereof, taken on line 3—3 of Fig. 2;

Fig. 4 is a top view of the projector, parts broken away and other parts being shown in section;

Fig. 5 is a front detail view on a larger scale of the lens and supporting and actuating mechanism;

Fig. 6 is a side detail view taken at right angles to the view shown in Fig. 5;

Fig. 7 is a front detail view on a larger scale of the intermittent driving parts:

Fig. 8 is a vertical sectional detail view thereof on a larger scale, taken on line 8—8 of Fig. 7;

Fig. 9 is an inner face view of the condensing lens;

Fig. 10 is a vertical sectional view thereof taken on line 10—10 of Fig. 9;

Fig. 11 is a horizontal sectional view of the projecting lenses taken on line 11—11 of Fig. 3;

Fig. 12 is an inner face view of the projecting lens;

Fig. 13 is a top view of the split feed nut for moving the projecting lens vertically;

Fig. 14 is a front view of a modified form of lens shutter; and

Fig. 15 is an edge view thereof, parts in section.

Referring to the drawings, the numeral 18 indicates the casing of the improved projector which encloses some of the parts of the apparatus and including an electric motor 19 which may be used for driving the mechanism. Any other form of motor desired may be used for driving the mechanism or it may be driven by hand, a cranked member 20 being provided for that purpose. Mounted upon the upper portion of the casing is a main frame or support 21 which carries the supplemental lens guide frame 22 and the tubular film holder 23 spaced rearwardly therefrom. The supplemental lens frame is substantially of rectangular form with the main portion extending above the main frame and a lower portion 22' extending downwardly into the casing. A carriage 24 slidably mounted in grooved ways 25 formed in the vertically extending side members of the lens guide frame 22 is provided with a horizontally extending tubular lens holder 26 and a rearwardly extending arm 27 which carries the lamp chamber 28. The tubular lens holder 26 extends between two vertically extending shafts 29 and 30 which are journaled respectively at their upper and lower ends in portions of the carriage and move therewith. Shaft 29 is the lens feed shaft and is threaded throughout the greater part of its length as indicated by the numeral 29' while shaft 30 is the shutter actuating shaft and is formed with a longitudinal groove or keyway 31 for receiving the key 32 of the spiral gear 33 slidably mounted on said shaft. The lower end portion of the shaft 29 has a worm wheel 34 mounted loosely thereon which meshes with a worm 35 mounted fast on a horizontally extending counter shaft 36. Collars 37 and 38 mounted fast on the shaft 29 above and below the worm wheel 34 hold said wheel in position, and the lower face of the collar 37 is formed with rounded teeth 37' which are frictionally engaged by pins 39 yieldingly mounted in the hub portion of the worm wheel 34 to transmit motion from the worm

wheel 34 to the shaft 29 and permit adjustment of the shaft 29 with relation to the said worm wheel. A milled thumb knob or handle 34' is mounted fast on the upper end of the shaft 29 for manually adjusting the split nut on said shaft.

The counter shaft 36 is journaled in a medial portion of the guide frame 22 and on one of its outer end portions carries a grooved fly wheel 40 and a spiral pinion 41. The groove of the grooved fly wheel is engaged by a friction wheel 42 carried by a swing arm 43 which is fulcrumed on the electric motor 19 within the case. Said friction wheel has a belted driving connection 44 with the motor and the swing arm is controlled to move the friction wheel into and out of engagement with the fly wheel by a bolt and thumb nut connection 45 which projects through the front portion of the casing. Circuit wires 19' extending out of the casing are adapted to be connected to a source of current supply. A rheostat 46 controls the speed of the motor. To drive manually, the hand crank 20 is mounted on a shaft 47 which is connected by a train of gears 48 to the spiral gear 41 and drives the same when the crank is turned.

The transversely extending counter shaft 36 between the worm wheel 34 and the spiral pinion 41 also has mounted fast thereon a cam wheel 49 provided with a cam tooth 50 which extends circumferentially around the wheel for the greater portion of its length and then extends spirally the distance of one tooth of the toothed wheel 51 with which it is in mesh, and which will be described later.

A split nut 52, formed of two half sections which are pivotally mounted on projecting portions 53 of the carriage 22 adjacent the projecting lens holder 26 by pivot pins 54, engages the threaded portion 29' of the shaft 29 to feed the carriage upwardly with a continuous movement. In order to more firmly support the weight of the carriage, the thread of the threaded portion 29' of the feed screw is formed with a flat or horizontally extending upper edge as clearly shown in Fig. 8, and the split nut is threaded to correspond.

The inner faces of the forward end portions of the split nut are formed with half rounded recesses 55 to receive the lower rounded end 56 of a split nut separator link 57 which pivotally depends from an actuating arm 58. A spring means 59 normally pulling on the outer sides of both split nut sections yieldingly holds said sections in closed position and in engagement with the threaded portion of the feed shaft 29. When the link is pulled upwardly the lower rounded or spherical end will be withdrawn from the rounded recesses of the nut sections and separate said nut sections sufficiently far to clear or disengage the thread of the feed

shaft and thus permit the carriage 24 to be quickly adjusted to any desired position to properly frame the pictures or to replace a film.

A transversely extending rock shaft 60 journaled in the upper portion of the carriage 24 and the upper portion of the projecting lens holder 26 extends through vertically extending elongated slots 61 formed in the opposite side upright portions of the rectangular frame 22 and is provided on its opposite ends with milled knobs or handles 62 for convenience in rocking said shaft. The split nut actuating arm 58 before mentioned, is mounted fast on the rock shaft 60 and is moved thereby. A coiled spring 63 surrounding the rock shaft and interposed between the arm 58 and one of the side portions of the carriage has its opposite end portions hooked, respectively, over the arm and the said carriage part to yieldingly hold the arm in its lower position of swing and the rock shaft in its normal position of rest.

Journaled in the carriage 22 a short distance below the lens holder 26 and projecting forwardly from the carriage is a short shutter shaft 64 having a spiral gear 65 on its inner end portion which is in mesh with and driven continuously by the spiral gear 33 slidably mounted on the vertically extending shutter actuating shaft 30, before described. The forward end of the shutter shaft 64 carries a disk 66 upon which is adjustably mounted a rotary segmental lens shutter 67, the segmental blades 68 and 69 of which rotate across the axial line of a pencil of light projected by a lens 70 within the lens holder 26. The movement of the shutter is so co-related to the movement of the film that during the short period of time the film is moving to position in consecutive order the next picture to be projected, the pencil of light from the lens will be intercepted by the larger segmental blade 68 of the shutter. The larger segmental blade is approximately one-fifth of the whole diameter so that each picture would be projected for a period of approximately three quarters of the period of the rotation and produce the effect or appearance of a flicker or vibration of the projected picture were it not for the use of the other and smaller segmental blade 69 which divides the exposure period and eliminates this optical illusion and thus projects a steady clean cut moving picture. The hub portion of the shutter is provided with segmental slots 71 to receive screws 72 which extend through the slots and thread into the disk 66 to adjust said shutter circumferentially with relation to the movement of the film.

The tube portion 75 of the lens 70 is provided on one end with an aperture 70' to frame or outline each picture on the film.

The tubular lens holder 26 is provided with a larger bore on its inner end to form an annular shoulder 73 against which a coiled spring 74 bears. The tube portion 75 of the lens 70 is slidably positioned within the lens holder 26 and on its inner end portion is formed an annular shoulder 76 against which the inner end portion of the coiled spring 74 bears and yieldingly holds the lens in its innermost position. The tube portion 75 is also provided with opposite side projecting trunnions 77 which extend through elongated slots 78 provided in the opposite side portions of the lens holder 26. Said projecting trunnion portions are engaged on their inner sides by downwardly extending fingers 79 mounted fast on the transversely extending rock shaft 60 so that when the rock shaft 60 is turned to disengage the threaded nut from the shaft to permit the adjustment of the lens axially with relation to the film, the said lens will be moved forwardly away from the film a slight distance to prevent marring the same. The focus of the projecting lens may be adjusted in any manner desired. One of the milled knobs or handles 62 is provided with a downwardly extending finger 80 which engages a shoulder 81 formed on the upper edge portion of an arm 82 pivotally mounted on one side portion of the rectangular frame 22. A guide member 83 limits the movement of the arm 82 and a spring 84 yieldingly holds the arm in its uppermost normal position of rest. When the carriage is moved downwardly to its lower position the finger 80 will engage the shoulder of the arm 82 and said shoulder will hold the finger in its outer position and the lens in its outer position and out of contact with the film to permit changing or removal of a film without liability of damaging the film. When the finger is thus held the split nut will also be held out of engagement with the threaded shaft until the finger is released by pressing downwardly manually on the arm 82.

Mounted in the frame 21 are two vertically extending shafts 85 and 86 on which are mounted film engaging wheels 87 and 88. The said wheels are mounted on opposite end portions of the shafts and the wheels 87 are provided with teeth which enter perforations 89 formed in the upper and lower edge portions of the endless film 90 and move the film circumferentially the distance of one picture for each movement of the wheels. The wheels 88 are idlers against which the film bears. Partly surrounding each shaft 85 and 86 and between the respective wheels on said shafts are positioned vertically extending stationary film guide members or aprons 91 which are of semi-circular shape in cross section and are of less diameters than the wheels 87 and 88 and are not contacted with the film during

its travel to prevent scratching said film. The wheels and the guides are positioned on opposite sides of the lens and the wheels intermittently move the film transversely to the axis of the lens. The vertically extending shaft 85 is intermittently driven by the toothed wheel 51, before mentioned, which is mounted fast on the lower end of said shaft 85 and is turned the distance of one tooth each complete revolution of the cam wheel 49. The cam wheel in addition to intermittently rotating the toothed wheel also firmly holds the toothed wheel in a position of rest during the period of time the angular portion of the cam tooth is out of engagement with the toothed wheel.

In order to hold the film firmly against the film engaging wheels 87 and 88, pressure members 92 are provided which are curved to partly surround the said wheels and bear against the upper and lower portions of a film interposed between the wheels and the pressure members. The pressure members are pivotally mounted at their inner ends on the frame 22, and comprise upper and lower curved portions which are connected together by vertically extending outer and inner rods 93. Flat springs 94 mounted on the frame 22 have their opposite ends bearing against the pressure members 92 and hold them yieldingly against the film. Spring members 95 mounted on the opposite side portions of the rectangular frame 22 are provided with rearwardly extending stop hook portions 96 for limiting the movement of the pressure members towards the film, and are also provided with shouldered portions 97 which hold the pressure members 92 when swung forwardly to permit the removal or insertion of a film. To release the pressure members from the shoulders it is only necessary to press inwardly on the hooked end portions of the spring members. The frame 22 is also provided with a pressure block 98 which is guided on upwardly extending frame pins 99 and is pressed downwardly by a flat spring 100 also mounted on the frame 22. Said pressure block bears downwardly on the upper edge portion of the film and yieldingly holds the film in its lowermost position.

The lamp chamber 28, before mentioned, extends upwardly in spaced relation within the tubular film holder 23 and is formed with a double wall of which the outer wall 28' is spaced from the inner wall and is perforated to permit the escape of heat from the electric lamp 101 within the lamp chamber. The outer surface of the inner wall of the chamber is provided with an asbestos covering 102 to insulate the film from the heat of the lamp.

The lamp socket 103 is provided with a downwardly projecting stem 104 which ex-

tends through a ball member 105 and a bolt member 106 which form part of a ball and socket connection 107 with the rearwardly extending arm 27 of the carriage. The ball member 105 on one side extends into the socket of a part spherical member 108 and the bolt 106 extends transversely through a slot 109 in the same member 108 and through the ball member 106 at right angles to the stem 104. A nut 110 threaded on the end portion of the bolt 106 clamps the ball member and the lamp socket stem in adjusted position to the arm 27. This construction permits the lamp to be adjusted vertically, laterally or forwardly and rearwardly and is very desirable in replacing electric lamp bulbs in which the position of the filament varies in different bulbs.

A condensing lens holder 111 in the form of a tube having a conical front end portion is mounted in and extends through the lamp chamber in axial alinement with the projecting lens holder 26. The forward end of the said holder 111 terminates sufficiently close to the rear end of the projecting lens 70 as to just leave space between the two for the film to pass therebetween without undue friction. The adjacent ends of the holder 111 and the lens 70 are formed with upper and lower projecting portions 112 which engage the film in lines between the pictures and thus prevent scratching or marring the pictures as they intermittently pass between the said parts.

The inner or rear end portion of the condensing lens holder 111 projects through the wall of the lamp chamber 28 and into said chamber a short distance. A condensing lens 113 is removably positioned in the holder 111 and is provided with a tubular portion 114 which extends upwardly in the lamp chamber. The tubular portion 114 is provided with a spring bolt 115 which extends through an opening 116 in the holder 111 and into a registering opening 117 in the tube of the lens 113 thus providing for the correct positioning of the lens in the holder and for removably locking the same in position. As the lamp and both lenses are mounted on the carriage they will move simultaneously downwardly or upwardly as desired. An elongated opening 114' is provided in the tubular film holder 23 and the connected frame parts to permit the travel of the lenses projecting through the parts.

The rearwardly projecting arm 27 is provided with a plurality of openings 116 to permit a circulation of air therethrough. An inclined cover 117 is mounted on top of the lamp chamber 28 and is provided with a rearwardly extending opening 118 to permit the passage of the warm air from the said lamp chamber. The film 90 may have its end portions joined together in any manner desired to form an endless belt or

tube, or it may be formed as a tube with integral portions. Said film is formed of transparent material and is adapted to have the pictures thereon extend spirally circumferentially around the film and slightly in offset relation vertically.

In the modified form of shutter shown in Figs. 14 and 15, the shutter 119 is of elongated rectangular shape and is pivotally mounted at its opposite end portions on the cranked portions of two cranked arms 120. The arms are provided with counterweight portions 121 and are mounted on shafts 122 which are journaled in the rectangular frame 22. Said shafts 122 are synchronously driven by sprocket wheels 123 mounted on the shafts and a sprocket chain 124 connecting the two sprocket wheels. The lower shaft 122 may be driven from the shaft 36 by bevel gears 125 or in any other manner desired. The shafts 122 are spaced a sufficient distance apart to permit the vertical movement of the lens therebetween. In this modified form the shutter will intersect the projected pictures from the lens twice for each revolution of the arms 120 thereby forming a very simple construction.

A front cover 126 provided with an elongated opening 127 is removably slidably mounted on the front portion of the rectangular frame to better protect the parts. The elongated opening 127 is of sufficient length to permit the projection of the pictures therethrough during the entire movement of the lenses. Switches 46' control the current for the electric motor and for the lamp.

In use the carriage is moved downwardly to its lowermost position and in which position the lens is automatically held in its forward position. The film is now placed over the film holder and between the condensing and projecting lenses with the lower edge of the film resting on the frame 21 and its upper edge beneath the pressure member 92. When thus placed the teeth of the film engaging wheels 87 will enter the line of perforations 89 of the film. The pressure members 92, which previously to the insertion of the film were moved outwardly, are now manually released and will spring into engagement with the film and hold said film firmly, yieldingly, in engagement with the wheels 87. It is now only necessary to turn on the current to the lamp, start the motor or turn the operating crank and press downwardly on the arm 82 to release the projecting lens and permit it to slide inwardly to its normal position and frame the pictures. As thus operated the film will be intermittently rotated the distance of one picture for each movement of the film while the carriage carrying the lamp and the condensing and projecting lenses will be slowly moved axially the distance one picture is offset from

the next succeeding picture of the spirally arranged series of pictures. If the lenses are not properly positioned to frame the pictures, the axial movement of the carriage 5 may be stopped by holding the milled thumb knob until the pictures frame properly with the lenses and the thumb knob is then released to permit the movement of the carriage to continue. When the lenses have 10 traveled the width of the film the split nut will have reached the end of the threaded portion of the shaft 29 and automatically stop further movement of the carriage. The transversely extending rock shaft 60 is now 15 turned outwardly to disengage the split nut from the threaded portion and the carriage is slid downwardly to its initial position to permit the removal of the film and the substitution of another film.

20 From the foregoing description, it will be seen that the moving picture projector is of comparatively simple construction and is well adapted for the purpose described.

What I claim as my invention is:

25 1. A moving picture projector, comprising means for intermittently moving a transparent film having a spiral line of pictures thereon, a projecting lens adjacent the film and continuously movable approximately at 30 right angles to the film movement and at a speed corresponding to the speed of travel of the line of pictures longitudinally of the axis of movement of said pictures, and means for directing a ray of light through the film 35 and the lens.

40 2. A moving picture projector, comprising means for intermittently moving a transparent film having a spiral line of pictures thereon, a projecting lens positioned on one side of the film and continuously movable 45 approximately at right angles to the movement of the film and at a speed corresponding to the speed of travel of the line of pictures longitudinally of the axis of movement of said pictures, and means positioned on the opposite side of the film for directing 50 a ray of light through the film and the lens.

55 3. A moving picture projector, comprising means for intermittently moving a transparent film having a spiral line of pictures thereon, a projecting lens positioned on one side of the film and continuously movable 60 approximately at right angles to the movement of the film and at a speed corresponding to the speed of travel of the line of pictures longitudinally of the axis of movement of said pictures, a condensing lens positioned on the opposite side of the film and movable 65 in unison with the projecting lens, and means for directing a ray of light through the condensing lens and the film and the projecting lens.

4. A moving picture projector, comprising means for intermittently moving a transparent film having a spirally trending line

of pictures thereon, a projecting lens positioned on one side of the film and continuously movable approximately at right angles to the movement of the film, a condensing lens positioned on the opposite side 70 of the film and movable in unison with the projecting lens, and a lamp adjacent the condensing lens and movable therewith for directing a ray of light through the condensing lens and the film and the projecting 75 lens.

5. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, and a carriage continuously movable in a line approximately parallel to the axis of movement of the film, said carriage carrying a projecting lens and a condensing lens and a lamp for directing 80 a ray of light through the film.

6. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to 85 the axis of movement of the film, a projecting lens mounted on the carriage and positioned on the outer side of the film, a condensing lens mounted on the carriage and positioned on the inner side of the film, and a lamp for directing rays of light through the condensing lens and the film and the 90 projecting lens.

7. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to 95 the axis of movement of the film, a projecting lens apertured part mounted on the carriage on one side of the film and manually movable in a line at an angle to the movement of the film and the carriage, a condensing lens mounted on the carriage on the opposite side of the film, and a lamp movable 100 with the carriage and adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting lens.

8. A moving picture projector, comprising means for holding an intermittently rotatable transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of 105 the film, a projecting lens mounted on the carriage on one side of the film, a condensing lens mounted on the carriage on the opposite side of the film, a lamp mounted on the carriage adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting 110 lens, and means for continuously moving some of the respective parts.

9. A moving picture projector, comprising 115

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means for intermittently moving a tubular transparent film having a line of pictures thereon, an automatically movable projecting lens adjacent the film and continuously moving with relation thereto, means for directing a ray of light through the film and the lens, and means intercepting the ray of light during each intermittent movement of the film.

10 10. A moving picture projector, comprising means for intermittently moving a tubular transparent film having a line of pictures thereon, a projecting lens adjacent the film and automatically movable approximately at right angles to the film movement and continuously with relation thereto, means for directing a ray of light through the film and the lens, and means intercepting the ray of light during each intermittent movement of the film.

11. A moving picture projector, comprising means for intermittently moving a transparent film having a spiral line of pictures thereon, a projecting lens positioned on one side of the film, means for continuously moving the lens approximately at right angles to the movement of the film and at a speed corresponding to the speed of travel of the line of pictures longitudinally of the axis of movement of said pictures, means positioned on the opposite side of the film for directing a ray of light through the film and the lens, and means intercepting the ray of light during each intermittent movement of the film.

12. A moving picture projector, comprising means for intermittently moving a transparent film having a spiral line of pictures thereon, a projecting lens positioned on one side of the film and continuously movable approximately at right angles to the movement of the film and at a speed corresponding to the speed of travel of the line of pictures longitudinally of the axis of movement of said pictures, a condensing lens positioned on the opposite side of the film and movable in unison with the projecting lens, means for directing a ray of light through the condensing lens and the film and the projecting lens, and means intercepting the ray of light during each intermittent movement of the film.

13. A moving picture projector, comprising means for intermittently moving a transparent film having a spirally trending line of pictures thereon, a projecting lens positioned on one side of the film and continuously movable approximately at right angles to the movement of the film, a condensing lens positioned on the opposite side of the film and movable in unison with the projecting lens, a lamp adjacent the condensing lens and movable therewith for directing a ray of light through the condensing lens and the film and the projecting

lens, and means intercepting the ray of light during each intermittent movement of the film.

14. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film said carriage carrying a projecting lens and a condensing lens and a lamp for directing a ray of light through the film, and means intercepting the ray of light during each intermittent movement of the film.

15. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens mounted on the carriage and positioned on the outer side of the film, a condensing lens mounted on the carriage and positioned on the inner side of the film, a lamp for directing rays of light through the condensing lens and the film and the projecting lens, and means intercepting the ray of light during each intermittent movement of the film.

16. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens apertured part mounted on the carriage on one side of the film and manually movable in a line at an angle to the movement of the film and the carriage, a condensing lens mounted on the carriage on the opposite side of the film, a lamp movable with the carriage and adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting lens, and means intercepting the ray of light during each intermittent movement of the film.

17. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens mounted on the carriage on one side of the film, a condensing lens mounted on the carriage on the opposite side of the film, a lamp mounted on the carriage adjacent the condensing film for directing a ray of light through the condensing lens and the film and the projecting lens, means for continuously moving some of the respective parts, and means intercepting the ray of light during each intermittent movement of the film.

18. A moving picture projector, compris-

ing means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens mounted on the carriage on one side of the film, a condensing lens mounted on the carriage on the opposite side of the film, a lamp movable with the carriage and adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting lens, and a shutter intercepting the ray of light during each intermittent movement of the film.

19. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens mounted on the carriage on one side of the film, a condensing lens mounted on the carriage on the opposite side of the film, a lamp movable with the carriage and adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting lens, and a rotary shutter intercepting the ray of light during each intermittent movement of the film.

20. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens mounted on the carriage on one side of the film, a condensing lens mounted on the carriage on the opposite side of the film, a lamp movable with the carriage and adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting lens, and a continuously rotatable shutter intercepting the ray of light during each intermittent movement of the film.

21. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens mounted on the carriage on one side of the film, a condensing lens mounted on the carriage on the opposite side of the film, a lamp movable with the carriage and adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting lens, and a shutter intercepting the ray of light during each intermittent movement of the film and during a period between said intermittent movements.

22. A moving picture projector, compris-

ing means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens mounted on the carriage on one side of the film, a condensing lens mounted on the carriage on the opposite side of the film, a lamp movable with the carriage and adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting lens, and a shutter intercepting the ray of light during each period of time of the intermittent movement of the film and also intersecting the ray of light for a shorter time during the period of rest of the film between each intermittent movement.

23. A moving picture projector, comprising means for intermittently rotating a transparent film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens mounted on the carriage on one side of the film, a condensing lens mounted on the carriage on the opposite side of the film, a lamp movable with the carriage and adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting lens, and a rotary shutter having two blades of different widths, the wider blade intercepting the ray of light during each period of intermittent movement of the film and the narrower blade intercepting the ray of light during the period of rest of the film between each intermittent movement thereof.

24. A moving picture projector, comprising means for intermittently rotating a transparent tubular film having a spirally trending line of pictures thereon, a carriage continuously movable in a line approximately parallel to the axis of movement of the film, a projecting lens mounted on the carriage on one side of the film, a condensing lens mounted on the carriage on the opposite side of the film, a lamp movable with the carriage and adjacent the condensing lens for directing a ray of light through the condensing lens and the film and the projecting lens, and a shutter intercepting the ray of light during each intermittent movement of the film.

25. A moving picture projector, comprising a support for holding an intermittently rotatable transparent tubular film having a spirally trending line of pictures thereon, means for intermittently rotating a tubular film mounted thereon, a carriage slidably mounted on the support and movable in a line parallel to the axis of the film, means for continuously moving the carriage in one direction, a projecting lens mounted on the

carriage adjacent the outer surface of the film, a condensing lens mounted on the carriage within the tubular film, and a lamp mounted on the carriage adjacent the condensing lens.

26. A moving picture projector, comprising a support having a tubular film holder for receiving a transparent tubular film having a spirally trending line of pictures thereon, means for intermittently rotating a tubular film mounted on the holder, a carriage slidably mounted on the support and movable in a line parallel to the axis of the film, means for automatically moving the carriage in one direction, an apertured projecting lens part movably mounted on the carriage on the outer side of the tubular film holder, a condensing lens mounted on the carriage within the tubular film holder, and means for directing a ray of light through the condensing lens and the film and the projecting lens.

27. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame, a threaded shaft for moving the carriage continuously in a direction parallel to the direction of the axis of the film, a projecting lens mounted on the carriage adjacent the outer side of the tubular film, a condensing lens mounted on the carriage within the tubular film holder, and means for directing a ray of light through the condensing lens and the film and the projecting lens.

28. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame, a threaded shaft for moving the carriage continuously in a direction parallel to the direction of the axis of the film, a projecting lens mounted on the carriage adjacent the outer side of the tubular film, a condensing lens mounted on the carriage within the tubular film holder, and a lamp mounted on the carriage and within the tubular film holder for directing a ray of light through the condensing lens and the film and the projecting lens.

29. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame, a threaded shaft for moving the carriage continuously in a direction parallel to the direction of

the axis of the film, a projecting lens mounted on the carriage adjacent the outer side of the tubular film, a condensing lens mounted on the carriage within the tubular film holder, a lamp mounted on the carriage within the tubular film holder for directing a ray of light through the condensing lens and the film and the projecting lens, and means intercepting the ray of light during each intermittent movement of the film.

30. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame, a threaded shaft for moving the carriage continuously in a direction parallel to the direction of the axis of the film, a projecting lens mounted on the carriage adjacent the outer side of the tubular film, a condensing lens mounted on the carriage within the tubular film holder, a lamp mounted on the carriage within the tubular film holder for directing a ray of light through the condensing lens and the film and the projecting lens, and means intercepting the ray of light during each intermittent movement of the film and also during a period between said intermittent movements.

31. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame, a threaded shaft for moving the carriage continuously in a direction parallel to the direction of the axis of the film, a projecting lens mounted on the carriage adjacent the outer side of the tubular film, a condensing lens mounted on the carriage within the tubular film holder, a lamp mounted on the carriage within the tubular film holder for directing a ray of light through the condensing lens and the film and the projecting lens, and a rotary shutter mounted on the carriage and having two blades of different widths, the wider blade intercepting the ray of light during each period of intermittent movement of the film and the narrower blade intercepting the said ray of light during the period of rest of the film between each intermittent movement thereof.

32. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in

the frame and engaging and moving the carriage with a continuous movement in a direction parallel to the axis of the film, means permitting the disengagement of the carriage with the threaded shaft to move the carriage in the opposite direction, a projecting lens mounted on the carriage adjacent the outer side of the tubular film, a condensing lens carried by the projecting arm of the carriage and positioned within the film holder, and means carried by said projecting carriage arm for directing a ray of light through the condensing lens and the film and the projecting lens.

33. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame and engaging and moving the carriage with a continuous movement in a direction parallel to the axis of the film, means permitting the disengagement of the carriage with the threaded shaft to move the carriage in the opposite direction, a projecting lens mounted on the carriage adjacent the outer side of the tubular film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber in axial alinement with the projecting lens, and means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens.

34. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame and engaging and moving the carriage with a continuous movement in a direction parallel to the axis of the film, means permitting the disengagement of the carriage with the threaded shaft to move the carriage in the opposite direction, a projecting lens mounted on the carriage adjacent the outer side of the tubular film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber and extending through the wall thereof in axial alinement with the projecting lens, and a lamp adjustably mounted on the carriage arm and extending into the lamp chamber for directing a ray of light through

the condensing lens and the film and the projecting lens.

35. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded means carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, a projecting lens mounted on the carriage adjacent the outer side of the film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber and extending through the wall thereof in axial alinement with the projecting lens, and means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens.

36. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the film holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded means carried by the carriage and engageable with the threaded shaft for continuously moving the carriage parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, a projecting lens mounted on the carriage adjacent the outer side of the film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber and extending through the wall thereof in axial alinement with the projecting lens, a lamp adjustably mounted on the carriage arm and extending into the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, and means intercepting the ray of light during each intermittent movement of the film.

37. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the film holder, said film having a spirally trending line of pictures thereon, a

carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded means carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, a projecting lens mounted on the carriage adjacent the outer side of the film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber and extending through the wall thereof in axial alinement with the projecting lens, a lamp adjustably mounted on the carriage arm and extending into the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, and a rotary shutter journaled on the carriage and intercepting the ray of light during each period of intermittent movement of the film and also intercepting the ray of light during the period of rest of the film between each intermittent movement thereof.

38. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the film holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded means carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, a projecting lens mounted on the carriage adjacent the outer side of the film and having an apertured part, means for moving the projecting lens apertured part away from the film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber in axial alinement with the projecting lens, and means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens.

39. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the film holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded

shaft journaled in the frame, a threaded means carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, a projecting lens apertured part mounted on the carriage adjacent the outer side of the film, means for moving the projecting lens apertured part away from the film controlled by the movement to disengage the carriage from the thread shaft, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber in axial alinement with the projecting lens, and means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens.

40. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, means for intermittently rotating a tubular film mounted on the film holder, said film having a spirally trending line of pictures thereon, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded means carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, a projecting lens apertured part mounted on the carriage adjacent the outer side of the film, means for moving the projecting lens apertured part away from the film controlled by the movement to disengage the carriage from the threaded shaft, means for maintaining the projecting lens apertured part in its outer position and the carriage disengaged from the threaded shaft, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber and extending through the wall thereof in axial alinement with the projecting lens, and means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens.

41. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, an intermittently rotatable shaft journaled in the frame and provided with a toothed wheel, a tubular film surrounding the film holder and having a line of openings formed in one of its edges which are entered by the teeth of the toothed wheel, a carriage slidably mounted on the frame and having an arm

projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded member carried by the carriage and movable into engagement with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, means mounted on the carriage for controlling the movement of the threaded member, a projecting lens mounted on the carriage adjacent the outer side of the film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber and in axial alinement with the projecting lens, means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, and means for rotating the threaded shaft.

42. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, an intermittently rotatable shaft journaled in the frame and provided with a toothed wheel, a tubular film surrounding the film holder and having a line of openings formed in one of its edges which are entered by the teeth of the toothed wheel, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded member carried by the carriage and movable into engagement with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, means mounted on the carriage for controlling the movement of the threaded member, a projecting lens mounted on the carriage adjacent the outer side of the film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber and in axial alinement with the projecting lens, means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, means intercepting the ray of light during each period of intermittent movement of the film, and means for rotating the threaded shaft.

43. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, an intermittently rotatable shaft journaled in the frame and provided with a toothed wheel, a tubular film surrounding the film holder and having a line of openings formed in one of its edges which are entered by the teeth

of the toothed wheel, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded member carried by the carriage and movable into engagement with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, means mounted on the carriage for controlling the movement of the threaded member, a projecting lens mounted on the carriage adjacent the outer side of the film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber and in axial alinement with the projecting lens, means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, a rotary shutter journaled in the carriage and intercepting the ray of light during each period of intermittent movement of the film and also intercepting the ray of light during the period of rest of film between the intermittent movement thereof, and means for rotating the threaded shaft.

44. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, an intermittently rotatable shaft journaled in the frame and provided with a toothed wheel, a tubular film surrounding the film holder and having a line of openings formed in one of its edges which are entered by the teeth of the toothed wheel, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded member carried by the carriage and movable into engagement with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, means mounted on the carriage for controlling the movement of the threaded member, a projecting lens apertured part mounted on the carriage adjacent the outer side of the film, said threaded member controlling means also moving the projecting lens apertured part outwardly away from the film when the threaded member is out of engagement with the threaded shaft, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular film holder, a condensing lens carried by the lamp chamber in axial alinement with the projecting lens, means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting

lens, means for rotating the threaded shaft, means intercepting the ray of light during each period of intermittent movement of the film, and means for rotating the threaded shaft.

45. A moving picture projector, comprising a support having a tubular film holder and a frame adjacent thereto, an intermittently rotatable shaft journaled in the frame and provided with a toothed wheel, a tubular film surrounding the film holder and having a line of openings formed in one of its edges which are entered by the teeth of the toothed wheel, a carriage slidably mounted on the frame and having an arm projecting towards the axis of the film holder, a threaded shaft journaled in the frame, a threaded member carried by the carriage and movable into engagement with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, means mounted on the carriage for controlling the movement of the threaded member, a projecting lens apertured part mounted on the carriage adjacent the outer side of the film, said threaded member controlling means also moving the projecting lens apertured part outwardly away from the film when the threaded member is out of engagement with the threaded shaft, means for maintaining the threaded member in its disengaging position and the projecting lens apertured part in its outer position while the carriage is at rest in its initial starting position, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular frame holder, a condensing lens carried by the lamp chamber in axial alinement with the projecting lens, means within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, means for rotating the threaded shaft, means intercepting the ray of light during each period of intermittent movement of the film, and means for rotating the threaded shaft.

46. A moving picture projector, comprising a casing having an upstanding tubular film holder and a frame adjacent thereto, an intermittently rotatable shaft journaled in the frame and provided with toothed wheels, a tubular film surrounding the film holder and provided with lines of edge openings which are entered by the teeth of the toothed wheels, a carriage slidably mounted on the frame and having an arm projecting towards the film holder, a threaded shaft journaled in the frame, a split threaded nut carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of the movement of the film and

disengageable with the shaft to permit movement of the carriage in the opposite direction, a projecting lens apertured part slidably mounted on the carriage adjacent the outer side of the film, means mounted on the carriage for disengaging the split nut from the threaded shaft and also for moving the projecting lens apertured part outwardly away from the film, a lamp chamber mounted on the projecting arm of the carriage and extending in the tubular holder, a condensing lens adjacent the lamp chamber and in alined position with the projecting lens, a lamp mounted within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, a shutter intercepting the ray of light during each period of intermittent movement of the film, and means for rotating the threaded shaft.

47. A moving picture projector, comprising a casing having an upstanding tubular film holder and a frame adjacent thereto, an intermittently rotatable shaft journaled in the frame and provided with toothed wheels, a tubular film surrounding the film holder and provided with lines of edge openings which are entered by the teeth of the toothed wheels, a carriage slidably mounted on the frame and having an arm projecting towards the film holder, a threaded shaft journaled in the frame, a split threaded nut carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, a projecting lens apertured part slidably mounted on the carriage adjacent the outer side of the film, means mounted on the carriage for disengaging the split nut from the threaded shaft and also for moving the projecting lens apertured part outwardly away from the film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular holder, a condensing lens movable with the lamp chamber and in alined position with the projecting lens, a lamp positioned within the lamp chamber and having a slidable and universal connection with the carriage arm for directing a ray of light through the condensing lens and the film and the projecting lens, and a rotary shutter intercepting the ray of light during each period of intermittent movement of the film.

48. A moving picture projector, comprising a casing having an upstanding tubular film holder and a frame adjacent thereto, an intermittently rotatable shaft journaled in the frame and provided with toothed wheels, a tubular film surrounding the film holder and provided with lines of edge openings which are entered by the teeth of the toothed

wheels, a carriage slidably mounted on the frame and having an arm projecting towards the film holder, a threaded shaft journaled in the frame, a split threaded nut carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film and disengageable with the shaft to permit movement of the carriage in the opposite direction, a cam means for transmitting and changing the continuous movement of the carriage shaft to the intermittent movement of the toothed wheel shaft, a projecting lens apertured part movably mounted on the carriage adjacent the outer side of the film, means mounted on the carriage for disengaging the split nut from the threaded shaft and also for moving the projecting lens apertured part outwardly away from the film, a lamp chamber mounted on the projecting arm of the carriage and extending into the tubular holder, a condensing lens movable with the lamp chamber and in aligned position with the projecting lens, a lamp positioned within the lamp chamber and having a slidable and universal connection with the carriage arm for directing a ray of light through the condensing lens and the film and the projecting lens, and a rotary shutter intercepting the ray of light during each period of intermittent movement of the film.

49. A moving picture projector, comprising a casing having an upstanding tubular film holder and a frame adjacent thereto, a shaft journaled in the frame and provided with toothed wheels, a film mounted on the holder and provided with lines of edge openings which are entered by the teeth of the toothed wheels, a carriage slidably mounted upon the frame and having a projecting arm, a threaded shaft journaled in the frame, a split threaded nut carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film, a projecting lens apertured part slidably mounted in the carriage, a rock shaft journaled in the carriage and having a connection with the split nut to separate the portions thereof to disengage the threaded shaft and also having a connection with the projecting lens apertured part to move it outwardly away from the film, said disengagement permitting the carriage to be moved to its initial position, means releasably maintaining the split nut in its shaft disengaging position and the projecting lens apertured part in its outer position, a cam wheel connection between the two first mentioned shafts for intermittently rotating the film engaging shaft, a lamp chamber mounted on the projecting arm and extending into the tubular film member, a condensing lens removably carried by the projecting arm and in axial line with the projecting lens, a lamp universally mounted within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, means intercepting the ray of light during the period of intermittent movement of the film, and means for rotating the threaded shaft.

member, a condensing lens removably carried by the projecting arm of the chamber in axial line with the projecting lens, a lamp universally mounted within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, means intercepting the ray of light during the period of intermittent movement of the film, and means for rotating the threaded shaft.

50. A moving picture projector, comprising a casing having an upstanding tubular film holder and a frame adjacent thereto, a shaft journaled in the frame and provided with toothed wheels, a film mounted on the holder and provided with lines of edge openings which are entered by the teeth of the toothed wheels, a carriage slidably mounted upon the frame and having a projecting arm, a threaded shaft journaled in the frame, a split threaded nut carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film, a projecting lens apertured part slidably mounted in the carriage, means permitting the retardation of the threaded shaft without stopping the intermittent movement of the film shaft, a rock shaft journaled in the carriage and having a connection with the split nut to separate the portions thereof to disengage the threaded shaft and also having a connection with the projecting lens apertured part to move it outwardly away from the film, said disengagement permitting the carriage to be moved to its initial position, means releasably maintaining the split nut in its shaft disengaging position and the projecting lens apertured part in its outer position, a cam wheel connection between the two first mentioned shafts for intermittently rotating the film engaging shaft, a lamp chamber mounted on the projecting arm and extending into the tubular film member, a condensing lens removably carried by the projecting arm and in axial line with the projecting lens, a lamp universally mounted within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, means intercepting the ray of light during the period of intermittent movement of the film, and means for rotating the threaded shaft.

51. A moving picture projector, comprising a casing having an upstanding tubular film holder and a frame adjacent thereto, a shaft journaled in the frame and provided with toothed wheels, a film mounted on the holder and provided with lines of edge openings which are entered by the teeth of the toothed wheels, means for yieldingly holding a portion of the film in contact with the toothed wheel, a carriage slidably mounted

upon the frame and having a projecting arm, a threaded shaft journaled in the frame, a split threaded nut carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film, a projecting lens apertured part slidably mounted in the carriage, a rock shaft journaled in the carriage and having a connection with the split nut to separate the portions thereof to disengage the threaded shaft and also having a connection with the projecting lens apertured part to move it outwardly away from the film, said disengagement permitting the carriage to be moved to its initial position, means releasably maintaining the split nut in its shaft disengaging position and the projecting lens apertured part in its outer position, a cam wheel connection between the two first mentioned shafts for intermittently rotating the film engaging shaft, a lamp chamber mounted on the projecting arm and extending into the tubular film member, a condensing lens removably carried by the projecting arm and in axial line with the projecting lens, a lamp universally mounted within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, means intercepting the ray of light during the period of intermittent movement of the film, and means for rotating the threaded shaft.

52. A moving picture projector, comprising a casing having an upstanding tubular film holder and a frame adjacent thereto, a shaft journaled in the frame and provided with toothed wheels, a film mounted on the holder and provided with lines of edge openings which are entered by the teeth of the toothed wheels, means for yieldingly holding a portion of the film in contact with the toothed wheel, means yieldingly engaging one of the edge portions of the film, a carriage slidably mounted upon the frame and having a projecting arm, a threaded shaft journaled in the frame, a split threaded nut carried by the carriage and engageable with the threaded shaft for continuously moving the carriage in a direction approximately parallel to the axis of movement of the film, a projecting lens apertured part slidably mounted in the carriage, means permitting the retardation of the threaded shaft without stopping the intermittent movement of the film shaft, a rock shaft journaled in the carriage and having a connection with the split nut to separate the portions thereof to disengage the threaded shaft and also having a connection with the projecting lens apertured part to move it outwardly away from the film, said disengagement permitting the carriage to be moved to its initial position, means releasably maintaining the

split nut in its shaft disengaging position and the projecting lens apertured part in its outer position, a cam wheel connection between the two first mentioned shafts for intermittently rotating the film engaging shaft, a lamp chamber mounted on the projecting arm and extending into the tubular film member, a condensing lens removably carried by the projecting arm and in axial line with the projecting lens, a lamp universally mounted within the lamp chamber for directing a ray of light through the condensing lens and the film and the projecting lens, means intercepting the ray of light during the period of intermittent movement of the film, and means for rotating the threaded shaft.

53. A moving picture projector in part, comprising a support having a tubular film holder and a frame, a carriage slidably mounted on the frame, a tubular lamp chamber mounted on the carriage and extending into the film holder, and a lamp within the chamber and having a ball and socket and a sliding connection with the carriage.

54. A moving picture projector in part, comprising a support having a tubular film holder and a frame, a carriage slidably mounted on the frame, a double wall tubular lamp chamber mounted on the carriage and extending into the film holder and having openings formed in the lower portion and in the outer wall of the chamber to permit a circulation of air therethrough, and a lamp within the chamber and having a ball and socket engagement with the carriage.

55. A moving picture projector in part, comprising a support having a frame, a threaded shaft journaled in the frame, a lens and lamp carriage slidably mounted on the frame, a split nut carried by the carriage and engaging the threaded shaft, yielding means holding the portions of the nut in engagement with the shaft, a rock shaft carried by the carriage and having a link extending between the portions of the nut to separate and disengage said portions from the threaded shaft to permit manual movement of the carriage.

56. A moving picture projector in part, comprising a frame, a lens carriage slidably mounted thereon, means for moving the carriage in one direction, a lens apertured part movably mounted on the carriage and having an inner and an outer position, and means automatically moving the lens apertured part to its outer position when the carriage is moved in the other direction.

57. A moving picture projector in part, comprising a frame, a threaded shaft journaled in the frame, a carriage slidably mounted on the frame and moved in one direction by the threaded shaft, a film moving shaft mounted on the frame and having a worm wheel, and a cam worm engaging the

worm wheel and having a yielding frictional engagement with the threaded shaft.

58. A moving picture projector, comprising means for intermittently rotating a transparent tubular film having a spirally trending line of pictures thereon, and a carriage continuously movable in a line approxi-

mately parallel to the axis of movement of the film, said carriage carrying a projecting lens and a condensing lens and a lamp for directing a ray of light through the film. 15

In testimony whereof, I affix my signature.

HERMAN C. SCHLICKER.