C. J. KRYZANOWSKY.

CAMERA.

APPLICATION FILED MAY 18, 1917.

1,393,793.

Patented Oct. 18, 1921.

4 SHEETS—SHEET 1.

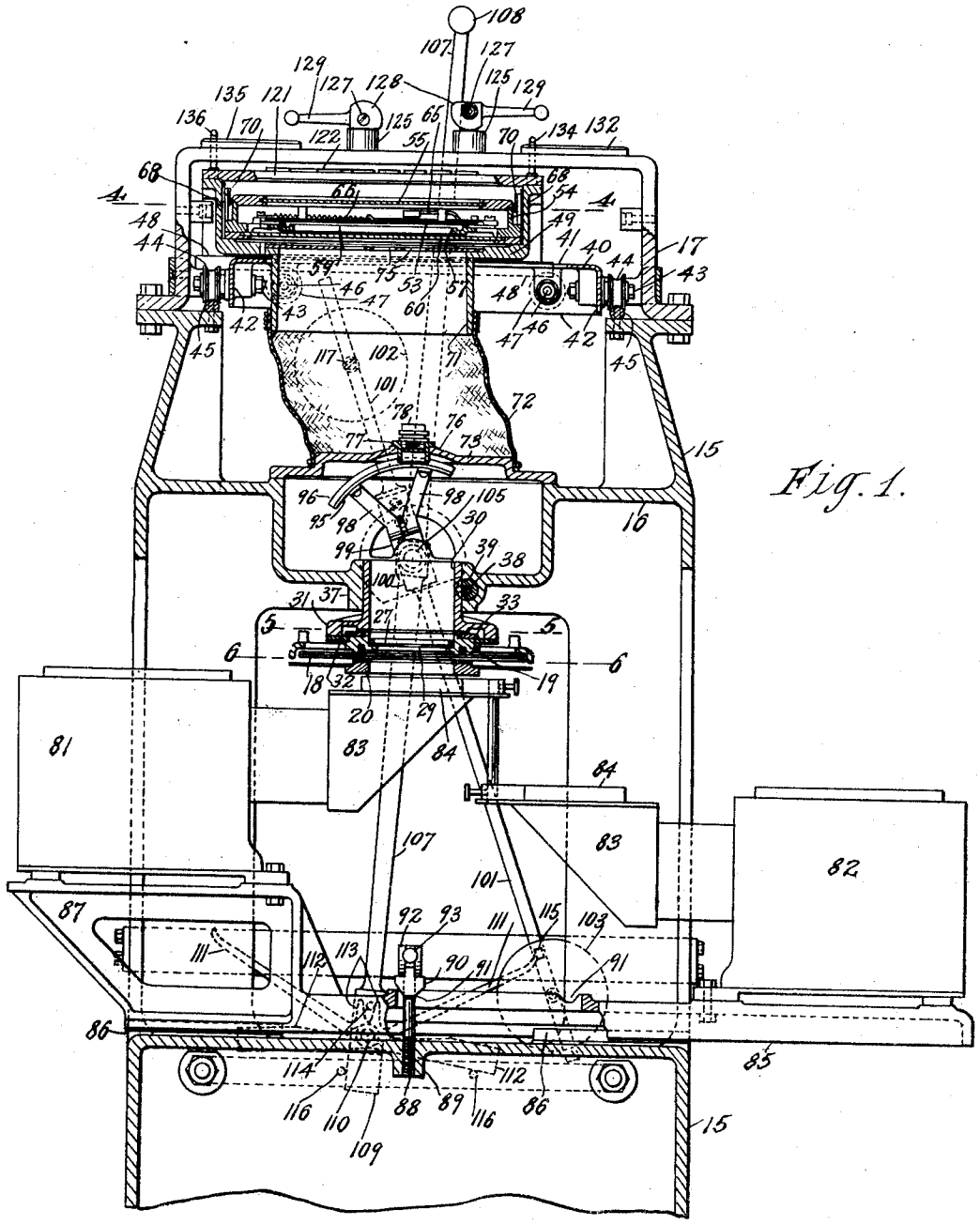


Fig. 1.

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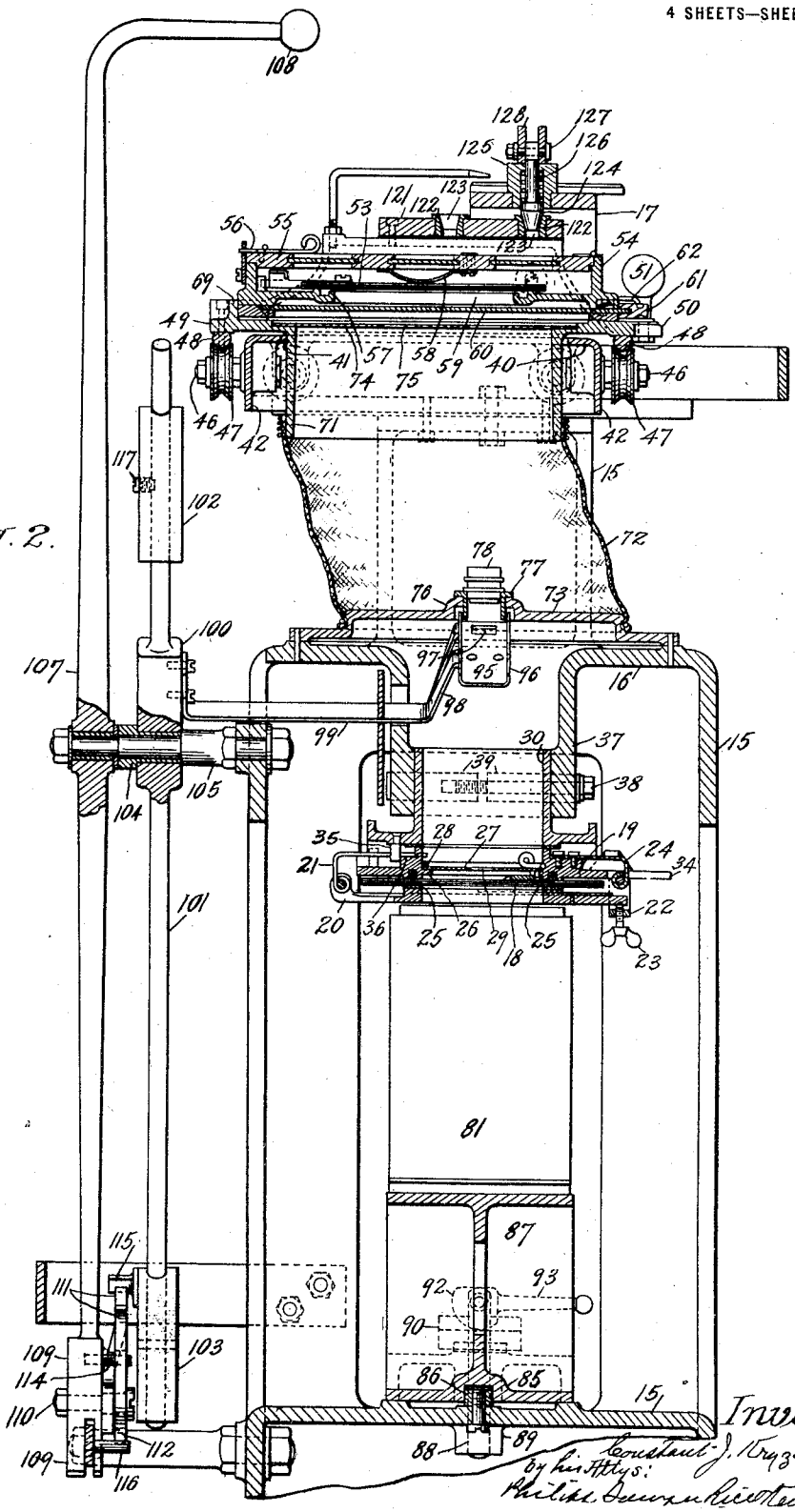
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

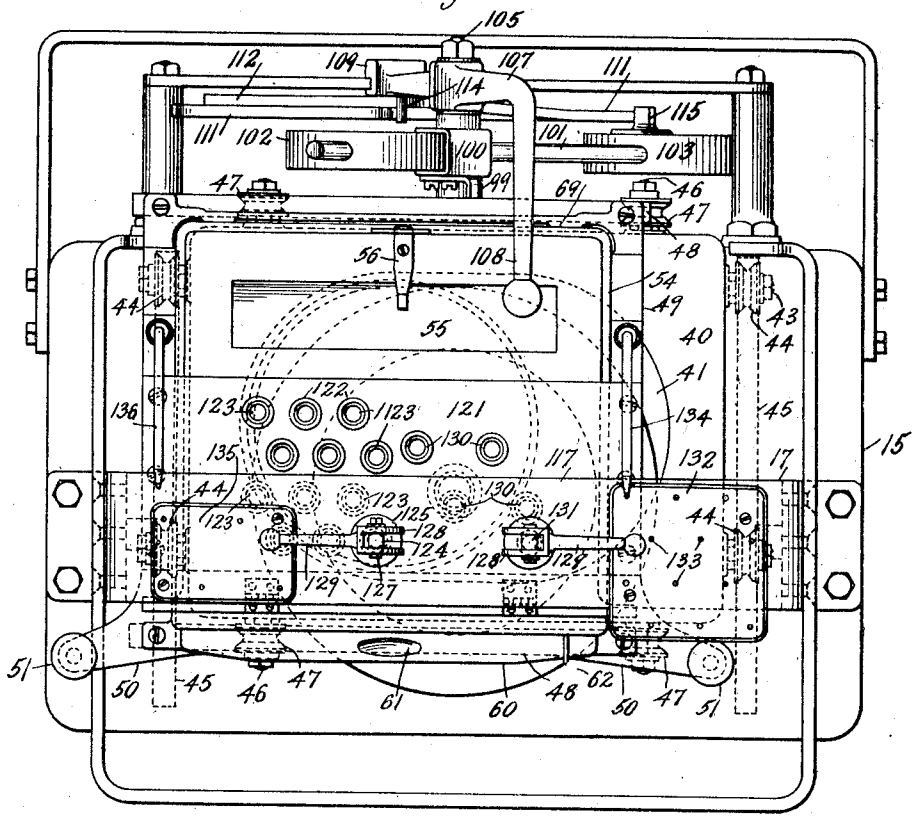
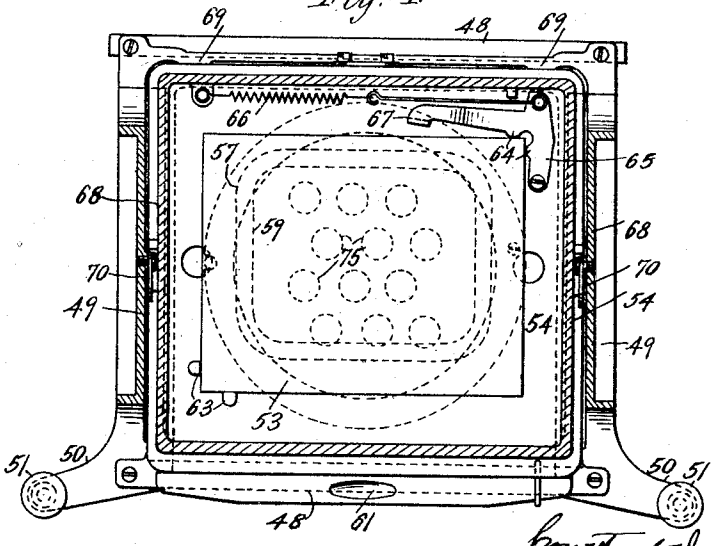


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 5.

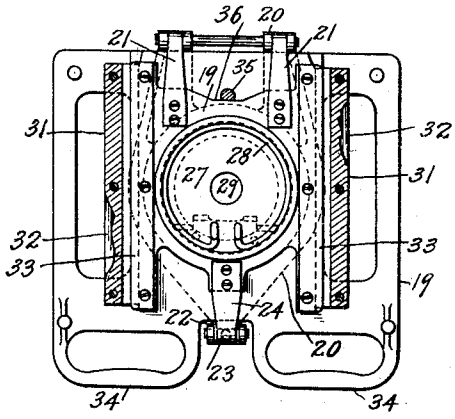


Fig. 6.

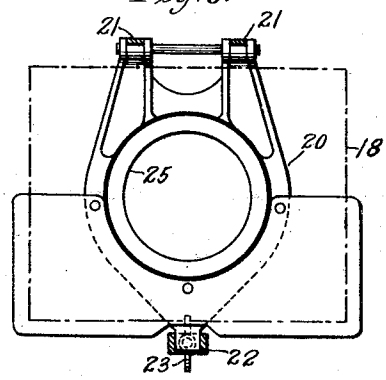


Fig. 7.

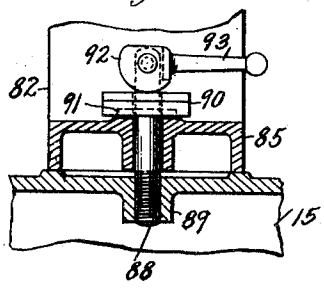


Fig. 9.

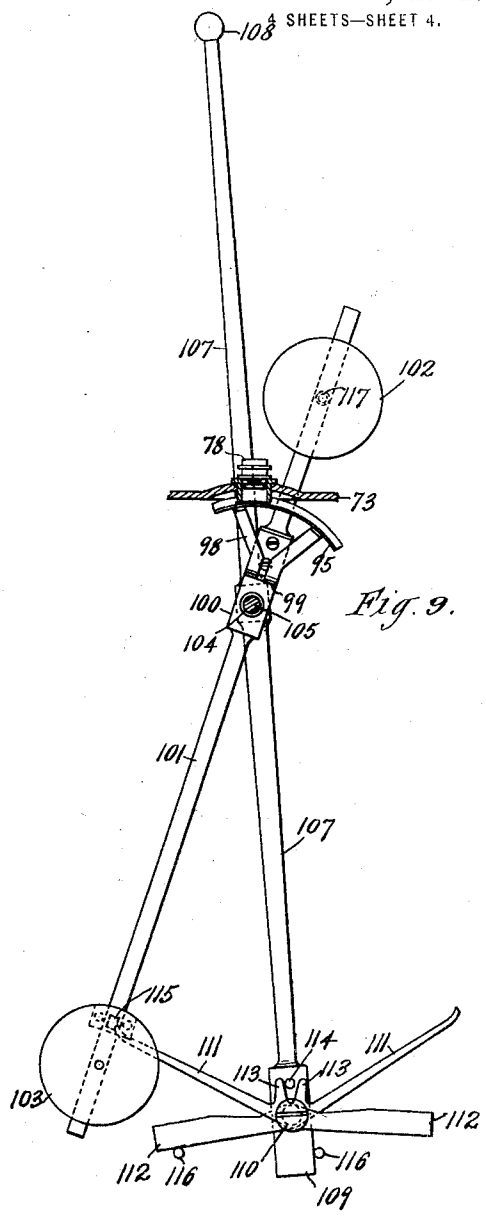
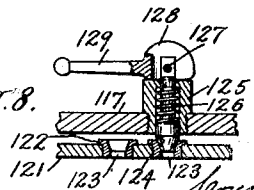


Fig. 8.



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CAMERA.

1,393,793. Specification of Letters Patent. Patented Oct. 18, 1921.

Application filed May 18, 1917. Serial No. 169,423.

To all whom it may concern:

Be it known that I, CONSTANT J. KRYZANOWSKY, a citizen of the United States, residing at Mount Washington, county of Baltimore, and State of Maryland, have invented certain new and useful Improvements in Cameras, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to cameras and particularly cameras of the so-called step and repeat variety.

In such cameras, an object, such as a unit design, is photographed on a sensitized plate in a plurality of positions according to a predetermined plan. To obtain this result, a number of exposures are made, the relative position of the sensitized plate and the lens being changed for each exposure. Cameras of this sort, as heretofore known, have been subject to several objections and disadvantages. For example, they have been lacking in exactness and uniformity due to inaccuracies in locating the parts and other reasons. As an example of one use of such a camera in which exactness and uniformity are particularly important, is the production of lithographed articles stamped or punched from a sheet of tin or the like. In such cases it is desirable to produce a sheet lithographed with a relatively large number of the unit designs, the single articles being then punched out. To obtain such a sheet the design is reproduced according to the desired plan on a photographic plate and the sheet is produced by the usual lithographic process. Since the punching is automatic, each unit design should be positioned exactly and successive sheets should be uniform. It follows, therefore, that the photographic plate should possess an equal degree of exactness and uniformity. As further examples of objections to step and repeat cameras as heretofore known, their operation has been slower than commercial efficiency demands; there has been an excessive loss of sensitized plate due to breakage and spoiling; it has been necessary to carry on the work in a dark room; and the whole operation has been lacking in efficiency and economy.

It is the object of the present invention to provide a step and repeat camera capable of a high degree of exactness and uniformity; a camera available for day-light use; and a camera meeting the demands of commercial efficiency.

The following specification describes and the accompanying drawings illustrate a step and repeat camera constructed in accordance with the invention, it being understood that changes may be made in the form, construction and arrangement of the parts without departing from the invention, the form herein disclosed being a preferred embodiment thereof.

In the drawings—

Figure 1 is a vertical cross-sectional view with parts in front elevation of a camera constructed in accordance with this invention;

Fig. 2 is a cross-sectional view of the same with parts in side elevation, showing the same somewhat enlarged;

Fig. 3 is a top plan view;

Fig. 4 is a cross-sectional view on the line 4—4 of Fig. 1;

Figs. 5 and 6 are similar views on the lines 5—5 and 6—6 of Fig. 1, respectively;

Fig. 7 is a detail view showing the locating and locking device for the master plate;

Fig. 8 is a detail view of the locating dowel, taken in vertical section, and

Fig. 9 is a diagrammatic view of the shutter mechanism.

As hereinafter more fully appears, the device comprises an object which is the unit to be photographed, a light source, a lens, and a sensitized plate on which the unit object is to be reproduced in a predetermined arrangement, the object and the sensitized plate being in the conjugate foci of the lens.

Referring to the drawings, the device comprises a supporting frame including upright portions 15, cross-pieces 16 and a separate top frame 17.

In order to absorb vibrations and for similar reasons, means is provided for yieldably carrying the object which is illustrated herein as a transparent plate bearing thereon the unit design, and in structure embodying the invention to the best advantage, this object plate is yieldably clamped within a two-part plate-holder. Although capable of various constructions, in the present embodiment the object plate 18 is carried by a

holder 19 having a cushioning cover 20 which is hinged to a resilient or yielding support 21 carried by the holder 19. As will be apparent from the drawings, both holder and cover have central round openings for the passage of the light rays from the source to the lens. To yieldably clamp the cover and holder together, a clamping member 22 including a thumb screw 23 is hinged to a second resilient or yielding support 24. When the object plate is in place, it is held between resilient gaskets 25 which engage it on either side and which are carried by the cover and holder, respectively. Just beyond the object plate, about the central opening, the holder is provided with a flange 26 on which rests a light screen 27 held in place by a spring clip 28 and having a central opening 29 in alinement with the lens.

Means is provided whereby the holder 19 is removably mounted in the camera. In the present embodiment, a sleeve-like mounting 30, hereinafter referred to further, is provided with a pair of downwardly extending flanges 31 to which are secured supporting members 32 so as to form internal shoulders, as more clearly appears in Fig. 1. To receive or embrace these shoulders, the top of the holder 19 is rabbeted on each side, as shown, and extending over these rabbeted portions is secured a pair of slide members 33 which rest on and slide over the supporting members 32. This provides a sliding tongue and groove connection which permits the holder 19 to be readily slid into place or removed by means of its handles 34. In order to properly position the holder in the mounting the mounting is provided with a pin 35 which serves as a stop for a shoulder 36 formed in the holder.

The invention includes means for adjusting the position of the object both longitudinally with respect to the lens and rotatably in its own plane so as to square up the unit design with the negative. Although capable of various constructions, in the form shown, the mounting 30 is telescopically embraced within a vertically disposed cylindrical support 37 formed by a downwardly extending portion of the frame cross-piece 16. The mounting 30 is rotatable in the cylindrical support and is also longitudinally movable therein, and the parts are normally locked in position by means of a bolt 38 operating in two sleeves 39 carried by the support 37 and cut away, as shown in Fig. 1, to accommodate the sleeve 30.

The invention includes means whereby the photographic plate is movable in a longitudinal plane across the axis of the lens, so as to bring substantially any part thereof in alinement with the lens, and in structures embodying the invention to the best advantage, the plate is carried in a holder, hereinafter described, in a carriage movable in at least two directions across the lens' axis. Although capable of various constructions, in the present embodiment, the carriage comprises two relatively moving parts, a carrier or base movable in one direction and a carriage movable either with the base or relative thereto. Referring more particularly to Figs. 1 and 2, the carriage comprises a base or carrier 40 having a substantially rectangular flat upper face containing a large central opening 41, and a downwardly extending flange 42. Each of the two opposite flanges of the carrier carries a pair of studs 43 on which are mounted wheels or rollers 44 arranged to run on parallel tracks 45 carried by internal flanges on the frame uprights 15. Each of the other two flanges 42 carries similar studs 46 and rollers 47 which coöperate with parallel tracks 48 depending from the bottom of the carriage 49. This latter member is in the form of an open sided frame, as more clearly appears in Fig. 4 to receive and embrace the plate holder.

For convenience in manipulating the carriage, the front corners thereof are extended, as at 50, and are provided with knobs or handles 51.

Due to the construction described, the carriage 48, carrying the plate, is movable in two directions at right angles to each other. Looking at Fig. 2, for example, the carriage with the carrier, is movable forward and back, whereas the carriage alone is movable relative to the carrier, to the right or left.

In order that the camera may be available for so-called "daylight" use, there is provision for carrying the plate in a lightproof holder and for a lightproof casing between the plate and the lens. While these features are capable of various constructions, in the particular form shown, the photographic or sensitized plate 53 is carried in a lightproof holder 54, having a hinged cover 55 provided with a latch 56. The plate rests on a curved cornered rectangular flange 57 and a bar spring 58 carried by the cover presses down against the back of the plate to hold it in place.

Within the supporting flange and of nearly the same size, the bottom of the plate holder has an exposure opening 59 normally closed or covered by a lightproof removable screen 60 which slides in suitable grooves in the holder and which has a handle portion 61 and a latching clip 62.

Means is provided for properly positioning the plate in the holder, so that all plates of a series will have the same relative position. In the particular construction illustrated, the edges of the corner of the plate are engaged by stops 63 and the edges of

the diagonally opposite corner are engaged between shoulders 64 on a pivoted centering device 65 held in place by a spring 66 and provided with a handle 67, this device 65 being self-centering. In this manner the plates may all have the same relative position in the holder, and in addition the holder itself is accurately positioned in the carriage. As shown, the carriage has one open end for the reception of the holder which slides into place between the side walls 68 of the carriage and is stopped by the rear wall or shoulder 69. As more clearly appears in Fig. 4, the holder fits snugly in place and is held in position by clips 70.

To provide a lightproof casing between the plate holder and the lens, the carriage, about its central exposure opening, is provided with a cylindrical skirt or thimble 71 which extends down through the central opening of the carrier and beyond the same, as appears in Figs. 1 and 2. Telescoping over the end of this skirt or thimble 71 and secured tightly thereto, in a manner to exclude light, is a lightproof flexible bellows 72 of cloth or other suitable material, the lower end of which is similarly secured to a shouldered lens support 73 secured to the frame 16. Thus a lightproof connection between plate and lens is provided, the bellows accommodating the various movements of the plate. To cut off any stray light, across the upper opening of the thimble 71 is a screen 74 having a plurality of openings 75, one or another of which is brought into alinement with the lens as the carriage is moved, these openings corresponding in arrangement to the arrangement of the images to be photographed on the negative.

Means is provided for mounting the lens whereby it may be positioned and maintained according to its proper focal length. Although capable of various constructions, in the present embodiment, the lens support 73 has a central, shouldered boss 76, and driven into this boss is a shouldered bushing 77. The shoulder of this latter rests against the shoulder of the boss, as appears in Figs. 1 and 2. The lens is carried in a shouldered lens mounting 78 which is screwed or otherwise inserted in the bushing 77 until their respective shoulders engage. The substantial focal relation between plate and lens is provided for in the general design of the camera, but in order to obtain very exact relative position, the shoulder of the bushing 77 is machined until, by experiments with a given camera, the exact focal position is determined.

The embodiment of the invention illustrated comprises an artificial light source and the invention includes provisions of plurality of light sources of different values, movable into and out of operative position. In structures embodying the invention to the best advantage a plurality of light sources is provided capable of movement into operative position at different distances from the object. Although capable of various constructions, in the particular construction shown, two light sources are provided. These are indicated as lanterns 81, 82, no specific light structure or means being illustrated, as the lights *per se* form no part of the present invention, and any suitable light, such as is well known in the art, may be used. Associated with each lantern is the usual ray directing and projecting means, indicated at 83 and including the rim 84. To permit ready movement of the lanterns into and out of operative position, they are secured to a support 85 slidable across the lens axis on a track 86 carried by the frame of the camera. The support 85 has a stepped up portion 87 which carries one lantern, the other being carried by the support proper. In this manner the light sources are at different distances from the object. As shown in Fig. 1, lantern 81 is in operative position with the rim close to the object. To obtain a light of less intensity, the support 85 is moved to the left (Fig. 1) until the rim of lantern 82 is in line with the object. As will be apparent, this light will not be as close to the object as the other was.

Means is provided for readily locating either lantern in operative position. In the present form, carried by a pin 88 screwed into a boss 89 in the main frame, is a V-shaped block 90 adapted to enter one of a plurality of similarly shaped notches 91 formed in a portion of the support 85, these being one notch for each lantern. As the lantern support slides over its track, the block 90 drops into one or the other of the notches and these notches are positioned so that as the block 90 enters one, the corresponding lantern is in operative position.

Means is provided for locking the lanterns in operative position. Although capable of various constructions, in the present form, the block 90 is locked in its notch. Pivoted to the pin 88 is a locking cam 92 bearing against the shouldered top of the block 90, the cam being turned by a handle 93. When the block has dropped into a notch, the cam is turned to clamp the block firmly into the notch and the lantern is locked against movement. Opposite movement of the cam releases the block and pressure on the support permits the same to move past the block until again locked. The clamping force of the cam 90 may be adjusted by screwing the pin 88 in or out of its boss 89.

As will now be clear, when one of the lanterns is in operative position, its light is directed through the object plate, through the lens and onto the photographic plate, thus photographing an image of the object on the sensitized plate.

A shutter is provided for normally shutting off the light rays from the lens, and in structures embodying the invention to the best advantage, the shutter will be capable of exposure adjustment. Although capable of various constructions, the shutter illustrated is a plate arranged to slide across the lens, between lens and light, and having an opening in alinement with the lens to permit passage of the light rays and consequent exposure as the shutter is operated. As shown, the shutter includes an arcuate plate 95 having associated therewith upturned edges 96 which enter suitable spaces formed in the lens mounting, as appears in Fig. 2, the shutter being held close to the lens mounting member 73. Located in the arcuate plate 95 is a rectangular opening 97 arranged to cross the lens axis as the shutter moves one way or the other across the lens. As the character of exposure varies with the shutter opening 97, exposure may be adjusted by substituting shutter plates having different sized openings.

Means is provided for operating the shutter, and in structures embodying the invention to the best advantage the shutter is gravity operated. Although capable of various constructions, in the form shown the shutter is carried by two arms 98 merging into a single arm 99 secured to a boss 100 formed on a compound pendulum 101 having upper and lower weights 102, 103. To pivot the pendulum, the boss is journaled on a sleeve 104 mounted on a pin 105 carried by the main frame. It will be seen that as the pendulum swings one way or the other, the shutter will be operated to carry the opening across the lens, or, in other words, each swing of the pendulum opens the shutter and permits an exposure. It is noted that the shutter opening and shutter are so arranged that the opening crosses the lens as the pendulum attains approximately its maximum velocity. As gravity and the friction of the parts may be considered constant, the successive exposure for a given adjustment of the various elements involved are substantially uniform.

The invention includes means for locking the pendulum against movement and for releasing the locking means to permit the pendulum to swing to open the shutter and in structures embodying the invention to the best advantage, the locking means will be automatically operated at each stroke of the pendulum, thereby to lock the shutter after each exposure. Although capable of various constructions, in the form shown, journaled on a bushing on the stud 105 is an operating member comprising a long rod 107 having a handle 108. At its lower end the rod 107 has an enlarged portion or foot 109 which carries a pivot pin 110 on which are mounted two arms 111 having weighted portions 112. These arms are oppositely disposed and the inner one is bent outwardly so their ends lie in the same plane, as appears in Fig. 2. Each arm has an upwardly extending lug 113 and the weighted portion is so arranged as to tend to swing the lug in against a stop pin 114 carried by the foot of the rod 107.

When the pendulum is raised, as shown, for example, in Fig. 9, its tendency is to swing downwardly. To prevent this movement and the resulting operation of the shutter, the lower weight 103 of the pendulum carries a stop member 115 adapted to be engaged by the curved ends of the arms 111. The weight of the pendulum presses against the arm 111 and through the engagement of the lug 113 with the pin 114 holds the foot of the rod 107 against a stop pin 116. The parts are therefore locked against movement. To release the lock to permit the shutter to operate, the operating bars 107 is swung on its pivot, as, for example, in the direction of the arrow in Fig. 9, thus throwing the foot to the left. During the first part of this movement, the left hand arm 111 is pushed against the lower weight of the pendulum, and rod and pendulum move together to the left. As soon, however, as the weighted portion 112 of the arm 111 strikes the right hand stop pin 116, the arm is tripped to swing its end out of contact with the lug 115, thus releasing the pendulum and allowing it to swing on its pivot in the ordinary manner of a compound pendulum. Meanwhile the foot 109 of the operating rod has moved over to a position against the left hand stop pin 116. The arms 111 and the pendulum are so arranged that the pendulum swings somewhat beyond the end of the arm. Thus, in the operation being described, the pendulum swings to the right until somewhat beyond the end of the right hand arm 111, which, meanwhile, under the influence of its weighted end 112, has been swung up until its lug 113 strikes the stop pin 114. This positions the arm for its end to engage the lug 115 as the pendulum starts its return stroke. This engagement locks the parts again in a position just the opposite of that shown in Fig. 9 and they remain locked until the rod 107 is again shifted.

Means is provided for adjusting the speed of the shutter movement, and in structures embodying the invention to the best advantage, this is accomplished by inherently regulating the stroke of the pendulum. Although capable of a wide range of construction, in that illustrated the upper weight 102 is slidable on the pendulum shank, being secured in place by a set screw 117. By moving this weight up or down on the shank, or by substituting different weights, the stroke of the pendulum is regulated as desired. With the pendulum mak-

ing its stroke at different speeds, the speed of the shutter movement is correspondingly varied.

With the construction described, each time the rod 107 is operated, the pendulum is allowed to make a single one way stroke under gravity, and this stroke moves the shutter to carry the opening across the lens. As this occurs at approximately the maximum velocity of the pendulum, successive exposures are substantially uniform. After one exposure the shutter is automatically locked, this locking means being also gravity-controlled. As a result, an effective shutter is obtained, which is rugged, compact and capable of a variation of exposure.

As before described, the photographic plate is movable across the axis of the lens to place the various image-receiving portions in alinement with the lens. Means is provided for locking the plate in any one of a plurality of predetermined positions, and in structures embodying the invention to the best advantage there is provided a master plate and coöperating locating means, one of these elements being stationary, the other moving with the plate and its carriage. Although the locking means may vary within a wide range, they may comprise coöperating pins and sockets, part being carried by the master plate and part stationary. Although capable of various constructions, in the present embodiment the carriage for the plate-holder has upwardly extending sides 68 on which is mounted a master plate 121 to move as a unit with the carriage. This master plate carries a plurality of set-in flanged bushings 122 forming frusto-conical sockets 123 for receiving a similarly shaped dowel pin 124 mounted in a housing 125 carried by the top portion of the frame work. The sockets 123 are arranged in accordance with the predetermined arrangement which the unit design is to have on the photographic plate. When the dowel is inserted in one of the sockets, in which it snugly fits, the carriage and consequently the plate is positively located in an exact and definite position with a given portion in alinement with the lens. When the dowel is removed, the carriage moved to bring up another socket, and the dowel again inserted, another predetermined portion of the plate is definitely and exactly fixed in alinement with the lens. Thus, by repeated locations of the carriage to bring each socket in coöperation with the dowel, all the predetermined image-receiving portions of the plate are brought into proper position, and the unit design is reproduced exactly in accordance with the predetermined arrangement governed by the master plate and all succeeding plates are uniform.

Means is provided for locking the plate and its carrier in the located positions, and in structures embodying the invention to the best advantage, this is accomplished by locking the dowel in the sockets. Although capable of various constructions, in that shown, in the housing 125 is a coil spring 126 bearing against a shoulder formed on the dowel and arranged to press the dowel into a socket. To withdraw the pin and hold it withdrawn, it is carried by a cross pin 127 mounted in a slotted cam 128 bearing against the top of the housing 125 and having an operating handle 129. As appears in Fig. 1, this cam has a flat surface which engages the housing when the dowel is in a socket. By throwing the handle 129 over about 180°, the increasing curve of the cam rides over the housing and raises the dowel and holds it raised until the handle is reversed.

It may be desirable to use the camera to reproduce different arrangements of the unit design without changing the master plate. To this end, the master plate may have more than one set of sockets. In the present embodiment, there is shown, as an example, in addition to the sockets 123, a second set of sockets 130 similar to those described, but located in accordance with a different arrangement. To coöperate with these sockets is a second dowel 131 similar to that described and having the same locking and withdrawing means. With such a construction plates may be exposed according to one arrangement, and then, by locating the carriage by means of the dowel 131 and the sockets 130, other plates may be exposed having a different arrangement of the unit design, without any change in the apparatus. In either case the plate is always positively and definitely located and locked in place, so that a high degree of exactness and uniformity is obtained.

The invention includes means for indicating the movement and locations of the plate and in structures embodying the invention to the best advantage, an indicating plate is provided bearing indicia arranged according to the arrangement of the sockets of the master plate. A pointer is also provided and one of these elements is stationary, the other moving with the carriage. Although capable of various constructions, in the form shown, mounted on the top frame 17 is an indicating plate 132 bearing markings 133 arranged to correspond with the positions of the sockets 123. A pointer 134 is mounted on the carriage and as the latter moves, the pointer indicates this movement and shows in which particular position the plate is located. Thus, in Fig. 3, the pointer rests over the upper left hand mark showing that the dowel is in the upper left hand socket. For the second set of locating sockets, a second indicating plate 135 and pointer 136 are provided.

The operation of the camera will be clear from the above description, but to recapitulate briefly, the object plate bearing the unit design is placed in its holder, and the desired light source placed in operative position. A plate holder in which a photographic plate has been placed in a dark room, is inserted in the carriage. The light screen of the holder is withdrawn and the carriage located in the first position by bringing a socket in position to receive the dowel. The operating bar 107 is thrown over which causes the shutter to move past the lens, thus making an exposure. The dowel is withdrawn, the carriage moved to bring up another socket, the dowel inserted and another exposure made. This continues until all sockets have coöperated with the dowel in locating the plate, the light screen is replaced and the plate-holder is removed. For succeeding operations, the same plate holder may be reloaded, or to save time, a number of duplicate holders may be used.

What is claimed is:

1. In a step and repeat camera, an upright frame, a lens carried by said frame with its axis in a vertical plane, a carriage mounted in said frame to move in a horizontal plane, a photographic plate holder carried by said carriage, a master plate moving with said plate holder, and means for locating said master plate in a plurality of predetermined positions.

2. In a step and repeat camera, an upright frame, a lens carried by said frame with its axis in a vertical plane, a carriage mounted in said frame to move in a horizontal plane, a photographic plate holder carried by said carriage, a flexible light proof casing between said plate holder and the lens, a master plate moving with said plate holder, and means for locating said master plate in a plurality of predetermined positions.

3. In a step and repeat camera, an upright frame, a lens carried by said frame with its axis in a vertical plane, a carriage mounted in said frame to move in a horizontal plane and having a central opening therethrough, a photographic plate holder carried by said carriage, a skirt on said plate holder extending through said carriage opening, a flexible light proof casing connected to said skirt and to said frame adjacent the lens, a master plate moving with said plate holder, and means for locating said master plate in a plurality of predetermined positions.

4. In a step and repeat camera, a lens, a plate holder movable across the axis of the lens in more than one direction in order that a photographic plate carried thereby may be given a plurality of predetermined positions with respect to the lens, a relatively stationary locating element, and a master plate moving with said plate holder and having a plurality of locating elements for coöperating with said stationary locating element to locate the photographic plate in all of said predetermined positions.

5. In a step and repeat camera, a lens, a photographic plate holder movable across the axis of the lens in more than one direction in order that a photographic plate carried thereby may be given a plurality of predetermined positions with respect to the lens, a relatively stationary dowel, and a master plate moving with said plate holder and provided with a plurality of dowel receiving sockets for coöperating with said dowel to locate the photographic plate in all of said predetermined positions.

6. In a step and repeat camera, a lens, a photographic plate holder, means for moving said plate holder across the lens in more than one direction in order that a photographic plate carried thereby may be given a plurality of predetermined positions with respect to the lens, a relatively stationary dowel, and a master plate movable with said plateholder and provided with a plurality of dowel receiving sockets for coöperating with said dowel to locate the photographic plate in all of said predetermined positions.

7. In a step and repeat camera, a lens, a photographic plate holder, a carriage for said plate holder movable across the axis of the lens in more than one direction in order that a photographic plate carried thereby may be given a plurality of predetermined positions with respect to the lens, a relatively stationary dowel, and a master plate connected with said carriage and having a plurality of dowel receiving sockets for coöperating with said dowel to locate the photographic plate in all of said predetermined positions.

8. In a step and repeat camera, a lens, a photographic plate on which an object is to be reproduced in a plurality of predetermined positions, a rigid, unitary element comprising a carriage movable across the axis of the lens in more than one direction, and a master plate having a plurality of locating elements, a plate holder, means whereby the plate holder is insertible in said carriage in a given position, means for fixing the position of the photographic plate in the plate holder, and a relatively stationary locating element for coöperating with said locating elements to locate the photographic plate with all of said predetermined positions in alinement with the lens.

9. In a step and repeat camera, a lens, a removable lightproof plate-holder, a carriage for said holder movable across the axis of the lens in more than one direction, a master plate movable with said carriage, locating means associated with said master plate and stationary locating means for co-

operating with said first-named means to locate said master plate in a plurality of predetermined positions.

10. In a step and repeat camera, an upright frame, a lens carried by said frame with its axis in a vertical plane, a horizontal track carried by the frame, a carriage part having a plurality of rollers for running on said track, a second carriage part, a track thereon located at right angles to said first named track, rollers on said first named carriage part for running on said second named track, a photographic plate holder carried by one of said carriage parts, a master plate movable with said plate holder, means for locating said master plate in a plurality of predetermined positions, and a flexible light screen between said plate holder and the lens.

11. In a step and repeat camera, a lens, a photographic plate holder movable across the axis of the lens, a master plate movable with the photographic plate holder, means for locating the master plate in a plurality of predetermined positions, and indicating means for tracing the path of movement of said plate holder.

12. In a step and repeat camera, a lens, a photographic plate holder movable across the axis of the lens, in order that a photographic plate carried thereby may be given a plurality of predetermined positions with respect to the lens, a master plate moving with said plate holder and having a plurality of locating means arranged in accordance with said positions, a relatively stationary locating member coöperating with said locating means, and indicating means including indicia arranged to correspond with the arrangement of said predetermined positions.

13. In a step and repeat camera, a lens, a photographic plate holder movable across the axis of the lens, in order that a photographic plate carried thereby may be given a plurality of predetermined positions with respect to the lens, means for locating said photographic plate holder to place said positions in alinement with the lens, and indicating means including indicia arranged to correspond to the arrangement of said predetermined positions.

14. In a step and repeat camera, a lens, a photographic plate, movable across the axis of the lens in more than one direction, on which an object is to be reproduced in accordance with one or another of different arrangements of a plurality of predetermined positions, a master plate moving with the photographic plate and having a plurality of locating elements arranged in accordance with each of said different arrangements, and a relatively stationary locating element for coöperating with all of said locating elements to locate the photographic plate in any or all of said predetermined positions.

15. In a step and repeat camera, a lens, a photographic plate, movable across the axis of the lens, on which an object is to be reproduced in accordance with one or another of different arrangements of a plurality of predetermined positions, a master plate moving with the photographic plate and having a plurality of dowel receiving sockets arranged in accordance with each of said different arrangements of predetermined positions, and a relatively stationary dowel coöperating with all of said locating means to locate the photographic plate in any or all of said predetermined positions.

16. In a step and repeat camera, a lens, a removable light proof plate holder, a carriage for said plate holder movable across the axis of the lens in more than one direction, a flexible light proof casing between said carriage and the lens, a master plate movable with said carriage, locating means associated with said master plate, and stationary locating means for coöperating with said first named means to locate said master plate in a plurality of predetermined positions.

17. In a step and repeat camera, a lens, a photographic plate holder movable across the axis of the lens, a master plate moving with said plate holder, means for locating said master plate in a plurality of predetermined positions, a shutter for the lens, and gravity operated means for operating said shutter.

18. In a step and repeat camera, a lens, a photographic plate holder, a carriage for the plate holder movable across the axis of the lens, a master plate rigidly connected with said carriage and having a plurality of dowel receiving sockets, a relatively stationary dowel coöperating with said sockets to locate the master plate in a plurality of predetermined positions, a shutter for the lens, and gravity operated means for operating said shutter.

19. In a step and repeat camera, a lens, a plate-holder movable across the axis of the lens, a master plate movable with said holder and having a plurality of locating means arranged in predetermined positions, and indicating means including a member having indicia arranged to correspond with the arrangement of said locating means, and a pointer, one of said indicating elements being stationary and the other movable with said master plate.

20. In a step and repeat camera, a frame, a plate holder, a two part carriage therefor, a track and roller connection between the two parts of the carriage, a track and roller connection between one part of the carriage and the frame, a master plate rigidly connected with the carriage, and a stationary

locating member coöperating with the master plate.

21. In a step and repeat camera, a lightproof plate holder, a carriage for said plateholder movable across the axis of the lens, means for locating the carriage in a plurality of predetermined positions, a light screen carried by the carriage and having a plurality of openings brought into alinement with the lens upon movement of the carriage, and flexible light screen between the carriage and the lens.

22. In a step and repeat camera, a lens, a photographic plate holder movable across the axis of the lens, a master plate moving with said plate holder, means for locating said master plate in a plurality of predetermined positions, a shutter for the lens, and a pendulum for operating said shutter by gravity.

23. In a step and repeat camera, a lens, a photographic plate holder movable across the axis of the lens, a master plate moving with said plate holder, means for locating said master plate in a plurality of predetermined positions, a shutter provided with an opening adapted to move past the lens, and gravity operated means for operating said shutter to move the opening past the lens.

24. In a step and repeat camera, a lens, a photographic plate holder movable across the axis of the lens, a master plate moving with said plate holder, means for locating said master plate in a plurality of predetermined positions, a shutter provided with an opening adapted to move past the lens, and a pendulum for operating the shutter to move the opening past the lens.

In testimony whereof, I have hereunto set my hand.

CONSTANT J. KRYZANOWSKY.