E. RECTOR.

CAMERA.

APPLICATION FILED SEPT. 5, 1911.

1,262,255.

Patented Apr. 9, 1918.

5 SHEETS—SHEET 1.

Fig. 1.

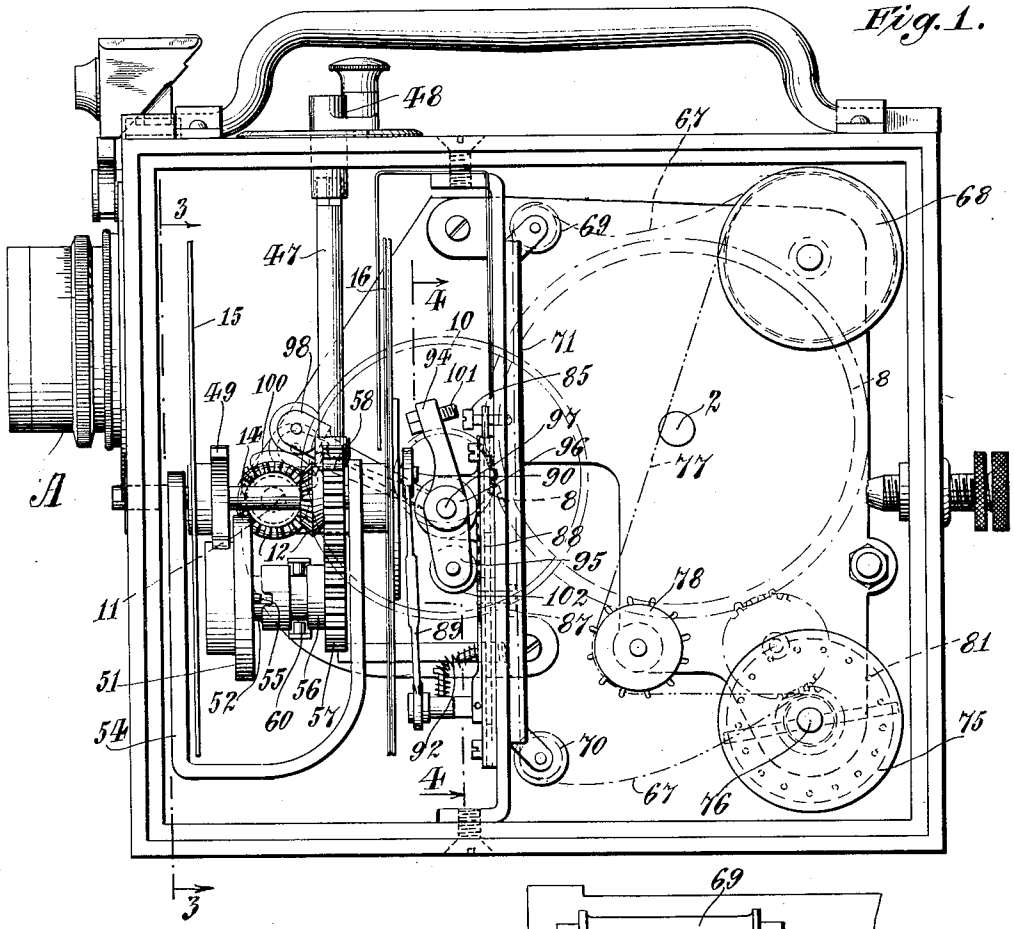
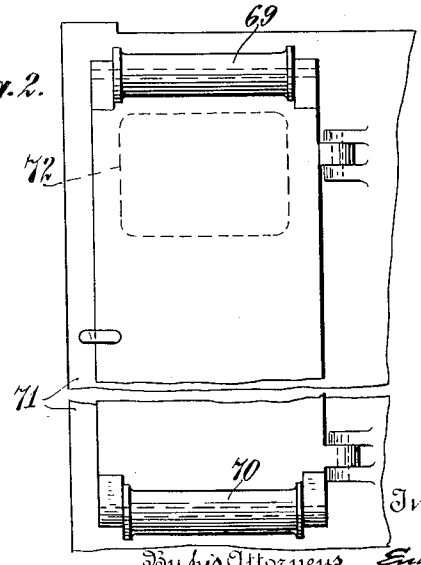


Fig. 2.



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5 SHEETS—SHEET 2.

Fig. 3.

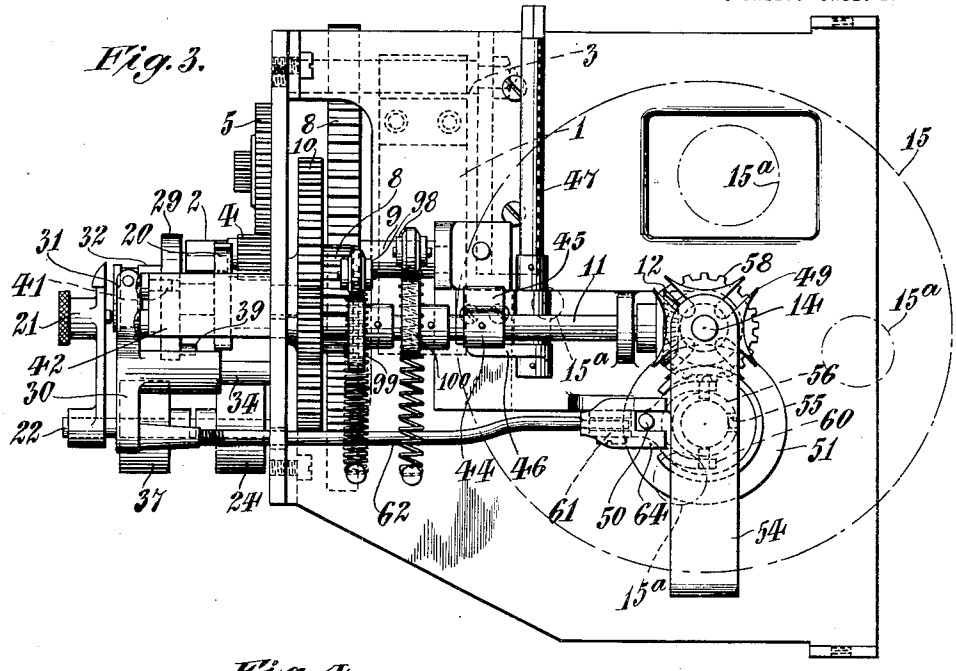
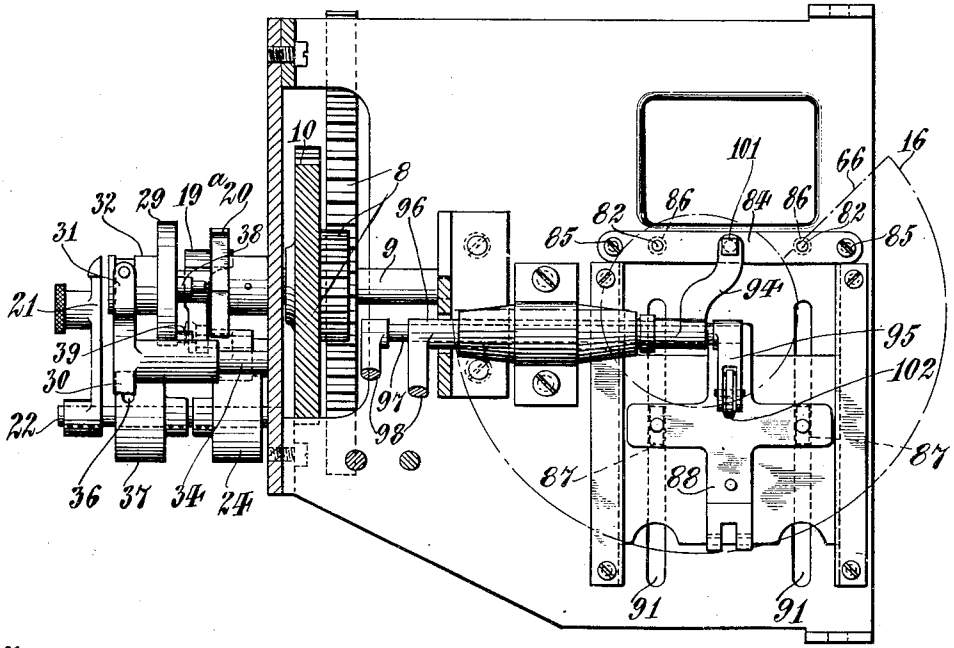


Fig. 4.



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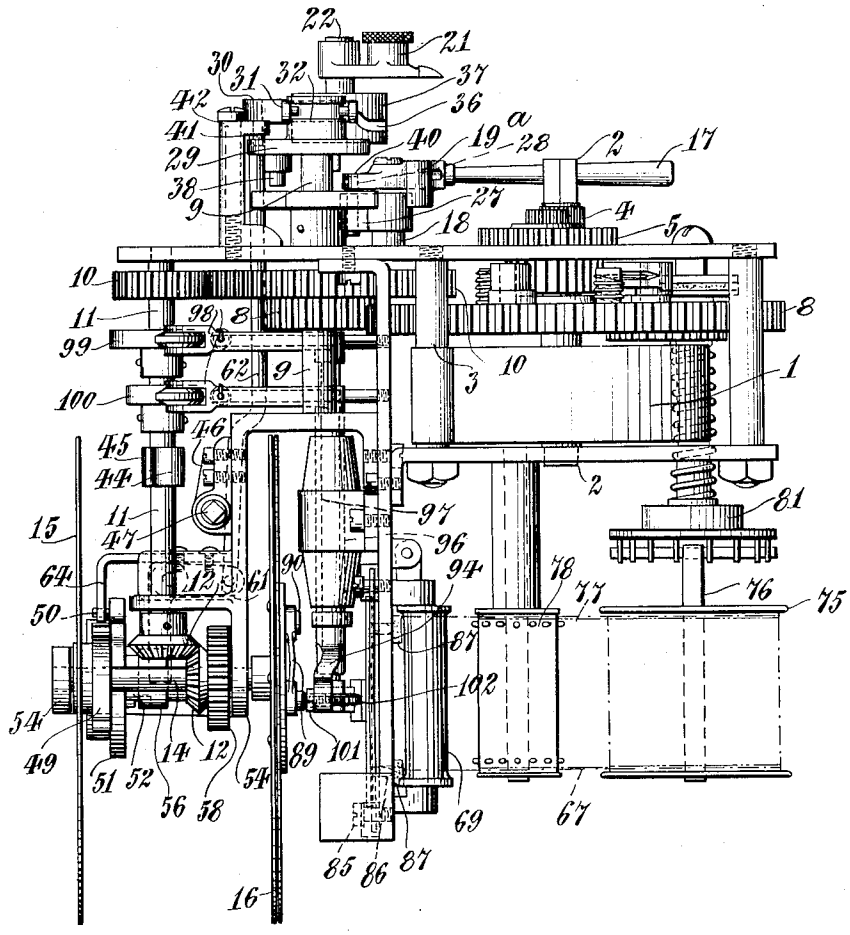
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5 SHEETS—SHEET 3.

Fig. 5.



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5 SHEETS—SHEET 4.

Fig. 6.

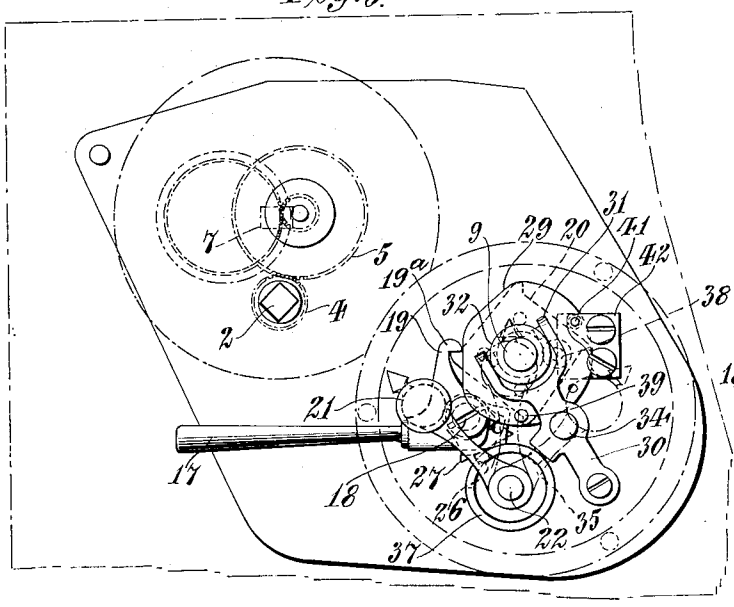
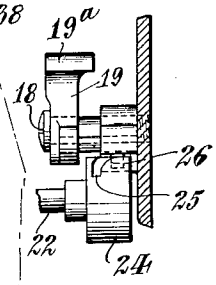


Fig. 7.



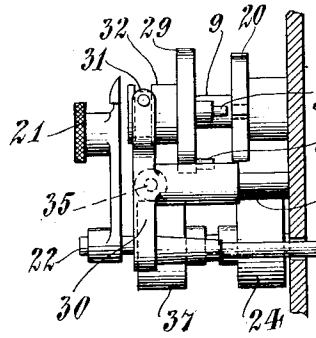


Fig. 8.

Fig. 9.

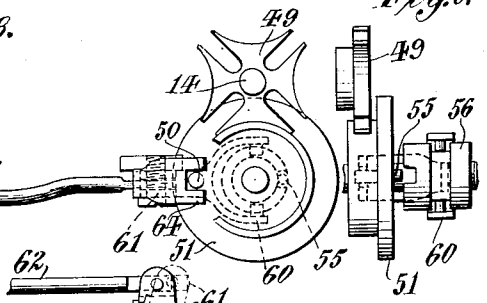
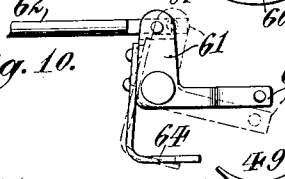


Fig. 10.



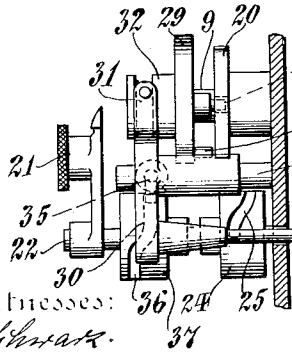
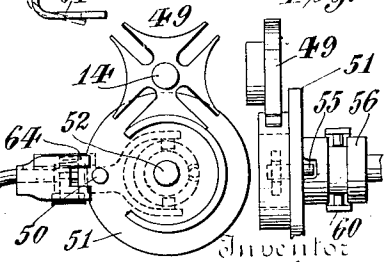


Fig. 11.

Fig. 12.



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APPLICATION FILED SEPT. 5, 1911.

1,262,255.

Patented Apr. 9, 1918.

5 SHEETS—SHEET 5.

Fig. 13.

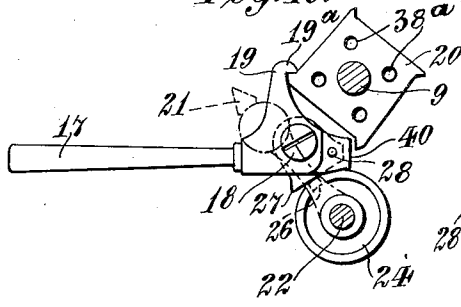


Fig. 14.

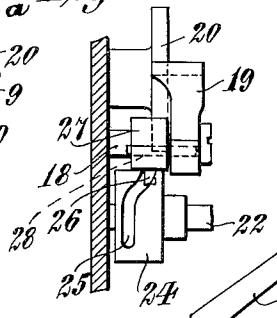


Fig. 15.

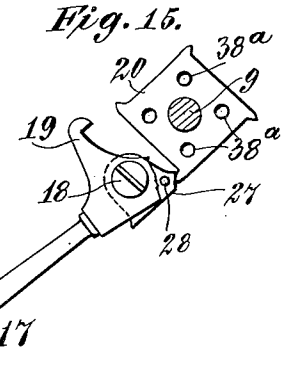


Fig. 16.

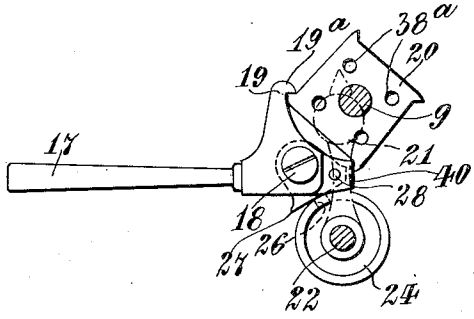


Fig. 17.

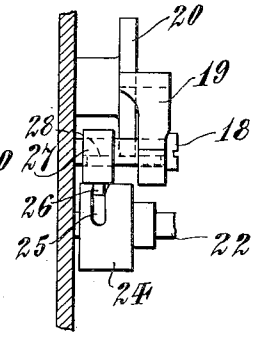


Fig. 18.

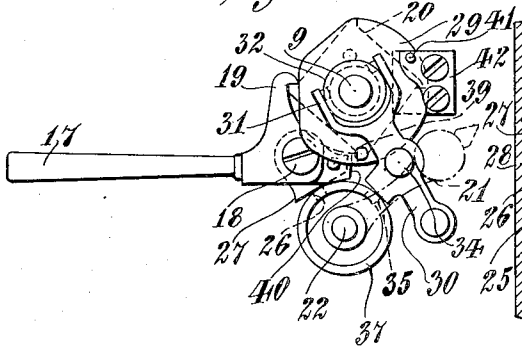
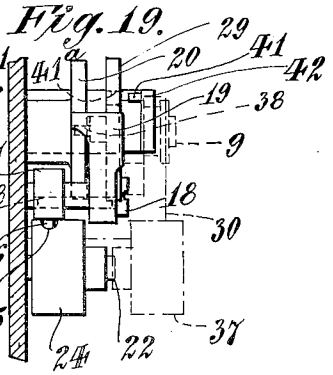


Fig. 19.



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UNITED STATES PATENT OFFICE.

ENOCH RECTOR, OF NEW YORK, N. Y.

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1,262,255. Specification of Letters Patent. Patented Apr. 9, 1918.

Application filed September 5, 1911. Serial No. 647,677.

To all whom it may concern:

Be it known that I, ENOCH RECTOR, a citizen of the United States, residing in the borough of Manhattan of the city of New York, in the State of New York, have invented certain new and useful Improvements in Cameras, of which the following is a specification.

One of the main objects of my invention is to provide a portable camera which is extremely compact in construction and which is adapted to make a single exposure (either an instantaneous or a time exposure) and which is also adapted to make a plurality of exposures in rapid succession upon a moving film or plate.

A further object of the invention is to provide a portable camera for making a single exposure, or an unlimited number of exposures, or, at the option of the operator a predetermined limited number of exposures in rapid succession, together with means for determining the number of exposures which shall be made and also means whereby the exposures may be made automatically after the mechanism has been set in operation.

A further object of the invention is to provide means whereby a predetermined number of exposures may be made and the aperture through the diaphragm may be automatically varied with each exposure, so that not only will a predetermined number of exposures be obtained, but each exposure will be under different conditions as determined by the size of the aperture; so that, regardless of the inexperience of the operator, the chances of obtaining at least one properly timed exposure out of a total number of exposures are greatly increased.

A further object of the invention is to provide means whereby the exposure may be made on a film automatically fed from a roll and also automatically rewound on a roll after being exposed, without any manual manipulation by the operator and whereby the amount of travel of the film between exposures may be accurately controlled and determined.

A further object of the invention is to provide improved means for feeding and controlling the film, which will operate to effect a uniform movement of the film, but without any possibility of subjecting the film to undue tension.

The various other objects of the invention will be more fully set forth in the following description of one form of apparatus embodying the invention which consists in the new and novel elements of construction and combinations and arrangements of parts hereinafter set forth and claimed.

In the accompanying drawings one form of apparatus embodying my invention has been illustrated, in which—

Figure 1 represents a side elevation of my improved camera mounted in the casing.

Fig. 2 represents a plan view of the rollers for holding the film in position against the aperture plate.

Fig. 3 represents a front view of the improved camera from the plane of line 3—3 of Fig. 1.

Fig. 4 represents a section on the line 4—4 of Fig. 1.

Fig. 5 represents a plan view of the camera with the casing and lenses removed.

Fig. 6 is an enlarged side elevation of the setting and controlling mechanism.

Fig. 7 is a detail view showing one of the setting cams.

Figs. 8 to 12, inclusive, are detail views illustrating the means for controlling the operation of the diaphragm, and

Figs. 13 to 19, inclusive, are detail views illustrating the setting mechanism.

The apparatus is operated from a powerful coiled spring 1 having one end secured to a spindle 2 which projects from the casing so that the spring can be wound by any suitable means as a key, and having its other end permanently secured to a stud or bolt 3 mounted in the frame. The spindle 2 is connected through the spur gears 4 with the indicating gear 5 which may have numerals or other indicia thereon that can be seen through a sight opening provided in the casing to indicate the number of exposures which have been made from any particular film. The spindle 2 is also connected through the spur gears 8 with the main shaft 9 which is mounted in suitable bearings provided in the frame.

The main shaft is operatively connected through a train of gearing 10 with a parallel driving shaft 11 which is operatively connected through miter gears 12 with the transverse operating shaft 14 that carries the diaphragm 15 and the shutter 16 and the main shaft is also operatively connected

with the feeding mechanism as hereinafter described.

The operation of the camera is immediately under the control of the operator through a handle 17 which is pivoted to a stub shaft 18 mounted in the frame and having a pawl 19 formed integral therewith. Said pawl, in connection with the detents hereinafter described, provides an escapement or stop control for a star wheel 20 which is keyed to the main shaft and permits the rotation of the main shaft as determined by the position of the setting mechanism.

The setting mechanism controls the movement of the main shaft to determine whether a single exposure, or a predetermined limited number of exposures, or a succession of exposures limited only by the will of the operator shall be made, and is regulated by an indicating handle 21 secured to a stub shaft 22 and projecting outside of the casing so it can be manipulated by the operator. A cam wheel 24 is mounted upon said shaft 22, having a cam groove 25 formed in its periphery, which engages a pin 26 on a detent 27 mounted to slide upon the shaft 18, that is laterally toward and away from the star wheel. Said detent is held in position with relation to the pawl and the star wheel by any suitable means as a guide pin 28 mounted on the pawl as an extension thereof. In the position shown in Figs. 13 and 14 the detent is arranged in the path of the star wheel 20 and consequently an up and down movement of the handle, in the particular mechanism shown in the drawings, will permit a quarter turn of the main shaft, which, through the gearing, causes one complete revolution of the operating shaft, and permits a single exposure to be made.

When it is desired to produce an unlimited number of exposures, however, the indicating handle 21 is moved into the position indicated by the dotted lines in Fig. 16, which, through the cam groove 25 moves the detent 27 away from the pawl 19 and out of the path of the star wheel, and consequently when the star wheel is released from the pawl by a downward movement of the handle, the shaft will rotate continuously and a succession of exposures will be made until the operator again brings the pawl into engagement with the star wheel by raising the handle.

In order to limit the number of exposures, however, to a predetermined number, as for example four exposures, which is the number provided for in the particular mechanism shown in the accompanying drawings, a guard plate or cam 29 is mounted to slide upon the main shaft, and said guard plate is of suitable shape so that only the particular point of the star wheel which may be in engagement with the pawl will be exposed. That is, the cam covers or eclipses certain of the teeth of the star wheel. The guard plate is actuated by an arm 30 having a yoke 31 provided at one end thereof, which engages in a collar 32 formed integral with said guard plate. The arm 30 is mounted to slide on a stub shaft 34 secured to the frame and is provided with a pin or projection 35 which engages in a cam groove 36 provided in the periphery of a wheel 37 which is mounted upon the shaft 22 controlled by the indicator handle. The guard plate is also provided with two pins 38 and 39 respectively; the pin 38 engages in any one of four perforations 38^a provided in the star wheel 20 when the plate is in its operative position; the other pin 39 is arranged in the path of a detent 40 formed integral with the pawl 19. Consequently when the guard plate is moved by the indicating arm into the position indicated in Fig. 18 of the drawings the detent 40 will engage with the pin 39 when the operating handle 17 is moved downward. When the pin 39 and therefore the main shaft is released by moving the operating handle upward, the pawl 19 which has its axis off-set with respect to the main shaft will fall just to the rear of the adjacent tooth of the star wheel and will ride upon the guard plate until the projecting point of the star wheel again comes into engagement therewith, thus permitting one complete revolution of the main shaft, which, through the gearing, causes four complete revolutions of the operating shaft and consequently four exposures to be made. While the guard plate is in its non-operative position it is normally held against rotation by any suitable means as a pin 41 provided upon an arm 42 secured to the casing. This pin holds the guard plate by entering a perforation 41^a in the guard plate. (Fig. 19).

The pin 41 and the perforations 41^a will always aline with each other when the star wheel 20 is detained by the catch or tooth 19^a of the pawl 19. From this arrangement, the cam 29 is normally held withdrawn from the star wheel but alined so that when slid toward the star wheel the pin 38 will pass into some one of the perforations 38^a and lock the cam non-rotatably to the star wheel.

In order to take time exposures the driving shaft 11 is provided with a collar 44 having a lip 45 formed integral therewith. A dog or stop 46 is secured to the end of a rotatable shaft 47 mounted in the casing and controlled by a handle 48 which permits the stop to be moved into the path of the lip. By arranging the setting mechanism so as to take a single exposure and then placing the stop in the line of the lip the operation of the handle 17 will release the operating shaft, which will be stopped by the dog with the shutter in its open position; it will be held there until the handle 48 is operated to dis-

engage the lip, which permits the operating shaft to complete its movement and close the shutter.

In order to operate the diaphragm 15, which is provided with a plurality of apertures 15ª of different sizes so that said apertures may be successively brought in line with the lens A when a predetermined limited number of exposures is made, the diaphragm is loosely mounted upon the operating shaft 14 and the star wheel 49 of a Geneva movement is secured thereto. The pin 50 (Fig. 11) of the movement is carried upon a disk 51 loosely mounted upon a countershaft 52 parallel to the operating shaft and supported in an arm 54 of the frame. Said disk is provided with a pin 55 which constitutes one member of a clutch, and the other member, preferably the movable member, 56 is secured to a gear 57 which is driven from the operating shaft through a gear 58. The driven gear 57 is provided with a face of sufficient width so that it always remains in mesh with the driving gear 58 and together with the movable member 56 of the clutch is operated through a yoke 60 secured to one arm of a bell crank lever 61 pivoted to the frame and having its other arm secured by a connecting rod 62 to the free end of the arm 30 comprising a part of the setting mechanism. An arm or detent 64 is preferably mounted on the bell crank lever and engages with the pin 52 of the Geneva movement when the clutch is in its nonoperative or disengaged position to hold the disk against rotation through frictional engagement with the operating shaft and automatically disengages when the clutch is in its operative position. Consequently when the indicating handle 21 is moved in position to make a predetermined limited number of exposures, the clutch mechanism is automatically engaged and the diaphragm is rotated through the Geneva movement so that the different apertures are successively brought in line with the lens.

The shutter 16 comprises a disk provided with an opening or gap 66 of any desired shape, and is keyed upon the operating shaft so that the opening will register with the apertures in the diaphragm when a predetermined limited number of exposures are being made and so that said opening will be in the path of the lens only when the feeding mechanism is holding the film at absolute rest.

The film 67 is carried by a feed roller 68 journaled in the frame, and leaves the paper web 77 at roller 68, passing forwardly to form a loop over guide rollers 69 and 70 arranged at opposite ends of a plate 71 provided with an aperture 72 across which the film passes. The film passes from the lower guide roller 70 on to the winding or take up roller 75 mounted upon a shaft 76. Web 77 is of the same width as the film but has perforations in its edges, and is wound with the film on the feed roller. This paper web passes over a guide sprocket 78 on to the take up roller 75. The sprocket roller and the take up roller are both driven from one of the aforesaid gears 8 which is upon the spindle 2. The take up roller 75 is loosely mounted upon the shaft 76 and is driven through any suitable friction device or clutch mechanism 81 which will compensate for the increasing diameter of the take up roller as the film is wound thereon.

In other words, the sprocket wheel 78 is rotated at a uniform speed so as to draw the web 77 from the feed roller 68 and this sprocket wheel is positively driven. The take up roller 75 being yieldingly or friction driven, winds up the slack of the web and keeps the web taut between the sprocket 78 and the roller 75. As the web 77 winds upon the roller 75 it winds over the film 67 which is winding upon the same roller. From this arrangement it will be understood that the film leaves the feed roller 68 and forms a forwardly extending loop passing across the exposing aperture 72 and the film in this loop is automatically advanced and held stationary while the exposure is taking place without subjecting the film to any tension whatever.

In order to insure the film's being held stationary while an exposure is being made, a pair of holding studs 82 are provided on a bar 84 movably mounted on pins 85. (See Fig. 4.) Said studs are adapted to project through openings 86 formed in the aperture plate and engage the film to hold the same stationary while an exposure is being made.

In order to feed the film after the exposure has been completed, a pair of friction pads 87 are secured to a sliding plate 88 which is movable on the aperture plate and is reciprocated vertically by a connecting rod 89 actuated by an eccentric 90 upon the operating shaft (Fig. 1). The friction pads project through suitable openings 91 formed in the aperture plate, and engage with the film to feed same by frictional engagement.

Both the bar and the friction plate are normally held out of engagement with the film by any suitable means as a spring 92 (Fig. 1) and the studs and the friction pads are forced alternately into engagement with the film by means of two arms 94 and 95 mounted upon the shafts 96 and 97 respectively, which are actuated through connecting rods 98 from cams 99 and 100 respectively, provided upon the driving shaft. The arm 94 actuates the bar 84 through an adjusting screw 101. The arm 95 is provided preferably with a roller 102 which engages with the sliding plate and permits same to be reciprocated while the friction pads are in engagement with the film.

In this way while the bar 84 is released the film is advanced, and when the film is not advancing it is held fixed by the bar.

The paper web also regulates and determines the movement of the take up roller, and causes the clutch mechanism connecting the take up roll with the driving shaft to slip as the roll increases in size, so that the peripheral speed of the take up roller will remain constant regardless of the enlarged size of the roll thereon. The paper strip which is perforated also provides a pattern for subsequent perforations of the film.

In operation the spring tends to feed the film continuously across the aperture and at the same time to operate the star wheel 20, keyed to the main shaft. The actuation of the handle 17 unlocks the star wheel and thus permits the rotation of the shaft to cause either a single exposure or a plurality of exposures, which choice in the number of exposures is controlled by the position of the guard plate 29.

I claim as my invention:—

1. In a camera, the combination with a power spring, of a feeding mechanism for the film, a shutter operated from said power spring, mechanism designed to be preset to control the operation of the shutter and the film feeding mechanism thereby to regulate the number of exposures of the camera and manually operated means for releasing said spring.

2. In a camera, the combination with a main spring, feeding mechanism for the film, a shaft driven from said spring and operatively connected with said feeding mechanism, a pawl engaging said shaft to hold the same against rotation, a shutter driven from said shaft and mechanism operatively connected with said shaft and adapted to be preset to control the operation of said shutter and film feeding mechanism thereby to regulate the number of the exposures of the camera.

3. A camera comprising a shutter and a feeding mechanism for a sensitized film or plate, in combination with a setting mechanism, a source of power controlled through said setting mechanism, said setting mechanism adapted to be preset to control the number of exposures of the camera and a manually operated means connected with said source of power and designed to control the actuation of the setting mechanism.

4. A camera comprising a shutter and a feeding mechanism, a power train operatively connected with said shutter and feeding mechanism, a stop control operatively connected with said power train to control the actuation of said shutter and feeding mechanism thereby to regulate the number of exposures of the camera and means for regulating the actuation of said stop control.

5. In a camera comprising a shutter and a feeding mechanism for a sensitized film or plate, a source of power operatively connected with said shutter and said feeding mechanism, a stop controlling said source of power to regulate the duration of action of the same and a setting mechanism controlling said stop whereby the stop may be held out of operative engagement during a predetermined period to permit a predetermined number of exposures before the source of power becomes inoperative.

6. In a camera, the combination with a rotating shutter, of a diaphragm having a plurality of different sized apertures therein, means for rotating said shutter, and means for rotating said diaphragm to bring said apertures successively opposite said shutter.

7. In a camera comprising a rotating shutter and means for causing a complete rotation of said shutter at each exposure of a diaphragm having a plurality of different sized apertures therein, a driving shaft for said diaphragm and a clutch mechanism for engaging said driving shaft and diaphragm.

8. In a camera comprising a lens and a sensitized plate or film, a shutter arranged between said lens and film and having an opening therethrough, a rotatable shaft for said shutter, a diaphragm having a plurality of apertures therein mounted loosely on said shaft, a countershaft driven from said shutter shaft, a Geneva movement between said diaphragm and countershaft for operating the diaphragm so as to bring said apertures successively opposite the shutter and a clutch mechanism on said countershaft for operating the Geneva movement.

9. In an apparatus for taking photographs of objects in motion, comprising a lens, means for intermittently feeding a sensitized film across the line of the lens, means engaging the film by frictional contact for holding successive portions thereof at rest in line with the lens, a shutter exposing the successive portions of the film during the periods of rest, and a driving means comprising a setting mechanism, opertively connected with said shutter and film controlling mechanism for regulating the duration of movement of said driving means whereby a predetermined number of film picture units may be advanced across the line of the lens.

10. A camera having in combination a lens, means for feeding successive portions of a film across the line of the lens, driving mechanism operatively connected with said feeding means, means for operating said driving mechanism intermittently and a setting mechanism whereby the operation of the driving means may be limited so as to produce a predetermined number of exposures at one operation.

11. A camera comprising a lens, means for feeding successive portions of the film across the line of the lens, a motor operatively connected with said feeding means, a stop controlling the operation of said feeding means, and means operatively connected with said stop whereby said stop may be held in its non-operative position during a predetermined period of time and means for moving said stop into operative position at the termination of said predetermined period.

12. A camera having in combination a lens, a feeding mechanism for moving a sensitized film intermittently across the line of the lens, a shutter exposing the successive portions of the film during the periods of rest, a motor operatively connected with said feeding mechanism and shutter, and means permitting intermittent operation of said motor comprising a manually operated stop control and adjustable mechanism for holding said control in its non-operative position.

13. A camera comprising in combination a lens, a feeding mechanism for intermittently moving successive portions of a sensitized film in line with the shutter, a motor operatively connected with said shutter and feeding mechanism, a detent operatively connected to said motor to prevent movement thereof and adjustable means operatively connected with said detent to hold the same in its non-operative position for different predetermined periods.

14. A camera having in combination, a lens, a feeding mechanism for intermittently moving successive portions of a sensitized film across the line of the lens, a shutter exposing the film during the periods of rest, a motor, a driving connection with the motor for normally operating said shutter and feeding mechanism continuously, a stop control operatively connected with said driving mechanism and comprising a manually operated handle controlling the operation of said stop control and means for automatically holding said control in its non-operative position for a predetermined period.

15. A camera comprising a lens, and means for moving successive portions of a sensitized film in line with the lens, a motor, a shaft driven by said motor and operatively connected with said feeding mechanism, a detent wheel on said shaft, a pawl adapted to engage said wheel and hold the shaft against rotation and means acting on said pawl to hold the same in its non-operative position during a predetermined rotation of said shaft.

16. A camera having in combination, a lens, a feeding mechanism for moving successive portions of a sensitized film in line with the lens, a motor, a shaft driven by said motor operatively connected with said feeding mechanism, a stop control comprising a pawl and a movable detent adapted to engage said shaft and hold the same against rotation, a cam plate adapted to engage said pawl and hold same in its non-operative position and means for actuating said plate and detent.

17. In a camera, in combination with film operating means, of a shutter, power driven mechanism for actuating said shutter to make exposures, and hand controlled means adapted to engage said mechanism with said shutter in its exposed or open position and hold said shutter in its open position until said means is withdrawn.

18. In a camera in combination a shutter, power actuated mechanism for driving said shutter, said mechanism including a rotating member and a clip, and a manually controlled dog adapted to be moved into the path of said clip to arrest said mechanism with said shutter in its open or exposing position to make a time exposure, the withdrawing of said dog from the path of said clip terminating said exposure and permitting the closing of said shutter.

19. A camera having mechanism for making a succession of exposures, comprising a rotating member having teeth corresponding to the number of exposures, means forming a part of said mechanism for effecting the successive exposures through rotation of said member, a power means tending to move said member and a pawl coöperating with said teeth to hold or release said member.

20. A camera having mechanism for making a succession of exposures, comprising a wheel having teeth corresponding to the number of exposures, a power means tending to rotate said wheel, means forming a part of said mechanism for controlling the number of exposures by the rotation of said wheel, a pawl coöperating with said teeth to release or detain said wheel, and a cam coöperating with said wheel to guard a portion of the teeth of said wheel to prevent their coöperation with said pawl.

21. A camera having mechanism for making a succession of exposures, comprising a wheel having teeth, means forming a part of said mechanism for controlling the number of exposures by the rotation of said wheel, a power means tending to rotate said wheel, a pawl coöperating with the teeth of said wheel to release or detain said wheel, a movable detent also coöperating with said wheel to detain the same, and means for withdrawing said movable detent from said wheel to permit the continuous rotation thereof, to make a continuous succession of exposures.

22. A camera having mechanism for making a succession of exposures, comprising a wheel having teeth operatively connected to control the said exposures, a pawl coöperat-

ing with said teeth to release or detain said wheel, a movable detent mounted on said pawl and adapted to project into the path of said teeth to detain said wheel, and means for moving said detent with respect to said pawl to move the same into or out of engagement with said wheel.

23. A camera for taking a succession of exposures, comprising a star wheel having a plurality of teeth corresponding to the number of exposures to be made, a pawl cooperating with said teeth to release or detain said star wheel, a cam mounted to slide laterally with respect to said star wheel and having an edge portion projecting beyond certain of said teeth to prevent their coöperation with said pawl, and means for advancing or withdrawing said cam from said star wheel.

24. A camera having mechanism for making a succession of exposures, comprising a rotatably mounted star wheel having teeth corresponding to the number of exposures, a pawl coöperating with said teeth to release or detain said star wheel, a cam mounted to slide longitudinally on the axis of rotation of said star wheel, means for locking said cam to said star wheel to rotate therewith, and means for withdrawing said cam to permit the independent rotation of said star wheel, said cam having an edge adapted to cover certain of said teeth of said star wheel.

25. A camera having mechanism for making a succession of exposures, comprising a rotatably mounted star wheel having teeth corresponding to the number of exposures, a pawl coöperating with said teeth to release or detain said star wheel, a cam mounted to slide longitudinally on the axis of rotation of said star wheel, means for locking said cam to said star wheel to rotate therewith, means for withdrawing said cam to permit the independent rotation of said star wheel, said cam having an edge adapted to cover certain of said teeth of said star wheel, and means for holding said cam fixed against rotation when withdrawn from said star wheel.

26. A camera having a mechanism for making a succession of exposures, comprising a rotatably mounted star wheel having teeth corresponding to the number of exposures, a pawl coöperating with said teeth to release or detain said star wheel, a cam mounted to slide longitudinally on the axis of rotation of said star wheel, means for locking said cam to said star wheel to rotate therewith, means for withdrawing said cam to permit the independent rotation of said star wheel, said cam having having an edge adapted to cover certain of said teeth of said star wheel, said star wheel and said cam having a construction adapted to enable the cam to interlock non-rotatably with said star wheel in a plurality of different positions of said star wheel.

This specification signed and witnessed this 30th day of August, A. D. 1911.

ENOCH RECTOR.

Signed in the presence of—
HELEN M. DAMES,
AMBROSE L. O'SHEA.