E. S. PORTER.

KINETOSCOPE.

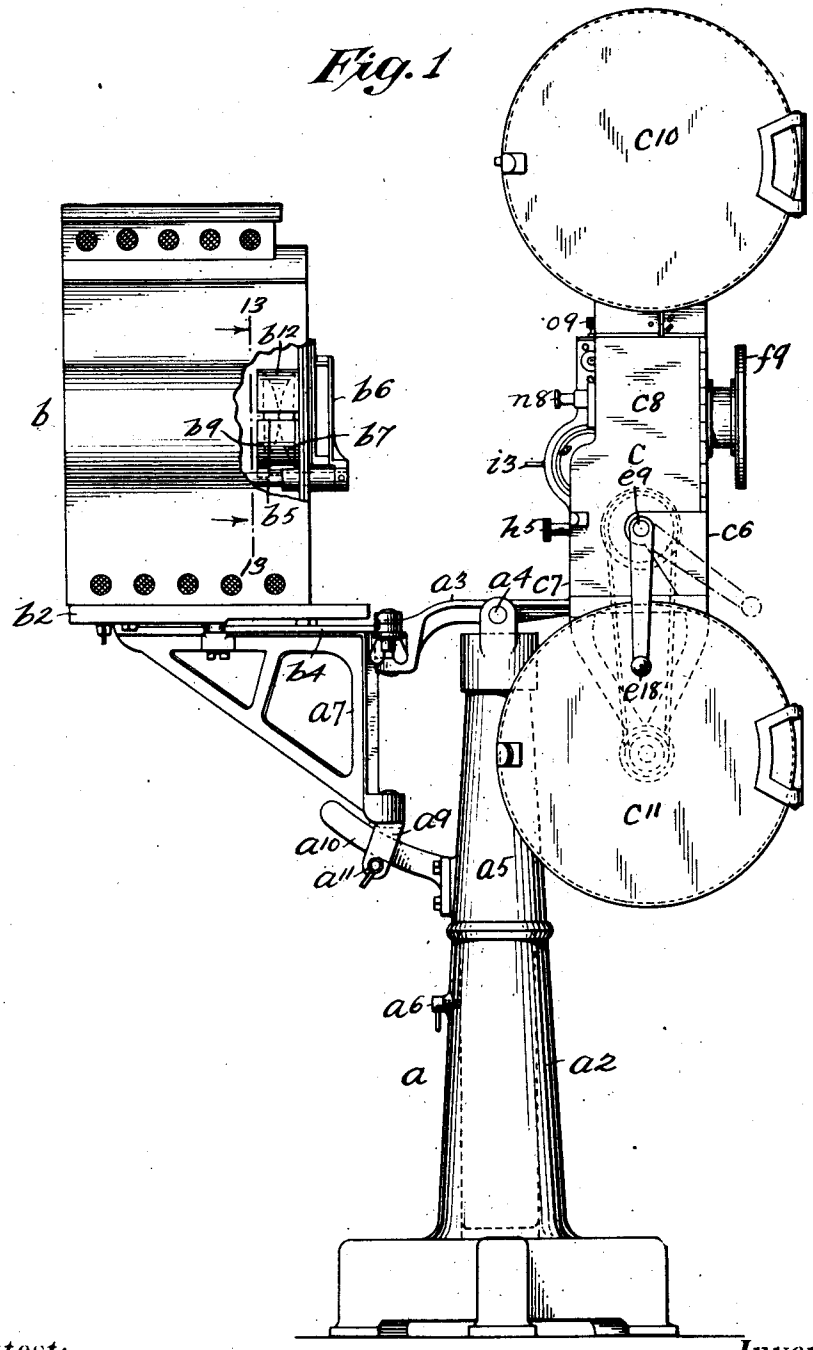
APPLICATION FILED MAR. 4, 1911.

1,041,345.

Patented Oct. 15, 1912.

9 SHEETS—SHEET 1.

Fig. 1



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9 SHEETS—SHEET 2.

Fig. 2

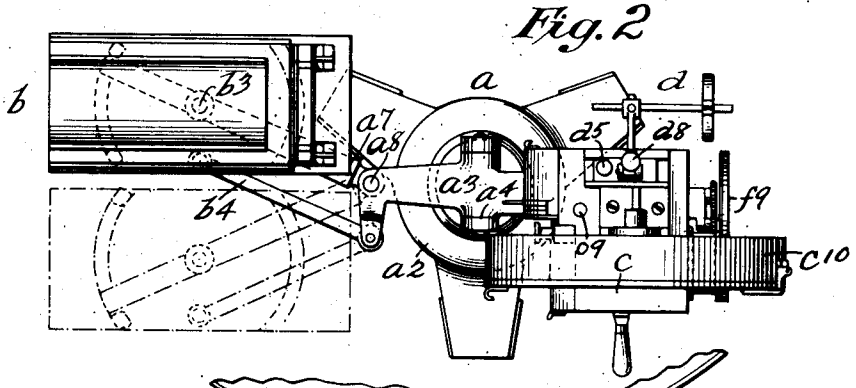
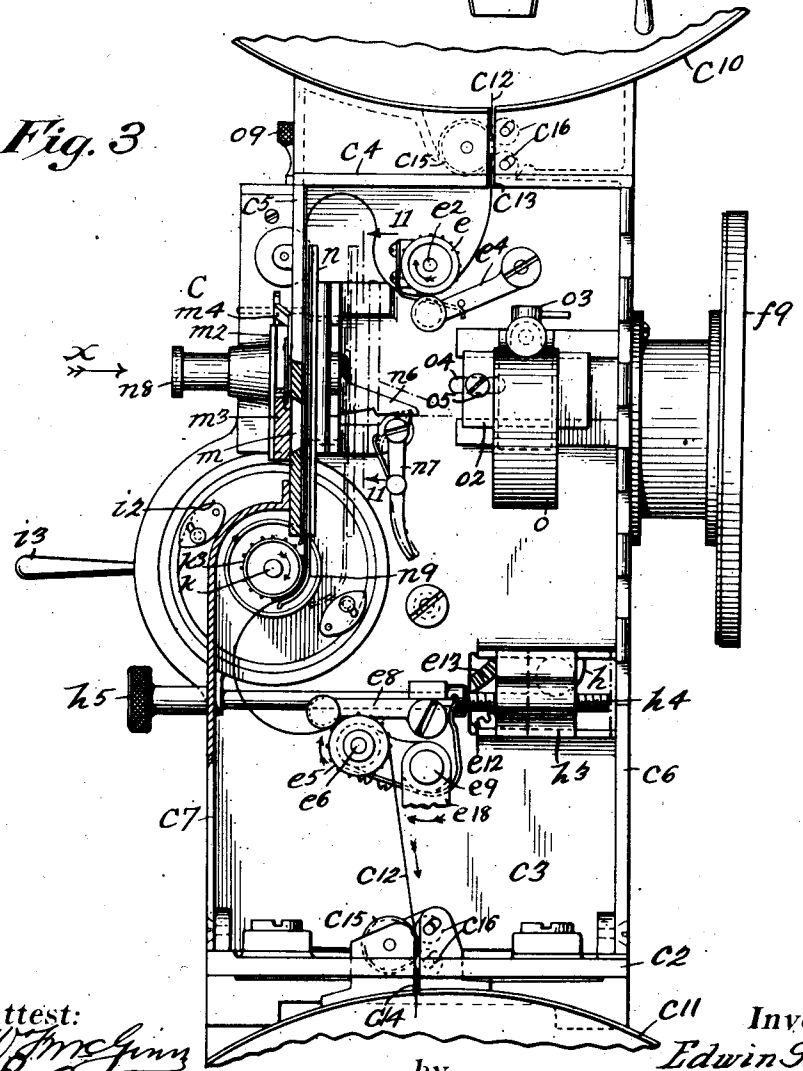


Fig. 3



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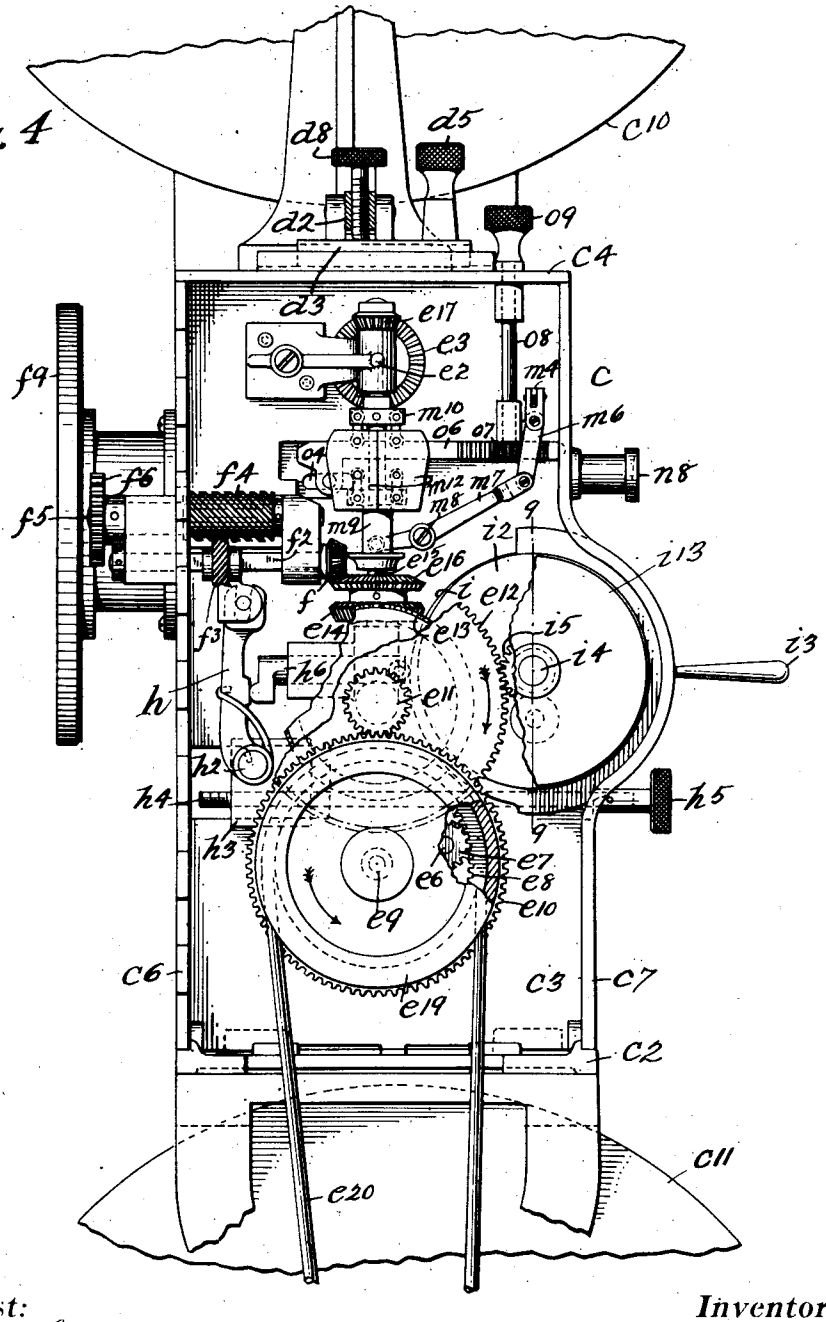
9 SHEETS—SHEET 3.

Fig. 4



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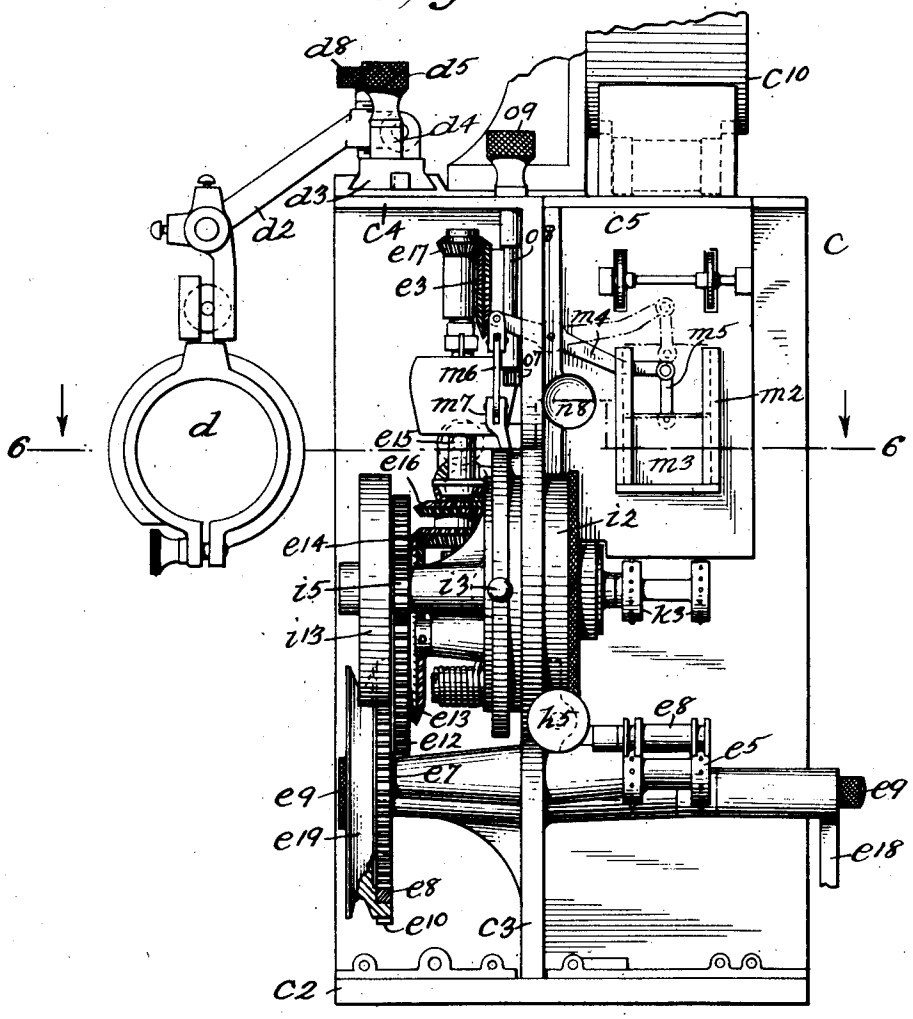
9 SHEETS—SHEET 4.

Fig. 5



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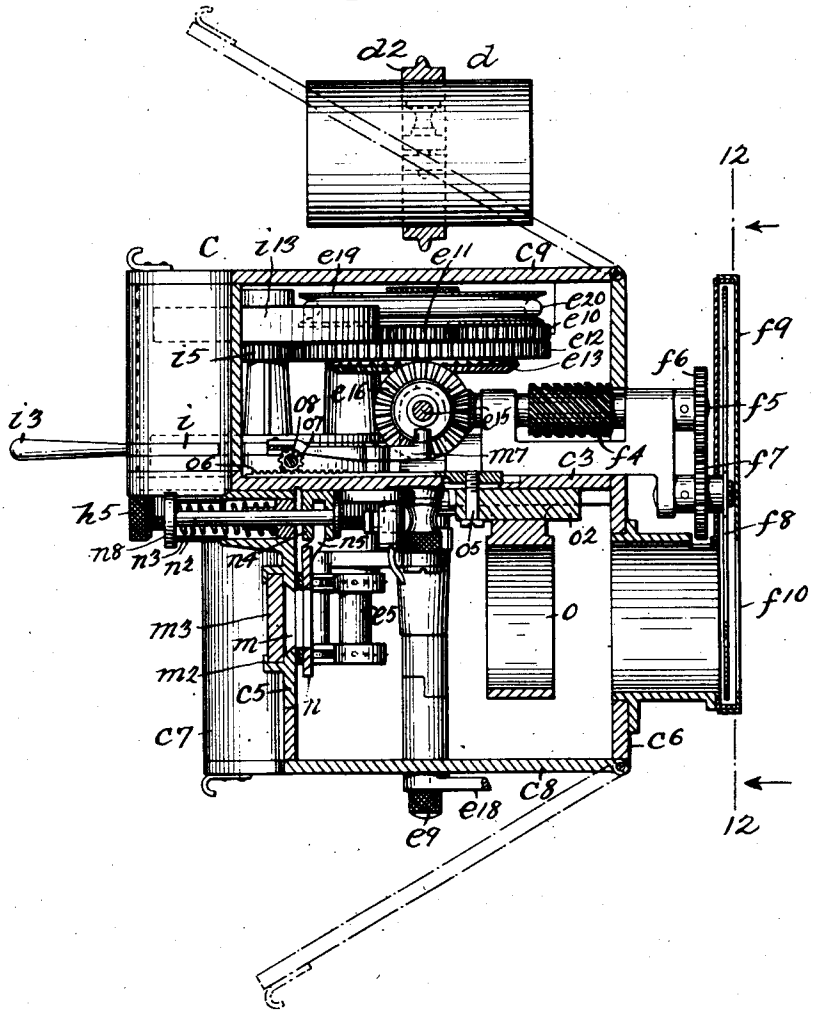
9 SHEETS—SHEET 5.

Fig. 6



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9 SHEETS—SHEET 6.

Fig. 7

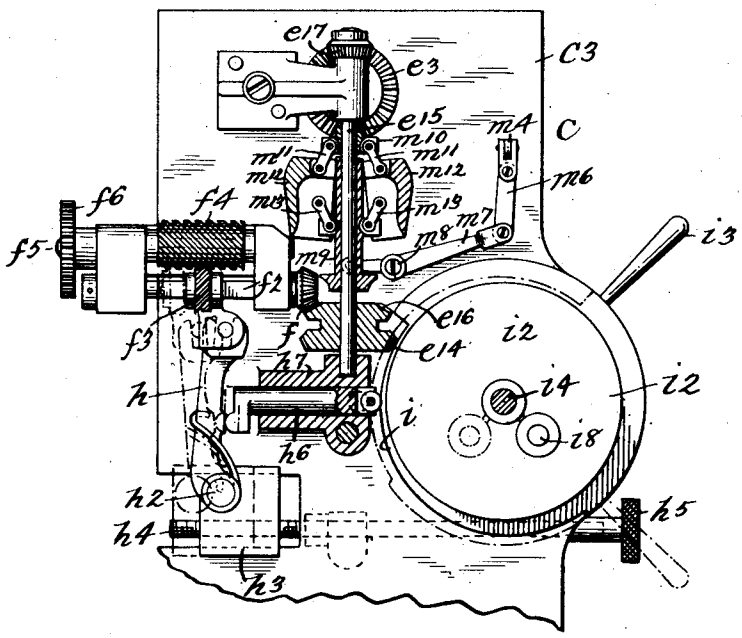
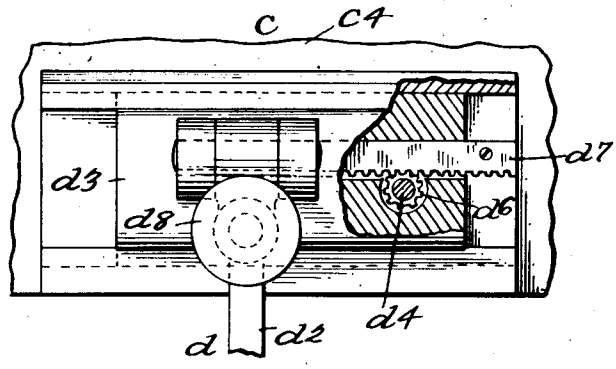


Fig. 8



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9 SHEETS—SHEET 7.

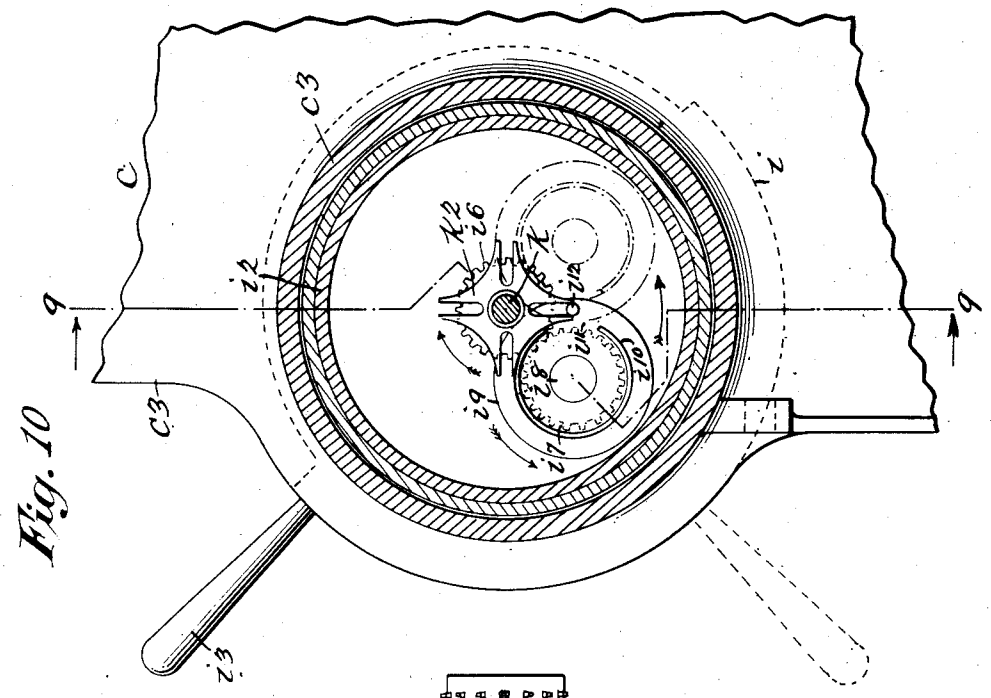

Fig. 10

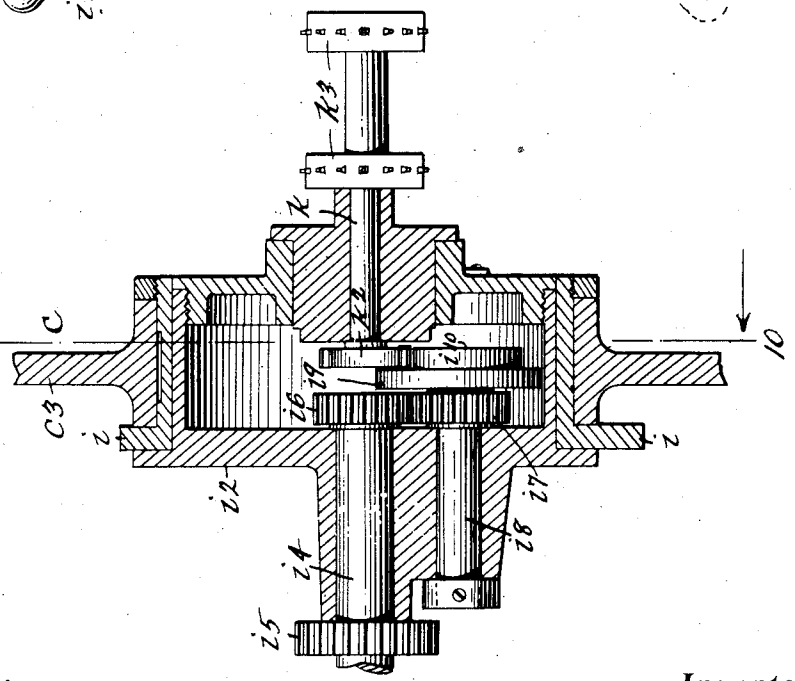

Fig. 9

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9 SHEETS—SHEET 8.

Fig. 11

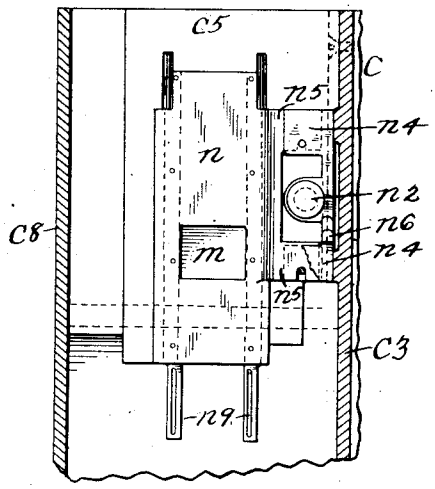
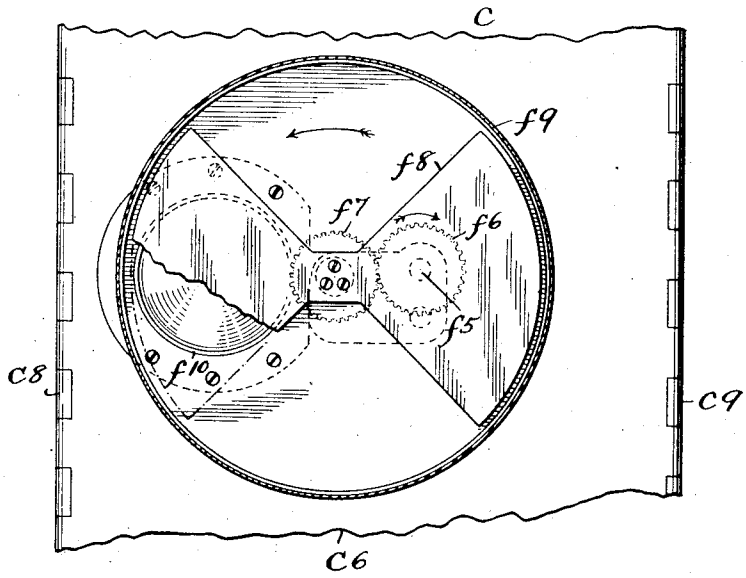


Fig. 12



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1,041,345. Patented Oct. 15, 1912.

9 SHEETS—SHEET 9.

Fig. 14

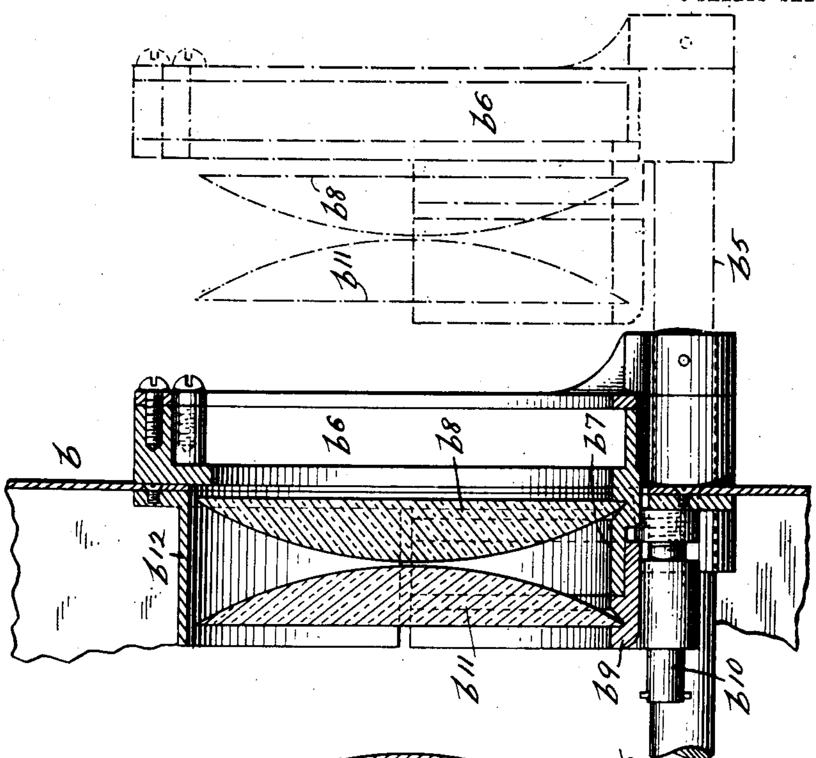
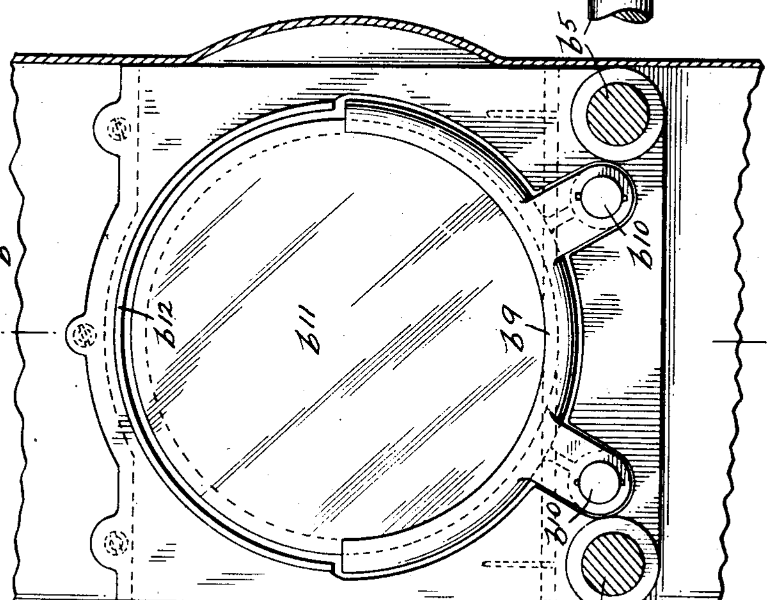


Fig. 13



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UNITED STATES PATENT OFFICE.

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1,041,345. Specification of Letters Patent. Patented Oct. 15, 1912.

Application filed March 4, 1911. Serial No. 612,417.

To all whom it may concern:

Be it known that I, EDWIN S. PORTER, a citizen of the United States of America, and residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Kinetoscopes, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to kinetoscopes, and the object thereof is to provide new and improved means for projecting a series of photographs on a ribbon or strip of film upon a suitable screen situated at a distance from the projector.

A further object is to provide means for accurately "framing" the said photographs as they are successively projected, without the necessity for moving any of the operative parts of the said projector out of normal positions, as for instance vertically as in projectors at present employed, said "framing" being accomplished by a rotary adjustment, backwardly or forwardly, of the intermittent film-carrying sprocket, to vary the position and moment of initial movement thereof, by changing the portion of the periphery engaging the film during the movement of the latter.

A further object is to provide a shutter for closing off the light at the aperture of the projector during the intermittent movement of the film, and also to provide means whereby the shutter may be adjusted, with respect to the moment of aperture closure, simultaneously with and in the degree of the adjustment of said intermittent sprocket.

A further object is to provide means for adjusting the said shutter independently of said intermittent sprocket, in order to obviate the lines, shadows, or "ghost" effect, on the screen due to lack of coincidental film and shutter operation.

A further object is to accomplish the said shutter and sprocket adjustments during the operation of the projector.

A further object is to so mount the said shutter as to be readily replaced by another of greater or less surface or with a different number of blades, and so as to be enabled, also, to increase or decrease the speed of rotation thereof in the ratio of shutter surface or construction.

A further object is to so locate the manual devices for adjusting the said feeding-sprocket, shutter, lenses, and stereopticon, when employed, as to be readily reached by the free hand of an operator not employed in turning the crank of the projector.

A further object is to completely inclose the operative parts of the projector, as well as the film, whereby no injury can result thereto, and whereby the film, if ignited, is quickly quenched and without any notice of such ignition exteriorly of the projector, thus preventing panic among the audience as well as the spread of fire from the film.

A further object is to provide a fire-door for the said projector which automatically closes to protect the film in the event of too slow operation, or stopping, of the projector.

A further object is to so construct the said projector as to permit of passing the film thereinto at any point intermediate of the ends of said film, as well as the removal thereof from the projector at any time.

A further object is to provide a film trap-door which is quickly and easily moved out of and into operative positions, and which is readily removable from the projector for cleansing and repair.

A further object is to provide a stand or support for the projector and for the lamp-box which is readily adjustable rotarily, vertically, and at desired angles.

A further object is to so mount the lamp-box upon the stand as to be readily swung from projector to stereopticon positions, or the reverse, by the free hand of the operator and without special effort.

A further object is to provide a sectional cell for the condensers in the lamp-box, whereby the distance between the condensers may be readily adjusted to meet varying conditions or to compensate for varying thicknesses of the said condensers, and whereby the condensers may be readily removed for replacement or cleansing at any time.

A further object is to so mount the said condensers as to permit expansion or contraction thereof without fear of breakage; and still further objects are to provide such projectors which are very practical, well adapted to the purpose for which they are designed, which permit of entire manipulation from one point and during the operation thereof, and which are practically noiseless in operation.

The invention is fully described in the following specification, of which the accompanying drawings form a part, in which the separate parts are designated by the same reference characters in each of the views, and in which:—

Figure 1 is an elevation of a kinetoscope, constructed according to this invention, on the operating side thereof, partly broken away to show a detail of the construction; Fig. 2 is a plan view thereof; Fig. 3 is an enlarged elevation of the side shown in Fig. 1, of the projector only, with the side door removed, and partly in section; Fig. 4 is a view similar to Fig. 3, on the side opposite to that shown in Figs. 1 and 3, and with the side door also removed; Fig. 5 is an end elevation looking in the direction of the arrow X in Fig. 3, with the housing removed; Fig. 6 is a horizontal section taken on the line 6—6 of Fig. 5, with the housing in position; Fig. 7 is a fragmentary view, similar to Fig. 4, with the operative parts in section to show the construction and operation thereof, with the housing removed and with several parts omitted; Fig. 8 is an enlarged fragmentary plan view of the stereopticon adjusting means; Fig. 9 is an enlarged fragmentary view of the intermittent sprocket operating mechanism, taken on the line 9—9 of Fig. 4, approximately, and of Fig. 10; Fig. 10 is a section thereof taken on the line 10—10 of Fig. 9, with parts in a different position; Fig. 11 is a fragmentary detail view taken on the line 11—11 of Fig. 3 and showing the film trap-door; Fig. 12 is a fragmentary section taken on the line 12—12 of Fig. 6 and showing the shutter construction and operating mechanism; Fig. 13 is an enlarged fragmentary section on the line 13—13 of Fig. 1 showing the condenser carrier of the lamp-box; and Fig. 14 is a section taken on the line 14—14 of Fig. 13.

In the drawings forming a part of this application a preferred form of embodiment of a kinetoscope is shown, comprising a stand a, carrying a lamp-box b, and a projector c, serving as a support for a stereopticon d, said stand comprising a base upon which is mounted a pedestal a^2 having a platform a^3 at the top thereof pivoted at a^4 to a rotary member a^5 of the pedestal a^2, adapted to be locked against rotation by means of a set screw a^6 or the equivalent the platform a^3 serving as a support for the projector c at one end and having a bracket a^7 pivoted thereto at its other end, at a^8, and which is also pivoted to a plate a^9 adjustable upon a segmental bar a^{10} and to which it is adapted to be locked by means of a set screw a^{11} or the equivalent, thus serving to tilt the platform a^3 to any desired angle. The bracket a^7 is pivoted, at its outer end, to the base b^2 of the lamp-box b, as shown at b^3, Fig. 2, a supplemental parallel bar b^4 being also pivoted thereto and to the platform a^3 in order to insure a parallel swinging movement of the lamp-box, limiting devices being provided on the bottom of the lamp-box to insure exact positioning of the lamp-box in either the projector or stereopticon uses, these devices being merely indicated in the drawings as they may be of any desired formation as will be readily understood.

Slidably mounted in the front of the lamp-box are two horizontal rods b^5, carrying a box b^6, for transparent lantern slides, titles of subjects, announcements and the like, and adapted to be moved away from the lamp-box, as clearly indicated in dotted lines in Fig. 14, said slide-box having a ring b^7, of approximately 180 degrees of a circle, secured to the inner side thereof and which is provided with an annular groove adapted to receive one of the condensers, b^8, a similar ring b^9 being slidably adjustable upon the ring b^7 and carried by horizontal rods b^{10} secured to the slide-box, said ring b^9 being likewise provided with an annular groove to receive a condenser b^{11}, the object of this adjustable relationship between the rings b^7 and b^9 being to accommodate the same to condensers of varying thicknesses, as well as to be enabled to adjust the distance therebetween, if any separation thereof is desired for any reason, and said lamp-box carries a complemental ring b^{12} above the condensers to serve as a cover therefor when in their extreme inner positions but, by reference to Fig. 14, it will be seen that when the slide-box b^6 is moved outwardly the condensers are carried therewith and are readily removable from their supporting rings for cleansing or substitution and, because of the method of mounting the said condensers, the liability of breakage thereof from expansion or contraction due to changes in temperature is prevented, and the position of the condensers, with relation to the lamp, may also be readily changed at will.

The projector c comprises a casing having a base c^2 and a vertical wall c^3 approximately centrally thereof provided with an integral horizontal top member c^4 and a plate c^5 preferably in permanent connection on the side adjacent the lamp-box, said casing being also provided with detachable front and rear walls, c^6 and c^7, respectively, the former of which has two doors c^8 and c^9 pivoted thereto, one on either side of the casing c, said casing also carrying the magazine drum c^{10} thereover and the re-wind drum c^{11} thereunder for a ribbon of film c^{12} adapted to be passed through the casing in a manner hereinafter described, said drum supports, drums, and casing, being provided with slots c^{13} and c^{14}, above and below the casing, for the insertion of the film at any point intermediate of its ends

or for the ready removal thereof at any time during the passage thereof through the casing, permanent rollers c^{15} being provided adjacent each of the said slots and gravity rollers c^{16} operating in conjunction therewith, there being preferably two of the latter for each one of the former, these gravity rollers serving to prevent too free film movement and serving also to prevent the spread of fire into the drums in the event of the film in the casing being ignited.

The stereopticon d, comprises a lens cell carried pivotally by an arm d^2 pivoted to a plate d^3 slidably mounted on the top of the casing and adjustable thereon by means of a shaft d^4 operable by means of a thumb-nut d^5 and carrying a pinion d^6 enmeshed with a fixed rack d^7, said arm being vertically adjustable by means of an adjusting screw d^8, and it will be observed that both of these adjusting devices are in a position convenient to the left hand of the operator while the projector is in operation and without any interruption thereof.

Arranged in the top of the casing, is a sprocket e upon a shaft e^2, held in the wall c^3, at the other end of which is a bevel-gear e^3, the film being passed around and engaged by the said sprocket, and a tension device e^4 is provided for insuring such engagement; adjacent the bottom of said casing is a similarly arranged sprocket e^5 upon a shaft e^6, the other end of which carries a pinion e^7, and a tension device e^8 is provided for this last named sprocket to insure the engagement of the film thereby, said sprockets being in operative connection with each other by means of a train of gears on the opposite side of the said wall and comprising an internal gear e^8 upon a shaft e^9 carrying also a spur-gear e^{10} enmehsed with a pinion e^{11} mounted on a stub-shaft which also carries a spur-gear e^{12} and a bevel-gear e^{13}, said last named gear being enmeshed with a bevel pinion e^{14} on a vertical shaft e^{15} carrying a bevel-gear e^{16} adjacent the gear e^{14}, and a bevel pinion e^{17} engaged with the bevel-gear e^3, the said gears being of such sizes as to insure coincidental rotation of the sprockets e and e^5, a crank arm e^{18} being connected with the shaft e^9 in order to rotate the gears and, in practice, a pulley e^{19} is also provided on the said shaft e^9 and a belt e^{20} connects the same with the re-wind drum.

Engaging with the bevel-gear e^{16} is a bevel pinion f upon a shaft f^2 provided with a flat side and upon which is slidably mounted a spiral pinion f^3 engaging a spiral worm f^4 upon a shaft f^5, the outer end of which carries a spur-gear f^6 enmeshed with a similar gear f^7 mounted upon a stub-shaft which carries the shutter f^8, arranged in a suitable casing f^9, said shutter in the form shown comprising two diametrically opposite blades of an arc of approximately 90 degrees of a circle, each, but these blades may be made of any desired size and of any desired number, and, if desired, the gears f^6 and f^7 may be replaced by gears of different diameters whereby a corresponding difference in the speed of rotation of the shutter results, this being particularly desirable where but one blade is employed, preferably of an area approximating that of the two blades shown, and an opening f^{10} is provided in the casing f^9 in line with the lens cell o and aperture m, as clearly shown in Fig. 6.

The spiral pinion f^3 is pivotally mounted on a spring actuated lever h pivoted at h^2 upon a sliding-block h^3, adjustable in suitable bearings by means of a screw h^4, the handle h^5 of which is at the rear of the projector and in a position where it can be readily reached by the free hand of an operator, the said lever h being normally forced against a plunger h^6 slidably mounted in a suitable guide h^7, the contact being insured by means of the spring of the said lever which also forces the opposite end of the said plunger against a cam i mounted upon a drum i^2 which is rotatable in the central wall c^3, said rotation being accomplished by means of a lever or handle i^3. A stub-shaft i^4 is mounted centrally of the drum i^2 and is provided with an outer pinion i^5 enmeshed with the spur-gear e^{12} and with an inner pinion i^6 enmeshed with a pinion i^7 mounted upon an eccentric stub-shaft i^8 which also carries a disk i^9 provided with a concentric rib i^{10} having an opening i^{11} therein, and secured in the said disk i^9, centrally of the said opening, is a pin i^{12} and a fly wheel i^{13} is provided for the shaft i^4, Figs. 4, 5 and 6. Arranged centrally of the drum i^2, at the side opposite the shaft i^4, is a shaft k which carries a star-wheel k^2 at its inner end and a sprocket wheel k^3 at its outer end, said star-wheel having a plurality of concavities in its periphery of the same radius as that of the periphery of the concentric rib i^{10}, as clearly shown in Fig. 10, and the pin i^{12} travels through a circle, the radius of which is slightly greater than that of the said rib and is adapted to enter the slots of the said star-wheel, as will be readily seen by reference to Fig. 10.

By reference to Figs. 3, 5, 6, and 11, it will be seen that a light aperture or "window" m is provided in the rear of the projector and in line with the condensers of the lamp-box, said "window" having a guide m^2 adjacent thereto for a fire-door m^3, said fire-door being connected with a lever m^4 by means of a link m^5, the opposite end of said lever being connected by means of a link m^6 with a lever m^7 pivoted at m^8 and the other end of which rests upon the flange of a sleeve m^9 vertically movable upon the shaft e^{15} and to the upper part of which is

secured a collar m^{10}, independent of the sleeve m^9, and rotatable with the shaft, links m^{11} connecting said collar with two segmental blocks m^{12}, one on either side of the said shaft, said segmental blocks being in turn connected with the sleeve m^9 by means of links m^{13}, and the rotation of the shaft e^{15} at a speed approximating the usual operating speed serves to move the blocks m^{12} outwardly by centrifugal motion, thus moving the sleeve m^9 upwardly and carrying the outer end of the lever m^7 downwardly to elevate the end of the lever m^4 and fire-door m^3 into a position clear of the aperture m, any material reduction in the speed of projector operation or a cessation thereof permitting the fire-door to again move downwardly into its protecting position, thus preventing the ignition of the film by the lamp.

By reference to Figs. 3, 6, and 11, it will be seen that a film trap-door n is provided for exerting pressure upon the film adjacent the aperture m, said trap-door being mounted upon a rod n^2 normally forced outwardly by means of a spring n^3, clearly shown in Fig. 6, said rod having a double flanged block n^4 secured thereto and slidable therewith and between the flanges of which notched arms n^5 of the trap-door n are adapted to pass, whereby the said trap-door is detachably held in position and, by reference to Fig. 3, it will be seen that the said block carries a notched arm n^6 adapted to be engaged by a spring actuated pawl n^7 when forced into its extreme inward position by means of the plunger n^8 on the rod n^2, exteriorly of the projector, and in a position convenient to the free hand of the operator, the trap-door being readily removable when the said block is in its innermost position, this being advantageous and in fact necessary in order to cleanse the contacting side of the door of minute particles of the film which forms a coating thereon, this innermost position of the trap-door permitting also the threading of the film through the projector, and when it is desired to permit the said trap-door to pass to operative position all that is necessary is to release the pawl n^7 and the spring n^3 forces the door into engagement with the film, the lower end of the said door carrying also curved springs n^9 to maintain the film in close contact with the intermittent sprocket k^3.

By reference to Figs. 3, 4, 5, and 6, it will be seen that a lens-cell o is provided which is adjustable upon a sliding-block o^2 by means of locking devices o^3 of any suitable character, said block o^2 sliding backwardly or forwardly in suitable guides on the wall c^3 of the casing and said wall is provided with a slot o^4 through which passes a pin o^5 secured in the block o^2 said pin o^5 being also secured to the end of a rack o^6 slidably mounted upon the opposite side of the wall c^3, said rack being in engagement with a pinion o^7 upon a shaft o^8 which extends upwardly through the top of the casing and is provided with a nut or handle o^9 whereby the rack may be moved forwardly and backwardly and thus carry the lens-cell correspondingly in order to focus the projected photograph upon the screen, this being possible at any time during the operation of the projector, and the operating device o^9 is conveniently situated for the free hand of the operator.

As is well understood the film carrying the series of photographs is provided in a reel which is placed in the magazine c^{10}, the door thereof, on the operating side of the projector, and of the re-wind c^{11}, having previously been opened, after which the film is passed through the slot c^{12} and between the rollers c^{15} and c^{16} adjacent thereto, thence around the sprocket wheel e, the tension device e^4 having been moved backwardly to permit the same, thence downwardly at the rear of the casing c and around the intermittent sprocket k^3, the film trap-door having been moved backwardly while passing the film, and thence over the sprocket e^5 and to the re-wind drum c^{11}, through the slot c^{14}, the film being passed loosely through the projector and forming loops above the film trap-door and beneath the intermittent sprocket to prevent undue strain upon the same at any time, after which the tension devices e^4 and e^8 and trap-door n are moved into operative positions and the projector is ready for operation by means of the crank e^{18}, the movement of which, at a proper speed, moves the fire-door m^3 away from the aperture m and the rays of light from the lamp-box are permitted to pass therethrough, through the film, and through the lenses in the cell o and thus to the screen, the lamp-box being preferably moved into projector position when the operator is ready to start projection. The crank rotates the shaft e^9 which in turn rotates the sprockets e and e^5, through the train of gears hereinbefore described, as well as the re-wind in the drum c^{11}, this not being shown as it is of old and well-known construction. The crank operation also actuates the pinion i^5 which in turn actuates the disk i^9, through the medium of the gears i^6 and i^7, and the pin i^{12} enters one of the slots of the star-wheel k^2 in each disk revolution, thus rotating the said star-wheel through an arc of 90 degrees, in the form of construction shown, in each full rotation of the disk i^9, thus feeding the film engaged by the intermittent sprocket k^3 in the ratio of one period of movement to three of rest and, because of the fact that the star-wheel is positively locked to the rib i^{10} until the pin i^{12} has entered one of the slots of the

said star-wheel and been engaged by both sides thereof, movement of the star-wheel is accomplished without the impact of the pin therewith and consequent noise common to machines of this type as at present constructed, this being equally true when the said pin i^{12} leaves the slot in which it may be engaged, the star-wheel being positively locked just previous thereto, and the annoying and injurious clicking of projectors employing the star-wheel as at present constructed is prevented, and a smooth and noiseless operation results.

While the operator's right hand is engaged in turning the crank e^{18}, his left hand is free to move the lamp-box from stereopticon to projector positions, and the reverse, as also to manipulate the condensers, if desired, the focusing and positioning of the stereopticon lenses, and the focusing of the projector lenses in the cell o, these adjusting devices being conveniently situated at the rear of the casing c for manipulation, and the operator may also swing the platform a^3 upon its pivot a^4, and move the entire machine, rotarily, upon the pedestal a^2, in order to approximately adjust the projected photographs upon the screen. If, however, the projected photographs should not be accurately "framed," or in other words if the line of division between two of them should be visible on the screen, all that is necessary is to move the handle i^3 upwardly or downwardly from the normal position shown in Fig. 3, according to the direction of adjustment required and in the degree thereof. This movement of the handle i^3 rotates the drum i^2 and cam i secured thereto, thereby moving the gear i^7 through an arc of a circle having the shaft i^4 as its center, this partial revolution of the gear i^7 being equally true of the disk i^9 connected therewith and, in the revolution of the gear i^7 about the gear i^6, a degree of rotation also results thereof and of the disk i^9 and, when the machine is at rest and the handle i^3 is moved from the position shown in full lines to that shown in dotted lines in Fig. 10, the star-wheel k^2 is slightly rotated by the revolving movement of the disk i^9 but this movement is compensated for by the rotation of the said disk and the pin i^{12} merely slides up into the star-wheel slot and then moves again into the position shown when the disk has reached its limit of movement indicated in dotted lines, thus producing no material effect upon the star-wheel nor upon the intermittent sprocket connected therewith, but the moment of initial star-wheel rotation is materially changed for, if the crank e^{18} should be turned with the parts in the positions shown in full lines in Fig. 10, initial star-wheel rotation occurs at the instant of crank movement, because of the direction of rotation of the disk i^9, through the train of gears connecting it with the said crank, whereas, if the parts were in the positions indicated in dotted lines, it will require a rotation of 270 degrees of a circle before the pin i^{12} engages the star-wheel to rotate the same, and the portion of the periphery of the intermittent sprocket engaging the film at the moment of initial movement is changed, these being the two extreme positions of the disk i^9 and no adjustment of the film results. However, in each degree of movement of the handle i^3, between its extreme positions, a different relationship occurs between the pin i^{12} and the star-wheel k^2, thus changing, in like degree, the portion of the periphery of the intermittent sprocket engaging the film, therefore changing the relationship between the photographs on the film and the aperture m, as well as the moment of initial movement of the film for, if the movement of the handle i^3 should be through an arc of 45 degrees, the disk i^9 is then directly beneath the star-wheel and turning of the crank rotates the disk i^9 and thus the star-wheel through an arc of 45 degrees before the concavities in the periphery thereof can engage the periphery of the rib i^{10}, thus resulting in a 45 degree rotation of the intermittent sprocket and a consequent adjustment of the film photographs with relation to the aperture m, this adjustment being one half the height of a photograph, for the reason that it is in the central position of the handle i^3, and in the two extreme positions of which the relationship between photograph and aperture are alike, and it will thus be noted that any degree of movement of the said handle i^3 has a corresponding effect upon the relationship between the photographs on the film and the said aperture, and accurate "framing" of the said photographs results.

As hereinbefore stated the handle i^3 rotates the cam i, and, by reference to Fig. 7, it will be seen that the plunger h^6 is correspondingly moved either outwardly or inwardly, thus moving the spiral pinion f^3 longitudinally of the shaft f^2 and, as the said pinion cannot rotate on its shaft in this sliding movement, the teeth thereon necessarily rotate the spiral gear f^4 in the degree of movement of the cam i and handle i^3, and in a corresponding direction, this rotation of the spiral gear f^4 serving to change the previously existing relationship between the shutter f^8 and the aperture of the projector, and, because the dimensions of the parts are so designed as to produce such result, the shutter movement is in the degree of intermittent sprocket movement, and in a corresponding direction, and thus in the degree and direction of film adjustment for "framing" the photographs, this dual result depending upon the degree and direction of movement of the handle i^3. If,

however, there is no coincidental relationship between the film and shutter movements, this may be readily noted upon the screen by hazy or shadowy lines or effects, generally at the top and bottom of the screen, generally termed "ghost", and it is therefore necessary to change the relationship between the film movement and the moment of shutter eclipse in order that these occur simultaneously for, if the shutter be so positioned as to close the aperture previous to film movement, the period of projection is reduced and the shutter has passed the aperture before the film has come to rest for another period of projection, thus resulting in "ghost", and this is equally true if the film movement occur previous to the moment of aperture closure by the shutter but, because of the movement of the slide-block h^3, by means of the screw h^4 and button h^5 thereon, simultaneous film and shutter operation may be attained, according to the degree and direction of movement of the block h^3 for, the spring maintaining the lever h against the plunger h^6 at all times, movement of the block h^3 moves the spiral pinion f^3 correspondingly and, as the spiral pinion cannot rotate on its shaft, rotation of the spiral gear f^4 results, with a consequent adjustment of the shutter with relation to the aperture, this adjustment being for changing the relationship between the film movement and moment of shutter eclipse in order to make them coincidental, whereas the handle i^3 is for simultaneous adjustment of the shutter and film with respect to the aperture, both of these adjusting devices being conveniently situated at the rear of the projector for manipulation by the free hand of the operator.

It will thus be seen that I provide a projector the parts of which are inclosed within a fire-proof envelop, but which permits adjustment of all of the operative parts of, and functions, exteriorly of the said envelop and in a position readily accessible to the left hand of the operator, while his right hand is engaged in turning the crank e^{18}, and during the projection of the series of photographs, the "framing" thereof being accomplished without moving any of the operative parts of the projector from their normal positions, an automatic shutter adjustment resulting during the film adjustment and in the degree thereof, and shutter adjustment, independent of the film adjustment, is very easily accomplished, these last named features being very important in this art, means having been long sought to accomplish the said results.

The entire device is compact, well balanced in appearance, adjustable to all possible conditions, absolutely safe from fire, automatic in all its actions, independent in adjustments, eminently practical, and well adapted to the purpose for which it is designed and, while certain preferred details of construction to accomplish certain results are shown and described, it will be obvious that many changes thereover may be made and still be within the spirit of this invention and without sacrificing any advantages.

Having fully described the invention, what is claimed as new, and desired to secure by Letters Patent, is:—

1. In a kinetoscope having an aperture therein, a source of light, a strip of film passing over said aperture, means for intermittently moving said film, and a shutter for closing off the light; means for adjusting the film with relation to said aperture and for adjusting said shutter in the degree of film adjustment, simultaneously, and means for changing the relationship between said film moving means and said shutter operation during kinetoscope operation.

2. In a kinetoscope having an aperture therein, a source of light, a strip of film passing over said aperture, means for intermittently moving said film, and a shutter for closing off the light; means for adjusting the film with relation to said aperture and for adjusting said shutter in the degree of film adjustment, simultaneously, and means for independently adjusting said shutter with respect to said aperture during kinetoscope operation.

3. In a kinetoscope having an aperture therein, a source of light, a strip of film passing over said aperture, means for intermittently moving said film, and a shutter for closing off the light; means, in a position convenient to the free hand of the operator, for adjusting the film with relation to said aperture and for adjusting said shutter in the degree of film adjustment, simultaneously, and means for independently adjusting said shutter with respect to said aperture during kinetoscope operation.

4. In a kinetoscope having an aperture therein, a source of light, a strip of film passing over said aperture, means for intermittently moving said film, and a shutter for closing off the light; a lever, in a position convenient to the free hand of the operator, for adjusting the film with relation to said aperture, a train of manually operable gears, a spiral gear in operative connection with said shutter, a spiral pinion enmeshed with said spiral gear in operative connection with said train of gears and means connected with said lever for moving said spiral pinion longitudinally of said spiral gear to adjust said shutter, simultaneously with and in the degree of said film adjustment, and means for changing the relationship between said film and shutter, during kinetoscope operation.

5. In a kinetoscope having an aperture

therein, a source of light, a strip of film passing over said aperture, means for intermittently moving said film, and a shutter for closing off the light; a lever, in a position convenient to the free hand of the operator, for adjusting the film with relation to said aperture, a train of manually operable gears, a spiral gear in operative connection with said shutter, a spiral pinion enmeshed with said spiral gear and in operative connection with said train of gears and means connected with said lever for moving said spiral pinion longitudinally of said spiral gear to adjust said shutter, simultaneously with and in the degree of said film adjustment, and means for changing the relationship between said film and shutter, comprising a supplemental lever in pivotal connection with a slide-block and means for adjusting the position of said block, the movement of said block moving the spiral pinion longitudinally of the spiral gear in the degree of said block movement to adjust the shutter independently of said first named lever.

6. In a kinetoscope having an aperture therein, a source of light, a strip of film passing over said aperture, means for intermittently moving said film, and a shutter for closing off the light; a lever, in a position convenient to the free hand of the operator, for adjusting the film with relation to said aperture, a train of manually operable gears, a spiral gear in operative connection with said shutter, a spiral pinion enmeshed with said spiral gear and in operative connection with said train of gears and means connected with said lever for moving said spiral pinion longitudinally of said spiral gear to adjust said shutter, simultaneously with and in the degree of said film adjustment, and means for changing the relationship between said film and shutter, comprising a supplemental lever in pivotal connection with a slide-block and a screw for adjusting the position of said block, the movement of said block moving the spiral pinion longitudinally of the spiral gear in the degree of said block movement to adjust the shutter independently of said first named lever.

In testimony that I claim the foregoing as my invention I have signed my name in presence of the subscribing witnesses this 17th day of February 1911.

EDWIN S. PORTER.

Witnesses:
H. H. FITZ,
J. C. LARSEN.