

(No Model.)

2 Sheets—Sheet 1.

N. CRANE.
ROLL HOLDING CAMERA.

No. 567,297.

Patented Sept. 8, 1896.

Fig. 1.

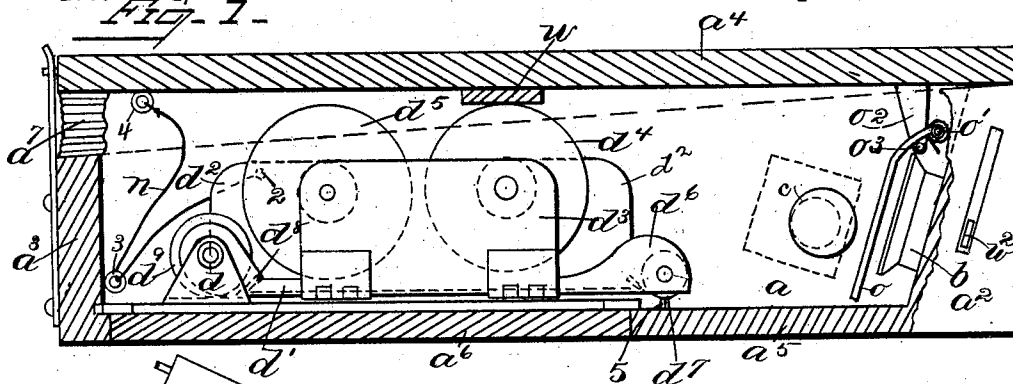


Fig. 2.

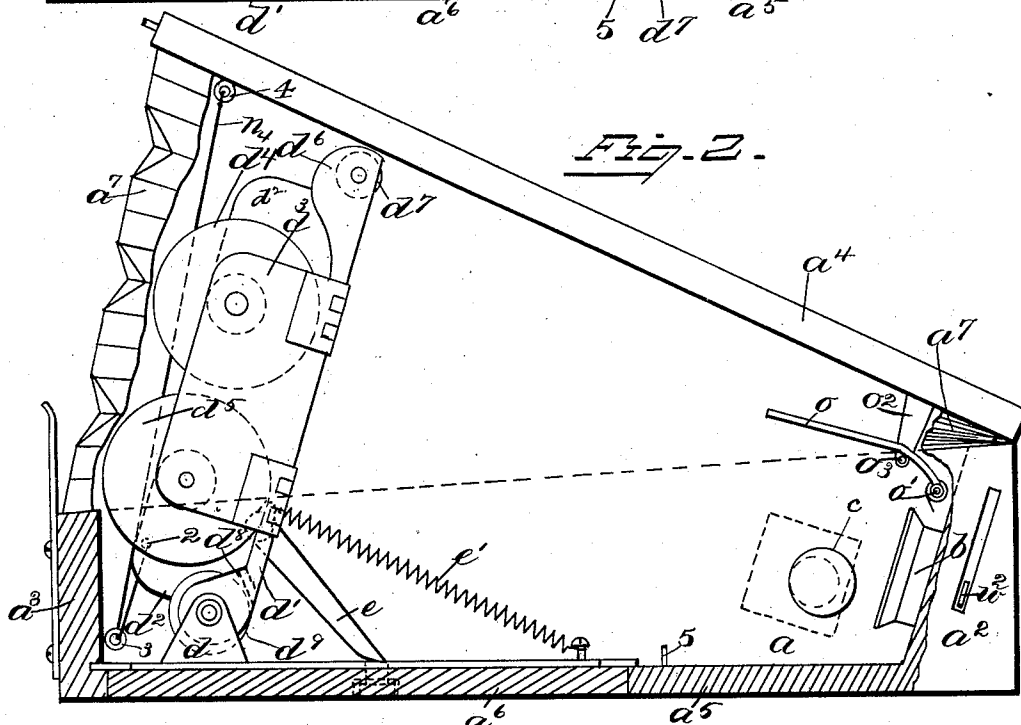
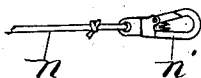


Fig. 8.



WITNESSES.

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Fig. 3.

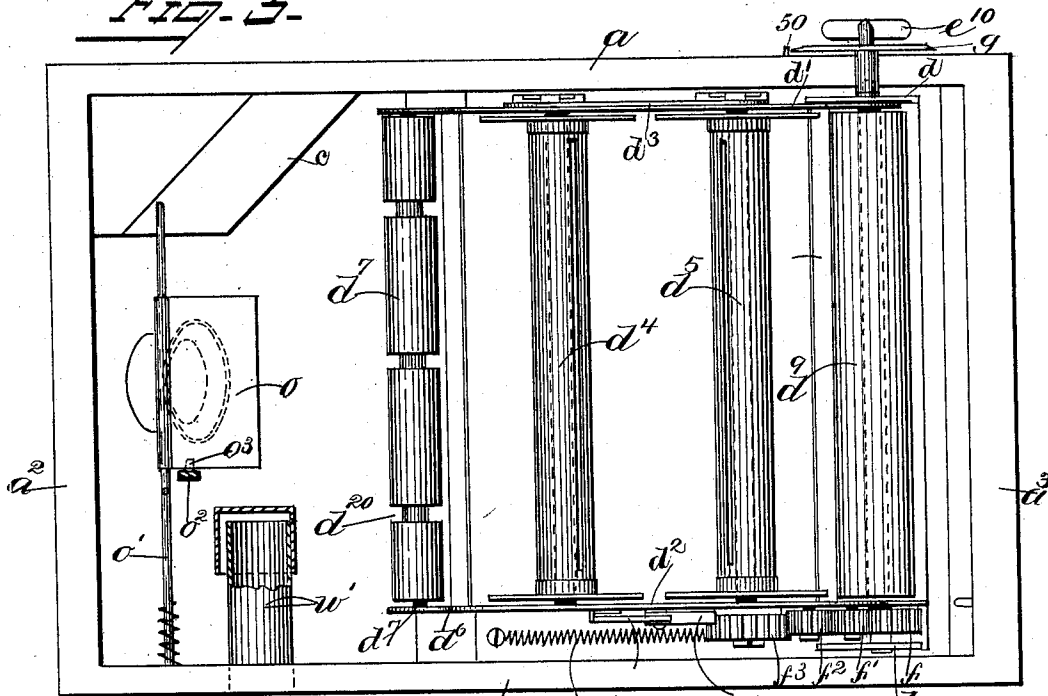


Fig. 4.

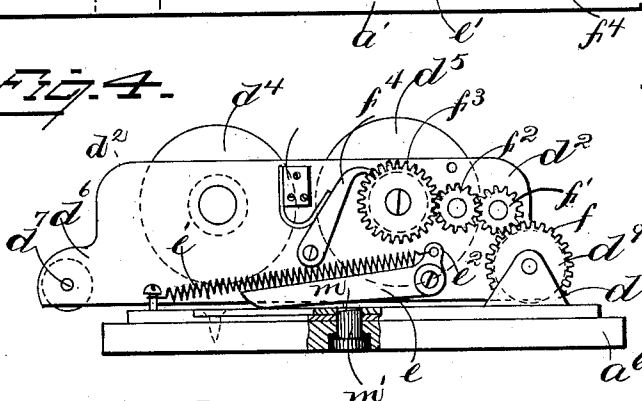


Fig. 5.

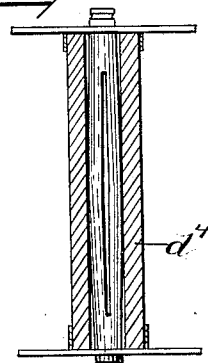


Fig. 7.

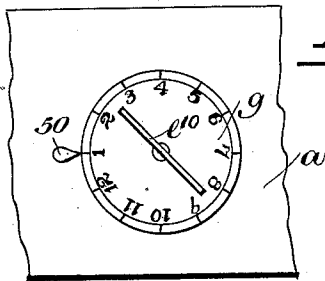
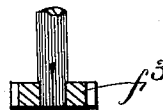


Fig. 6.



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UNITED STATES PATENT OFFICE.

NEWTON CRANE, OF NEWTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF
TO LOUIS R. LINCOLN, OF BROOKLINE, MASSACHUSETTS.

ROLL-HOLDING CAMERA.

SPECIFICATION forming part of Letters Patent No. 567,297, dated September 8, 1896.

Application filed December 12, 1895. Serial No. 571,917. (No model.)

To all whom it may concern:

Be it known that I, NEWTON CRANE, of Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in Cameras, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to cameras of that kind wherein a film-roll is used; and it has for its object to construct a camera that can be collapsed or closed up into small space and compact form, so as to be carried in the pocket, and yet when expanded or drawn out into working position is adapted to present a large portion of the film for exposure, in order that a good-sized picture can be taken.

In accordance with this invention, a box or case made rectangular or other suitable shape, and quite thin, has a lens at one end, and said box or case is made of separable parts which are connected by means of a bellows-folded portion in contradistinction to an accordion-folded portion, thereby making a light-tight bellows-folded box or case that can be collapsed and its thickness thereby reduced to the minimum, and can be drawn out or expanded into working position, in which position its sides converge toward that end of the box or case containing the lens.

The lens is supported obliquely to the end wall, so that when the parts of the box or case are separated, as, for instance, when it is expanded into working position, said lens will occupy a plane at right angles to a radial line passing midway between the converging side walls. A frame is contained in said box or case which supports the film-roll, winding-roll, and guide-rolls, and said frame is hinged or pivotally connected to one wall or side of said box or case at one end, and means are provided for swinging it on its pivotal connections when the box or case is drawn out or expanded, to thus bring it into a position whereby the exposed portion of the film lies in the focal plane of the lens. It is preferable that this film-supporting frame shall be moved into the focal plane of the lens automatically, and as it is pivotally connected to one side wall it may be connected with the other side wall in such a manner and by such

means that as the side walls are separated it will be swung on its pivotal connections and thus brought into the focal plane of the lens.

A suitable locking device is provided for the film-supporting frame, which holds it in the focal plane of the lens, and means are provided for releasing the locking device when it is desired to collapse the box or case.

In addition to several broad features which are comprised in this invention, as above briefly referred to, my invention also consists in many details of construction, as will be hereinafter more fully described.

Figure 1 shows in plan view a camera embodying this invention, the top piece being removed to expose the interior of the camera; Fig. 2, a similar view showing the camera expanded into working position; Fig. 3, a side view of the camera shown in Fig. 1, one side wall being removed; Fig. 4, a side view of the film-supporting frame and pivoted side wall to which it is attached; Fig. 5, a detail of the film-roll; Fig. 6, a detail showing the frictional connection of the driving-gear with the take-up roll; Fig. 7, a detail of the graduated winding-key for the measuring-roll, and Fig. 8 a detail of the clasp to be referred to.

The box or case, of rectangular or other suitable shape, consists of a top piece a and a bottom piece a' , of corresponding shape and size, a front-end wall a^2 and a rear-end wall a^3 , of corresponding shape and size, a side piece a^4 , which is hinged or otherwise connected with the front-end wall or to the front end of the box or case so as to open and close, said side piece being of suitable shape and size to cover or inclose one side of the box or case, and a side piece at the opposite side of said box or case, which is herein represented as made in two parts, one of which parts, as a^5 , is stationarily secured to the other parts of the box or case at the front end, and the other part a^6 of which is hinged to the rear end of the aforesaid part a^5 to swing in and out or toward and from the box or case as a door.

The hinged side piece a^4 is connected at the sides and rear end with the adjacent parts of the box or case by a bellows-folded portion a^7 , so that a light-tight box or case is produced, which consists essentially of two parts connected by a bellows-folded portion in con-

tradistinction to an accordion-folded portion, which is usually employed in cameras. Such a bellows-folded box or case may be expanded at one end only, and when in its expanded condition the broad side walls of the box converge toward each other.

In lieu of providing metallic hinges for the parts a^1 a^6 , I preferably employ the leather covering as a hinge.

The lens b is set or supported obliquely in the end wall a^2 , its obliquity being such that it occupies a plane at right angles to a radial line passing midway between the broad side walls when the box or case is expanded or brought into working position.

The "finder" c is of usual construction, but its lens is supported obliquely in the end wall a^2 in a plane parallel with the lens b .

Projecting from the interior side or face of the hinged or pivotally-connected side wall a^6 are two ears d , they being arranged at or near the rear end of said wall, and a flat plate d' , of rectangular shape, is pivotally connected to said ears.

The plate d' has at one side a vertical side piece d^2 , and at its opposite side a pivoted side piece d^3 , they being arranged parallel and affording bearings for the film-roll d^4 and take-up roll d^5 .

The plate d' has ears d^6 at its inner end or that end opposite its pivotal connections, which afford bearings for a guide-roll d^7 , the periphery of which projects just below the exposed or under side of said plate.

The plate d' is provided at its outer end with ears d^8 , which afford bearings for a guide-roll d^9 , which, like the guide-roll d^7 , projects just a little beyond the exposed or under side of the plate d' , and, as in ordinary film-supports, the film is taken from the film-roll, carried around the guide-roll d^7 , across the under side of the plate d' , around the guide-roll d^9 , and thence around the take-up roll d^5 .

The shaft or journals of the guide-roll d^9 have their bearings in the ears d and serve as pivots for the film-supporting frame. This film-supporting frame is thus adapted to swing on the axis upon which the guide-roll d^9 revolves. The film-supporting frame comprises a plate having guide-rolls at the ends over which the film passes, and which is constructed and arranged to receive and hold the film-roll and take-up or winding roll. The roll d^9 is also designed to serve as the measuring-roll, and has a key or thumb-piece e^{10} attached to or adapted to engage one end of its shaft, by means of which it may be rotated. A toothed gear f is secured to the shaft of the guide-roll d^9 , which engages a pinion f^1 , journaled in the side piece d^2 , and said pinion engages a pinion f^2 , likewise journaled in the side piece d^3 , and said latter pinion f^2 engages a toothed gear f^3 , frictionally secured to the shaft of the take-up roll d^5 . This frictional connection may be made by slitting the shaft of the take-up roll d^5 , as shown in Fig. 6, slightly ex-

panding it, and then compressing said shaft to receive the gear f^3 . By means of this gearing the take-up roll is rotated, and as the film wound thereon gradually increases the size of the roll the "slip" is utilized. A pawl f^4 is held pressed into engagement with the gear f^3 to prevent its backward motion.

To measure the film or draw off the film-roll enough film for a new exposure, the measuring-roll d^9 may have fixed to it a graduated plate g , (see Fig. 7,) which may have, say, twelve graduations, and on the top of the box or case a fixed point 50 is erected, with which said graduated plate coöperates as the measuring-roll is turned, and by turning said measuring-roll one and eleven-twelfths revolutions each time a definite amount of film will be drawn off of the film-roll, and also the number of exposures indicated.

The film-roll d^4 is frictionally connected with its shaft, and to accomplish this result I have provided its shaft with a transverse slit (see Fig. 5) extending for a suitable distance along the middle portion thereof, which permits the shaft to be expanded diametrically along said portion and thereby frictionally hold the film-roll, restraining it from too free rotation.

The swinging or pivoted film-supporting frame moves into and out of the focal plane of the lens b and has two positions, one being in parallelism with the side wall to which it is attached when the box or case is collapsed, and the other in the focal plane of the lens when the box or case is expanded. To thus move or swing the film-supporting frame automatically into the focal plane of the lens when the box or case is expanded, I have attached to the side piece d^2 at 2, by means of a clasp, a cord n , which passes through an eye 3 secured to the end wall or other part of the box or case, and its end is attached to an eye 4 secured to the side wall a^1 , and as the parts of the box or case are separated or expanded this cord will be drawn and the film-supporting frame thereby swung on its pivotal connections into the position shown in Fig. 2, wherein it will be observed that it lies in the focal plane of the lens b .

To hold the film-supporting frame in such position, a locking device is provided, which is herein shown as a prop e pivoted to the side piece d^2 , and a spring e' attached at one end to the box or case and at the other end to a projection e^2 on said prop, the tendency of which is to turn the prop on its pivot as the film-supporting frame is swung into the focal plane of the lens.

A recess m is formed in the side wall a^6 of the box or case near the pivotal connection of the film-supporting frame, into which the prop e drops when the film-supporting frame is swung way out to its full extent, and the prop is thus held as against a stop. The recess m in the side wall a^6 is preferably made as a hole through said side wall, the outer

end of which is made larger than the inner end, and this hole is concealed by the leather covering.

A headed stud m' is placed in the recess 5 m , the head of which is at the lower end of the recess, and said stud is held in place by the leather covering on the side wall which conceals it. The stud m' is made shorter than the hole, so as to move freely therein, 10 thereby permitting the end of the prop e to enter the recess and become caught and held; but by pressing upon the covering over the stud said stud will be moved and the prop e pushed out of engagement with the edge of 15 the recess. When the prop is thus disengaged, the spring e' restores the film-supporting frame, permitting the box or case to be collapsed. Thus the spring e' , in addition to controlling the action or movement of the 20 prop e , also serves as a return-spring for the film-supporting frame.

When the film-supporting frame is swung out into the focal plane of the lens, as represented in Fig. 2, it will be seen that it holds 25 the parts of the box or case separated, and no special locking device is necessary for this purpose.

To mark the film between exposures, perforating-points 5 are provided, projecting 30 from the stationary wall a^5 in a line close to the swinging plate or wall a^6 , and the film-support is made long enough or is so supported that when the box or case is collapsed the guide-roll d^7 , around which the film passes, 35 overlies these perforating-points, and by certain pressure they puncture the film whenever the box or case is closed.

In order that the perforating-points 5 may better puncture the film, the roll d^7 may have 40 several circumferential grooves d^{20} opposite the perforating-points.

In order to obtain the required pressure to cause the perforating-points to puncture the film, I have herein shown a strip w attached 45 to the interior of the part a^4 , which as the box or case is collapsed strikes or bears upon the roll d^4 and forcibly presses it down.

Of course if the ends of the roll d^4 should be made large enough, or the box thin enough, 50 this strip w could be omitted, the part a^4 directly engaging the roll.

The perforating-points when in engagement with the film also hold the film from moving or being moved along, to prevent 55 winding off the film; but when the box or case is expanded and the film-support swung into the focal plane of the lens the film is free to be moved along.

A plate or lid o is secured to a spring-actuated rock-shaft o' , which turns in bearings in 60 the box or case, said lid being designed to close the inner end of the lens-tube when the box or case is closed, and to accomplish this result I have secured to the movable wall a^4 65 a stud o^2 , having a pin o^3 , which passes beneath a curved portion of the lid near its

pivot, and whenever the parts of the box or case are separated the lid will be swung open against the action of its actuating-spring, 70 and when the parts are closed said lid is automatically closed.

The box or case will have a suitable vent, as w' , for the escape of the air as the box is collapsed.

The pivoted side piece d^3 of the film-sup- 75 porting frame may be turned down when it is desired to remove the film and take-up rolls, it becoming detached from the shafts of said rolls when so moved.

It will be seen that as the cord n is con- 80 nected to the swinging film-supporting frame by a suitable clasp, as n' , (see Fig. 8,) it may be easily detached in order that the part a^6 may be swung out, as a door, to expose the film-supporting frame which is attached to 85 the interior thereof. This is essential for the purposes of reloading.

By providing an inner shutter for the lens-tube, which is closed when the box is closed and opened only when the box is expanded, it 90 will be seen that if the usual outside shutter w^2 should be accidentally operated when the box is closed, the light is not admitted. In this form of cameras such an inside shutter is 95 very important.

I claim—

1. In a camera, a box or case made of separable parts connected by a bellows-folded portion, a lens at one end of the box or case, and a film-supporting frame having guide-rollers, 100 and constructed and arranged to support the film and winding rolls, said frame being contained in said box or case and movable into and out of the focal plane of the lens, operated by the expanding and contracting of the 105 parts of said box or case, substantially as described.

2. In a camera, a box or case made of separable parts connected by a bellows-folded portion, a lens arranged obliquely at one end of 110 the box or case, and a film-supporting frame having guide-rollers, and constructed and arranged to support the film and winding rolls, said frame being contained in said box or case and movable into and out of the focal 115 plane of the lens, operated by the expanding and contracting of the parts of said box, or case, substantially as described.

3. In a camera, a box or case made of separable parts connected by a bellows-folded portion, a lens arranged obliquely at one end of 120 the box or case, and a film-supporting frame having guide-rollers, and constructed and arranged to support the film and winding rolls, said frame being contained in said box or case movable into and out of the focal plane 125 of the lens, operated by the expanding and contracting of the parts of said box or case, and a locking device for locking said film-supporting frame in the focal plane of the lens, 130 substantially as described.

4. In a camera, a box or case made of sepa-

5 rable parts connected by a bellows-folded portion, a lens arranged obliquely at one end of the box or case, and a film-supporting frame having guide-rollers, and constructed and arranged to support the film and winding rolls, said frame being contained in said box or case movable into and out of the focal plane of the lens, and a locking device for locking said film-supporting frame in the focal plane of the lens, and a releasing device for said locking device, substantially as described.

10 5. In a camera, a box or case made of separable parts which are connected by a bellows-folded portion, a lens at one end, and a film-supporting frame having guide-rollers, and constructed and arranged to support the film and winding rolls, said frame being contained in said box or case and movable from a plane in parallelism with one side of the box or case into the focal plane of the lens, operated by the expanding of the parts of said box or case, substantially as described.

15 6. In a camera, a two-part box or case, the parts of which are connected by a bellows-folded portion, a lens arranged obliquely at one end of one part, and a film-supporting frame, substantially as described, pivotally connected to said part, and means for moving it automatically into the focal plane of the lens operated by the expanding of the parts of said box or case, substantially as described.

20 7. In a camera, a box or case composed of separable parts, connected by a bellows-folded portion, a lens at one end of the box or case, a film-supporting frame substantially as described pivoted to one part of the box or case, and means connected with the other part of said box or case for moving it on its pivot into the focal plane of the lens operated by the expanding of the parts of said box or case, substantially as described.

25 8. In a camera, a two-part box or case hinged together at one end and connected by a bellows-folded portion, a lens at the hinged end of said box or case arranged obliquely, a film-supporting frame substantially as described pivoted to one part of said box or case and movable into and out of the focal plane of the lens, and means for moving it connected with the other part of said box or case operated by the opening and closing of the same, substantially as described.

30 9. In a camera, a two-part box or case hinged together at one end and connected by a bellows-folded portion, a lens at the hinged end of said box or case arranged obliquely, a film-supporting frame substantially as described pivoted to one part of said box or case and movable into and out of the focal plane of the lens, and means for moving it connected with and operated by the other part, and a locking device for said film-supporting frame for holding it in the focal plane of the lens, substantially as described.

35 10. In a camera, a two-part box or case hinged

together at one end and connected by a bellows-folded portion, a lens at the hinged end of said box or case arranged obliquely, a film-supporting frame substantially as described pivoted to one part of said box or case and movable into and out of the focal plane of the lens, and means for moving it connected with and operated by the other part, and a locking device for said film-supporting frame for holding it in the focal plane of the lens, and a releasing device for said locking device adapted to be operated from the exterior of the box or case, substantially as described.

40 11. In a camera, a bellows-folded box or case having a lens at one end, a swinging film-supporting frame contained in said box or case, a detachable cord connecting said film-support with a moving part of said box or case, whereby the said film-supporting frame is moved into the focal plane of the lens as the box or case is expanded, substantially as described.

45 12. In a camera, a bellows-folded box or case having a lens at one end, a swinging film-supporting frame contained in said box or case, means for moving said film-supporting frame into the focal plane of the lens, a return-spring for said film-support, a prop for holding the film-supporting frame in the focal plane of the lens when in engagement with a stop, said return-spring being attached to said prop to thereby also serve as a controlling device for it, substantially as described.

50 13. In a camera, a bellows-folded box or case having a lens at one end, a swinging film-supporting frame contained in said box or case, and means for moving said film-supporting frame into the focal plane of the lens operated by the expanding of the said box or case, said frame when in such position holding the box or case expanded, substantially as described.

55 14. In a camera, a separable box or case connected by a bellows-folded portion, a lens at one end, and a film-supporting frame contained in said box or case movable into and out of the focal plane of the lens, and marking devices for marking the film between exposures brought into action upon closing the box or case, substantially as described.

60 15. In a camera, a separable box or case connected by a bellows-folded portion, a lens at one end, and a film-supporting frame contained in said box or case, movable into and out of the focal plane of the lens, and perforating-pins for perforating the film and holding it when the box or case is closed, substantially as described.

65 16. In a camera, a box or case made of separable parts connected by a bellows-folded portion, and having a side wall *a*⁶ opening outward, a lens at one end of the box or case, and a film-supporting frame attached to the interior of said side wall *a*⁶ which is movable into and out of the focal plane of the lens, substantially as described.

17. In a camera, a box or case, a pivoted film-supporting frame contained therein turning on the axis of the guide-roll, which forms a cooperative part of it, substantially as described.

5 18. In a camera, a film-roll, a rod upon which it is mounted, slitted transversely for a short distance between its ends which admits of diametrical expansion of the rod along such por-

tion, to thereby form a friction device for the roll, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NEWTON CRANE.

Witnesses:

B. J. NOYES,

F. H. DAVIS.