Nov. 11, 1924. 1,515,428

C. BOUIN

STEREOSCOPIC MOTION PICTURE PROJECTOR

Filed June 10, 1922 4 Sheets-Sheet 1

Fig. 1.

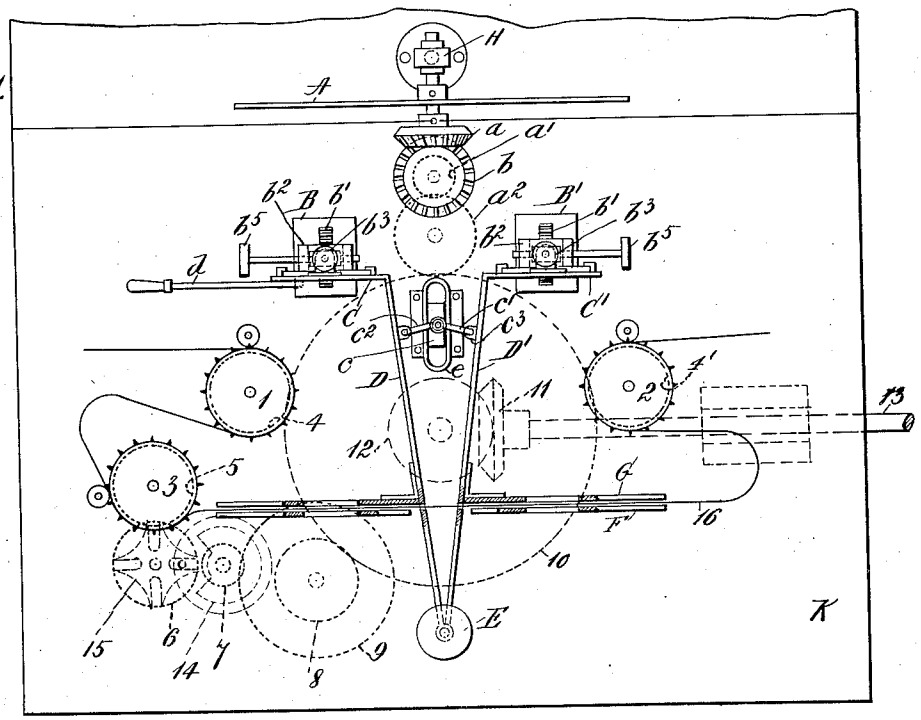
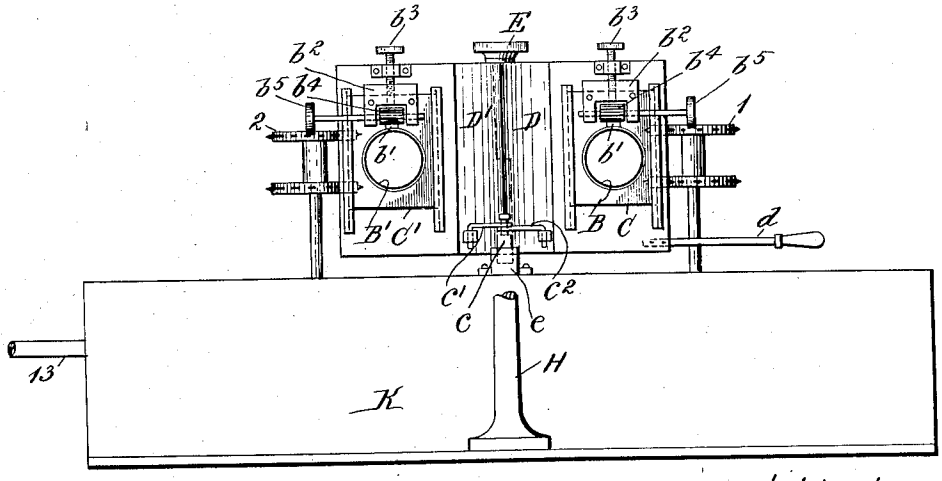


Fig. 2.



INVENTOR:

Charles Bouin.

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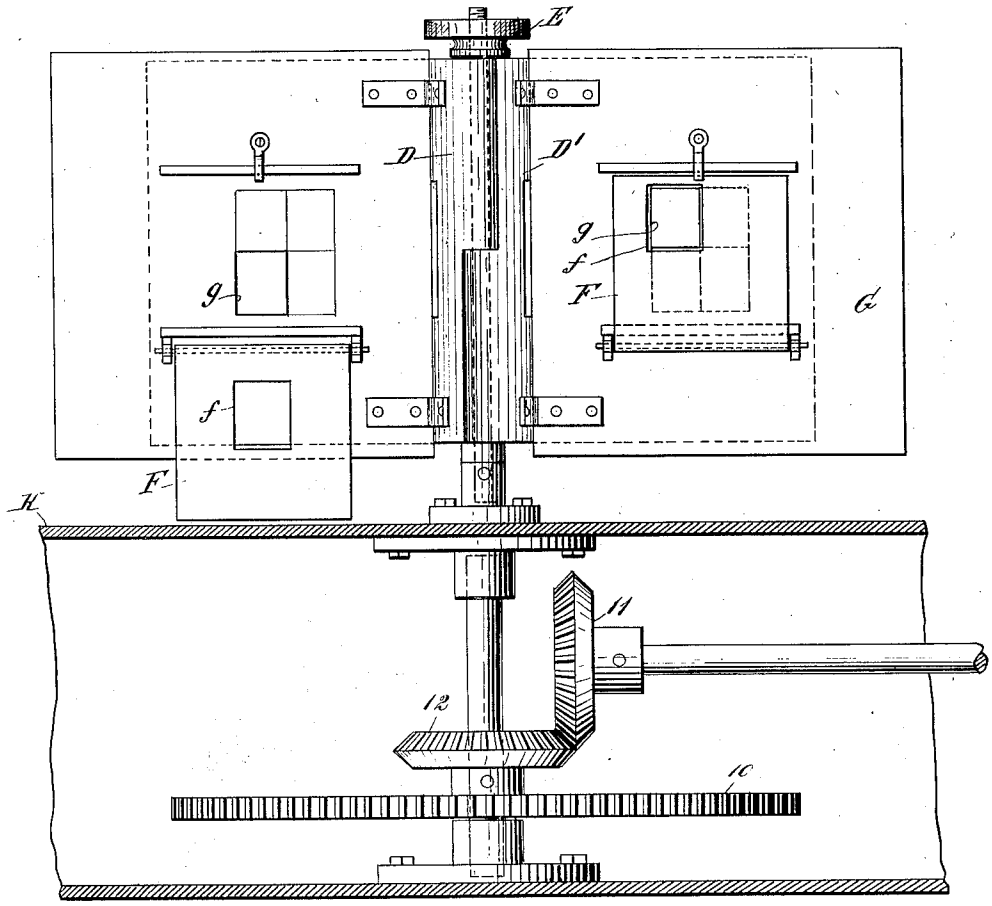
Fig. 3.



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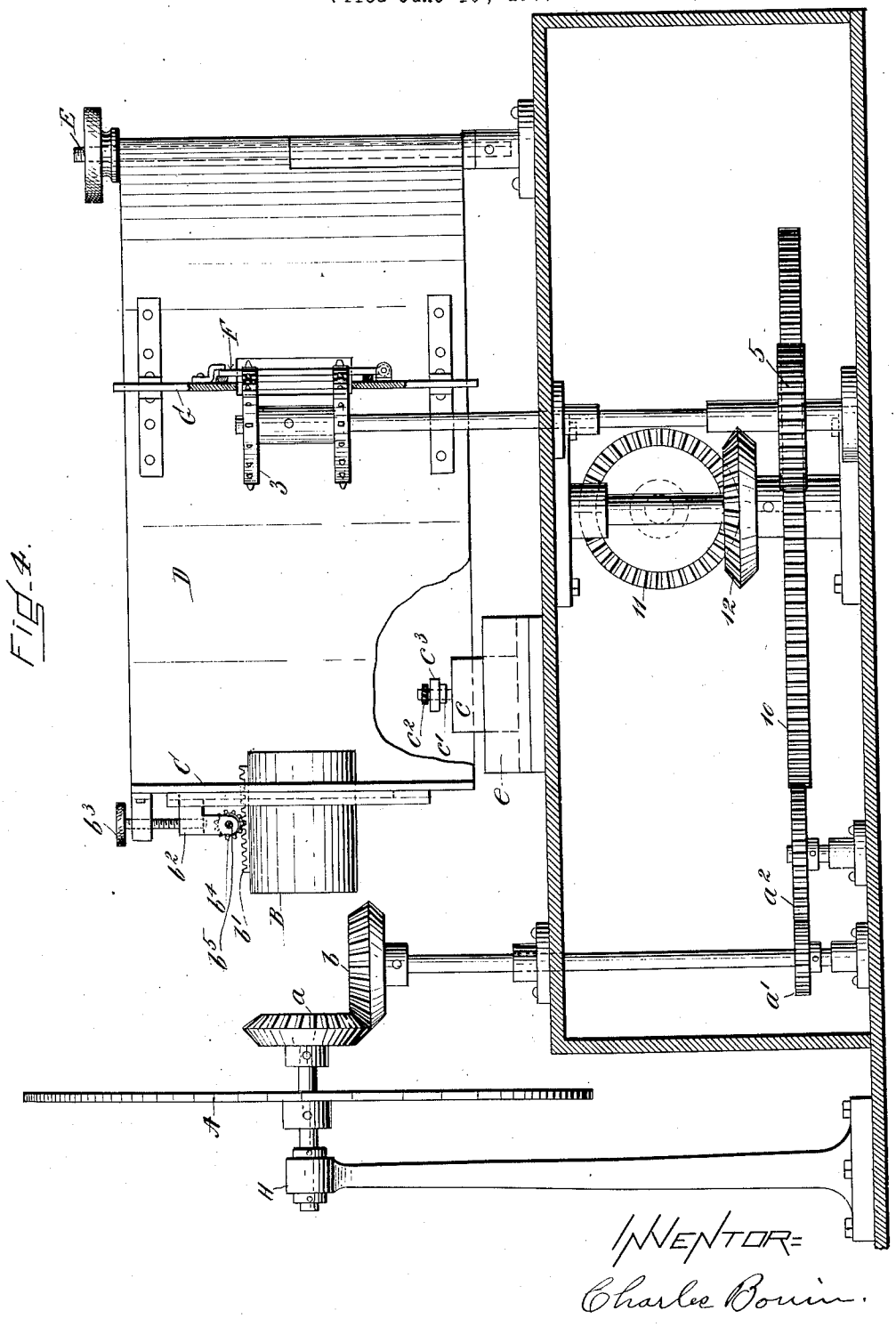

Fig. 4.

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Fig. 5.

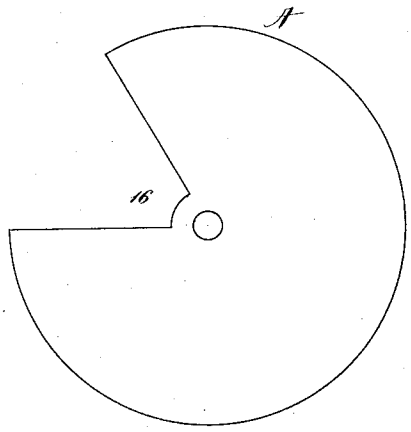


Fig. 6.

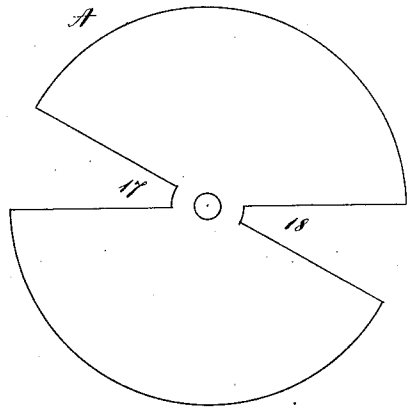
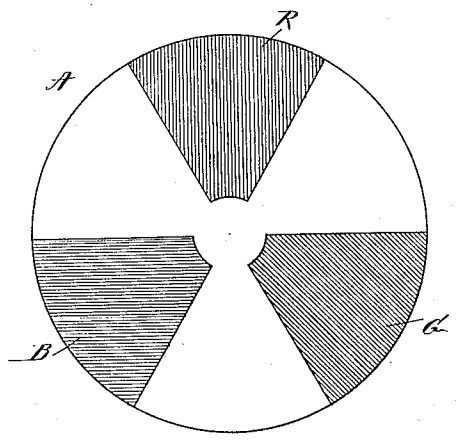


Fig. 4.



INVENTOR=
Charles Bouin.

Patented Nov. 11, 1924. 1,515,428

UNITED STATES PATENT OFFICE.

CHARLES BOUIN, OF BOSTON, MASSACHUSETTS.

STEREOSCOPIC MOTION-PICTURE PROJECTOR.

Application filed June 10, 1922. Serial No. 567,457.

To all whom it may concern:

Be it known that I, CHARLES BOUIN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Stereoscopic Motion-Picture Projectors, of which the following is a specification.

This invention relates to the projection of stereoscopic pairs of images upon a suitable screen.

The invention relates more particularly to a stereoscopic motion picture projector which employs a standard size film.

Further objects and advantages of the present invention will be pointed out in the hereinafter following description of one embodiment hereof, or will be obvious to those skilled in the mentioned arts.

Some of the objects of the stereoscopic motion picture projector to be described are as follows:

To project upon a stereoscopic projection screen images of scenes or objects or right and left pairs of images from two points equal to binocular distances from each other, the left angle images being projected from left side of projector and right angle images being projected from right side of projector in such a manner so as to superimpose such two images projected upon screen.

To converge or diverge the direction of rays of images from projector to screen in such a manner that convergence or divergence in process of superimposing the right and left image rays is equal to one another, or, during the process of convergence the same amount of convergence of rays occurs in both right and left image rays, and likewise with divergence.

To project upon a stereoscopic projection screen images of scenes or objects, or right and left stereoscopic pairs of images which are each one inch in height by ¾ inch in width: or ½ inch in height by ¾ inch in width: or ½ inch in height by ⅜ inch width.

To project upon a stereoscopic projection screen images of scenes or objects or right and left pairs of stereoscopic images which are on a single standard size film.

To project upon a stereoscopic projection screen right and left stereoscopic pairs of images at the rate of 16 or more pairs per second, and such right and left images comprising a stereoscopic pair being projected simultaneously or intermittently as desired according to the style of shutter employed in projector.

Referring to the accompanying drawings:

Fig. 1 represents a cross-sectional plan view showing position of different gears, film gate and aperture, method of converging direction of lenses and images.

Fig. 2 represents a front elevation, with shutter removed.

Fig. 3 represents a rear elevation view of film gate, film aperture, right and left partitions, openings in film gate and pressure plates.

Fig. 4 represents a side sectional elevation showing general view of different gears, etc.

Figs. 5, 6, and 7, represents different styles of shutters which may be used for different purposes.

In Fig. 1, which represents a cross-sectional plan view, B and B′ represents a pair of projection lenses which are placed in a true horizontal alinement when it is intended to project images which are one inch in height by ¾ inch in width on film: or one lens is placed ½ inch higher than the second lens when it is intended to project images which are ½ inch in height. The position and distance of the two lenses being such as to correspond to distance and position of stereoscopic pairs of images on film or openings in film gate. 3 is the sprocket wheel which pulls film through film gate. Sprocket wheel 3 and gear 5 being on same shaft, gear 5 meshing with gear 6; gear 7 meshing with gear 9 and gear 8 meshing with master gear 10; with such a combination, one revolution of master gear 10 will cause gear 8 to revolve four times, gear 8 revolving four times will also revolve gear 9 the same number of times inasmuch as gears 8 and 9 are on the same shaft; gear 9 revolving four times and meshing with gear 7 will cause gear 7 to revolve sixteen times; 7 and 14 revolving sixteen times will cause the Maltese-cross 15 and gear 6 to make four complete revolutions, which represents sixteen rests and sixteen periods of advancement; four revolutions of gear 6 will cause gear 5 and sprocket wheel 3 with sixteen teeth to revolve four times; during the four revolutions of sprocket wheel 3 the intermittent motion has been transmitted from the Maltese-cross to sprocket wheel 3; four

revolutions of sprocket wheel 3 equals four times sixteen sprocket teeth or perforations on edge of film or sixteen image widths of ¾ inch each, which has been advanced intermittently through film gate; by means of sprocket wheel 13 advancing film intermittently sixteen different times during one revolution of gear 10, each of such advancement of film equals $\frac{1}{16}$ of four revolutions of sprocket wheel 3, or sixty-four perforations on one edge of film which would give up four teeth or one image width advancing through film gate between each period of rest; such a combination being employed when projecting images which are ½ inch in height by ¾ inch in width on film and having one lens ½ inch higher than the second lens; images being on lower and upper horizontal half of film and running in rotation in a horizontal direction. Gear 10 revolving sprocket wheel 1 with sixteen teeth four times takes in sixteen image widths of ¾ inch each; gear 10 revolving sprocket wheel 2 with sixteen teeth four times advances film sixteen image widths of ¾ inch each, consuming the equivalent of one foot of film length.

When it is desired to employ a film having images which are ¼ the ordinary standard size of 1 inch by ¾ inch or images which are ½ inch in height by ⅜ inch in width, the size of opening that is made in film gate and pressure plate are likewise of the same size, one lens being ½ inch higher than the second lens; from such a position of lenses the upper lens is lowered and lower lens is raised by means of thumb screws b^3 a sufficient distance to allow the light rays from the two images to become superimposed in process of projection, in projecting sixteen pairs of stereoscopic images per one revolution of gear 10 when such images are ½ inch in height by ⅜ inch in width each, the equivalent of six inches of film is consumed and the following method is employed: Sprocket wheels are reduced ½ in size to eight teeth, or if preferred sprocket wheels with sixteen teeth are still employed and gears 4 and 4′ are increased double the size so that one revolution gear 10 will revolve both gears 4 and 4′ twice around, thus taking in and advancing film six inches; gear 10 revolving gear 8 four times and four revolutions of gear 8 revolves gear 7 sixteen times, gear 7 revolving sixteen times revolves the Maltese-cross four complete revolutions, Maltese-cross revolving four times will revolve gear 5 also four times, now, if the sprocket wheel 3 is reduced to ½ size or eight teeth,. four such revolutions will advance film through film gate four times eight teeth which equals thirty-two teeth lengths or the equivalent of six inches of film length; or if preferred gear 5 may be doubled in size, thus giving the same results. Four revolutions of the Maltese-cross 15 would revolve the double size gear 5 twice around and maintaining sprocket wheel with sixteen teeth would equal twice times sixteen teeth lengths which would be equivalent to six inches of film length; in either case sixteen periods of advancement of film through film gate would be equal to $\frac{1}{16}$ of the distance of thirty-two teeth or film perforations equalling ⅜ of an inch in length of advancement of film through film gate between each period of rest.

When it is desired to employ a film having images which are the ordinary standard size of one inch by ¾ inch, the size of opening in film gate and pressure plate are likewise of the same size; the projection lenses are placed in horizontal alinement, all images being also in horizontal alinement in direction of length of film; the distance between the two film apertures, distance of intermittent advancement of film and distance of stereoscopic pairs of images being such that in the process of projection no images are projected the second time and each image is projected from the angle direction which such image represents. In projecting sixteen pairs of stereoscopic images per one revolution of gear 10 when such images are each one inch in height by ¾ inch in width, the equivalent of twenty-four inches of film is consumed and the following method is employed: Sprocket wheels 1 and 2 are increased in size to thirty-two teeth, or, if preferred sprocket wheels with sixteen teeth are still employed and gears 4 and 4′ are decreased ½ the size so that one revolution of gear 10 will revolve both gears 4 and 4′ eight times around, thus taking in and advancing film two feet; gear 10 revolves gear 8 four times and four revolutions of gear 8 revolves gear 7 sixteen times; gear 7 revolving sixteen times revolves the Maltese-cross four complete revolutions; Maltese-cross revolving four times will revolve gear 5 also four times, now if the sprocket wheel 3 is increased to double the size or thirty-two teeth, four such revolutions will advance film through film gate four times thirty-two teeth lengths which equals 128 teeth lengths or the equivalent of two feet of length of film, or, if preferred gear 5 may be decreased ½ in size thus giving the same result. Four revolutions of Maltese-cross 15 would revolve the ½ size gear 5 eight times around and maintaining sprocket wheel with sixteen teeth would equal four times sixteen teeth lengths or two feet of film length. In either case sixteen periods of advancement of film through film gate would be equal to $\frac{1}{16}$ of the distance of 128 teeth lengths or perforations equalling eight teeth or two image widths of ¾ inch each in length of advance-

ment of film through film gate between periods of rest.

A, represents shutter which is placed in front of lenses, the centre of shutter being half way between both lenses. Shutter A being revolved by means of gears 10 to a^2, a^2 to a^1, b to a, gear a and shutter A being on same shaft; such a combination of gears as shown in Fig. 1 will revolve shutter A eight times to each revolution of gear 10; one revolution of crank shaft 13 revolves gears 11, 12, and 10 once around. The shaft upon which gear 11 is supported runs in a horizontal direction; B and B′ represent the left and right projection lenses respectively; b^1 and b^5 represent the method of adjusting projection lenses in process of focusing; b^2 represents means of supporting b^5; b^3 represents thumb screw which is related to b^2 for purpose of elevating or lowering projection lenses; C and C′ represent the left and right wall or partition upon which the left and right projection lenses respectively and its working devices are supported; c represents a section which upon advancing forward or backward from point of centre will cause both projection lenses to converge equally; section c being held in position by means of groove e; c converging or diverging equally both lenses by means of rods c^1 and c^2 which are both of same length and attached to receiving sections c^3; D represents the left innermost wall or partition being supported in position by means of a rod extending through E and D′ represents the right innermost wall being supported in position by means of the same rod extending through E; E represents a thumb screw and serves as a means of holding position of lenses firmly after lenses have been brought to the desired degree of convergence; G and F represents film gate and pressure plate respectively attached to partition D and D′; d is a handle for causing the lenses to converge or diverge.

Fig. 2, is a front elevation, B and B′ are the left and right projection lenses in horizontal alignment; 2 is the sprocket wheel feeding film and 1 is the sprocket wheel taking in film from sprocket wheel 3 in Fig. 1; b' and b^4 represents the method of adjusting projection lenses by means of thumb screw b^5 which is supported by b^2; b^2 also supporting the slides C and C′ upon which the lenses rest; b^3 is a thumb screw having a means of raising or lowering position of lenses by engaging section b^2; c^1 and c^2 are rods of equal length by means of which in the process of convergence or divergence of lenses B and B′ an equal amount of such motion is maintained in the two lenses when handle d is in operation; e is the groove in which plug c is inserted; D and D′ are the two innermost partitions upon which film gate is attached; E is the thumb screw which holds partitions and lenses in position firmly when tightened.

Fig. 3, is a rear elevation of aperture plates G; sections D and D′ being supported upon a rod, hinge like, the upper portion of rod being threaded and having a thumb screw E. The apertures on partitions G here shown represents openings made when images are ½ inch in height by ⅜ inch in width, one being below and the second opening being above horizontal centre of film gates. On one side of Fig. 3, the pressure plate F is shown open, and on the opposite side is shown pressure plate F closed; f and g are the corresponding openings in film gates and pressure plates.

Fig. 4, is a left side elevation. b^1, b^4, and b^5 represent rack and pinion for focusing lenses; B is the left projection lens; b^2 and b^3 is the means employed to raise or lower the lens; C is the front partition upon which grooves are attached for the purpose of a sliding board which holds the lens; D is the left innermost partition through which an opening is made to allow passage of film, the upper half and end of D is shown resting upon rod hinge like as well as the lower half of D′ resting on rod; the thumb screw E is shown at upper portion of threaded rod and serves as a means of firmly holding in place the desired position of partitions; F is the pressure plate and G is the partition having film gate and pressure plate attached to; partition G being supported upon partition D.

Fig. 5 is a lens shutter with an opening 16 for the purpose of projecting the right and left images intermittently during same period of rest of film.

Fig. 6 is a shutter with two openings, 17 and 18, for the purpose of projecting the right and left pairs of images simultaneously or practically so.

Fig. 7 is a combination color screen and shutter having three opaque sections and three color screens, R, G, and B represent red, green and blue respectively.

I do not confine myself to the particular style of stereoscopic motion picture projector here shown, but various other changes and modifications, within the skill of those versed in the mentioned arts may be made in such a projector without departing from the spirit of my invention, provided the principle set forth in the following claims be employed.

Having thus described my invention, I claim:

1. In a stereoscopic motion picture projection machine a pair of projection lenses, means for intermittently advancing a film in a horizontal direction one and one-half inches, means for effecting two projections one right and one left intermittently dur-

ing the same period of rest of the film, said projections being made from two points of position which correspond to the position of right and left pairs of images on film, a film gate having two openings spaced apart a distance corresponding to the distance of the points of projection of the right and left images and the distance of said projection lenses, a shutter having a single opening for projecting right and left pairs of images intermittently during the same period of rest of the film, means for equalizing convergence of the projecting lenses, and a Maltese-cross intermittent device having gears and sprocket wheel for drawing the film through the film gate.

2. In a stereoscopic motion picture machine means for intermittently advancing a film in a horizontal direction a distance of two image widths, means for effecting intermittent projections from two spaced points, right and left film gates having an aperture in each of said film gates, means for effecting projection at each of said apertures intermittently during the same period of rest of the film, means for successively shifting the position of the film in a horizontal direction, a pair of projection lenses, means for converging the projection lenses equally, means for raising and lowering the positions of the projection lenses, a projection shutter having six sections with three sections opaque and three sections color sections and filters, a Maltese-cross intermittent motion mechanism including a sprocket wheel, a separate partition for each of said left and right projections lenses, left and right film gates with apertures on each of said separate partitions, mechanical means connected to said partitions for adjusting the same and a single rod for supporting said partitions, a thumb screw mounted on the upper end of said rod, and a handle attached to one of the partitions for adjusting both of them.

This specification signed and witnessed this 5th day of June, 1922.

CHARLES BOUIN.

Witnesses:
MAY R. McEVOY,
MARGARET PEABODY.