No. 713,596. Patented Nov. 18, 1902.

F. A. BROWNELL.

PHOTOGRAPHIC CAMERA.

(Application filed Sept. 24, 1900.)

(No Model.) 3 Sheets—Sheet 1.

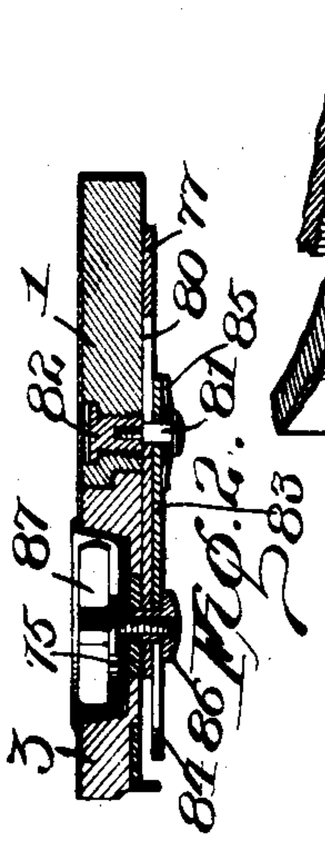

Fig. 2.

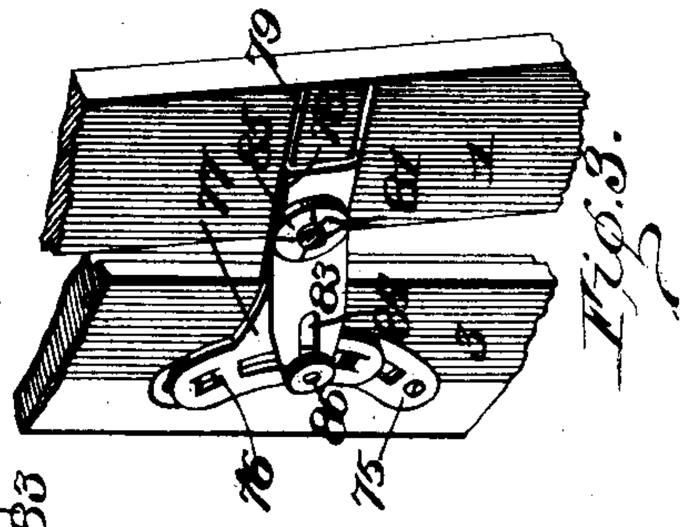

Fig. 3.

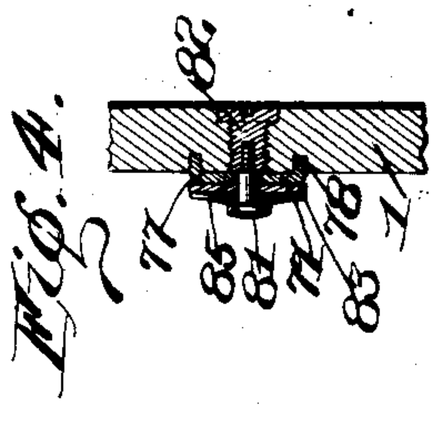

Fig. 4.

Fig. 1.

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PHOTOGRAPHIC CAMERA.

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(No Model.) 3 Sheets—Sheet 2.

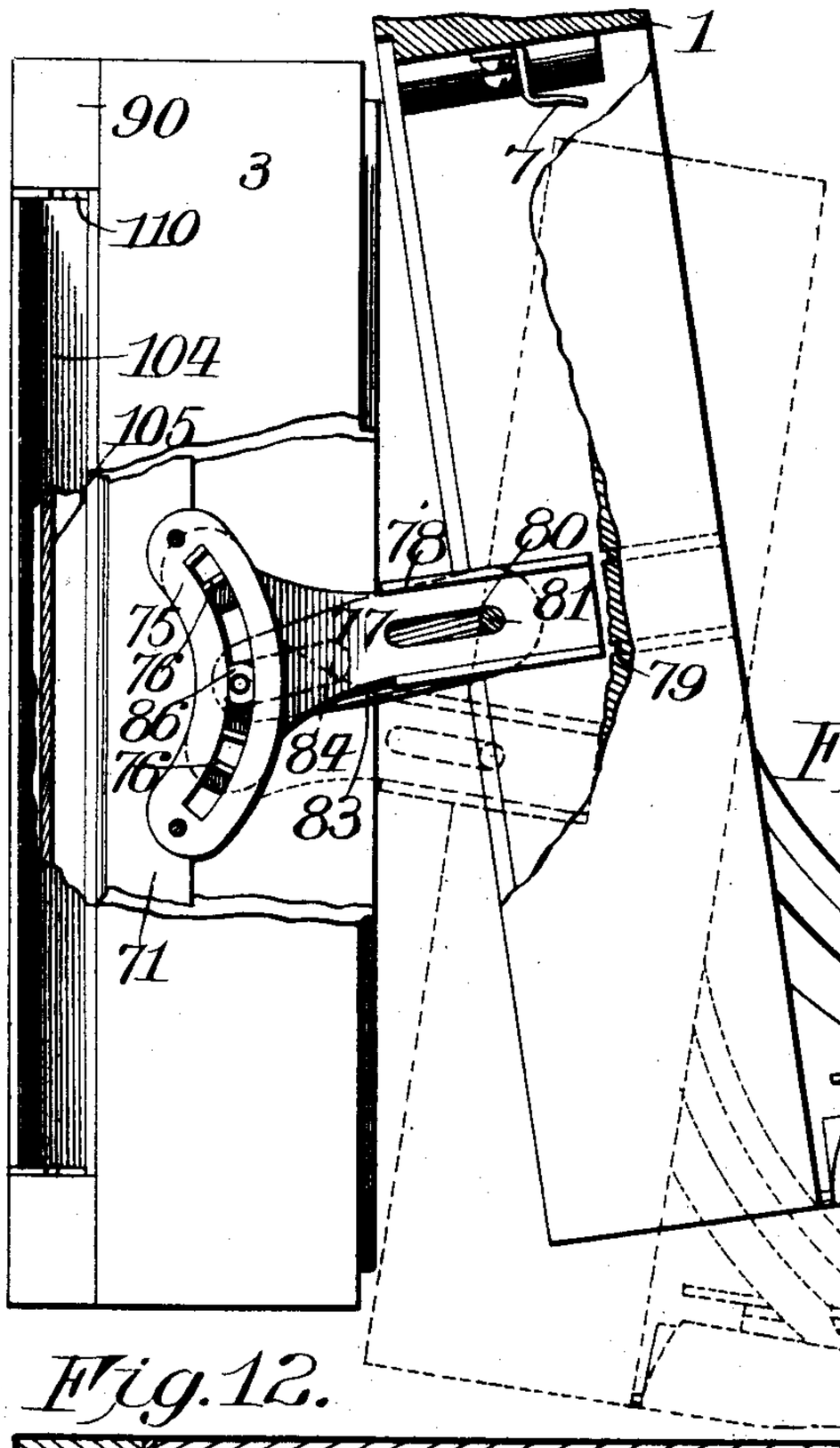


Fig. 5.

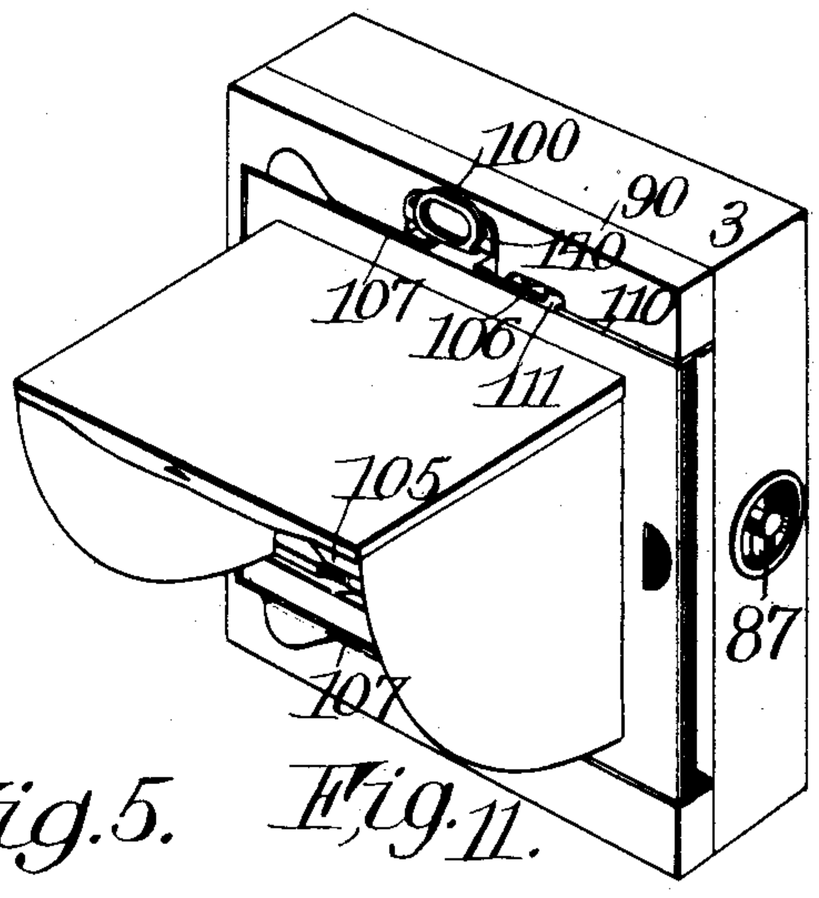


Fig. 11.

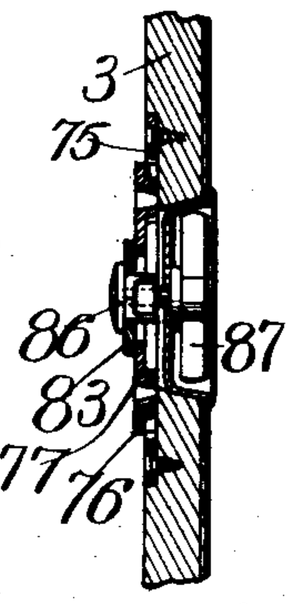


Fig. 12.

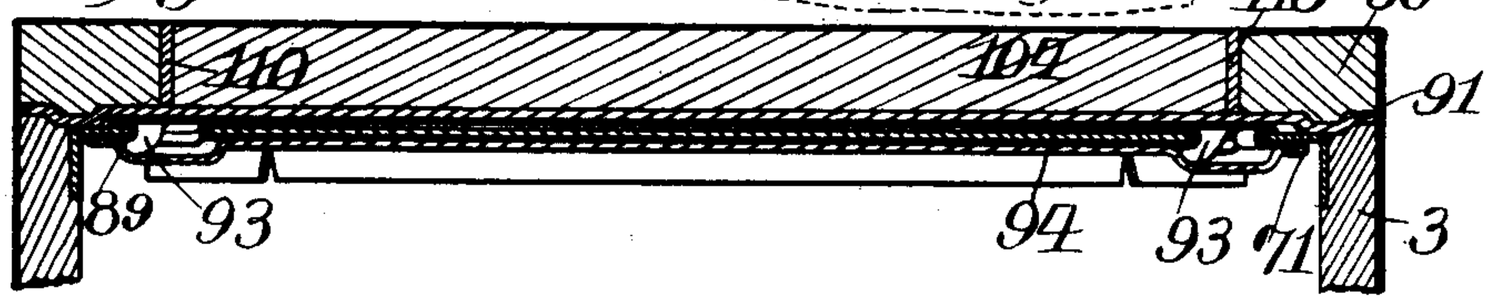


Fig. 7.

Fig. 6.

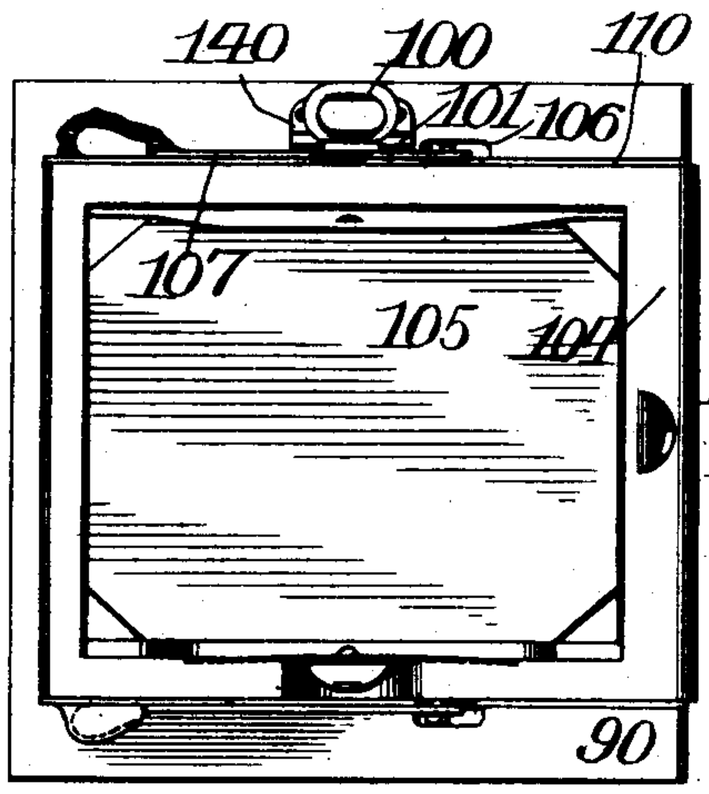
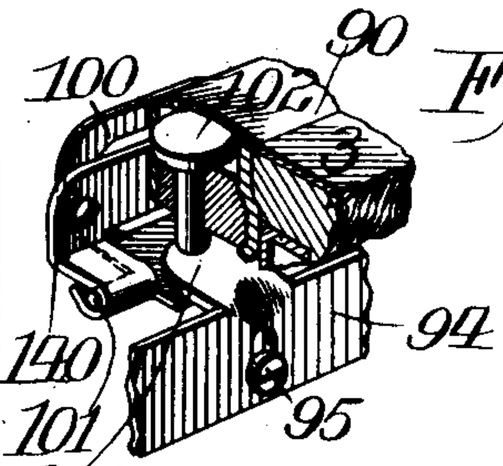


Fig. 13.



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No. 713,596. Patented Nov. 18, 1902.

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PHOTOGRAPHIC CAMERA.

(Application filed Sept. 24, 1900.)

(No Model.) 3 Sheets—Sheet 3.

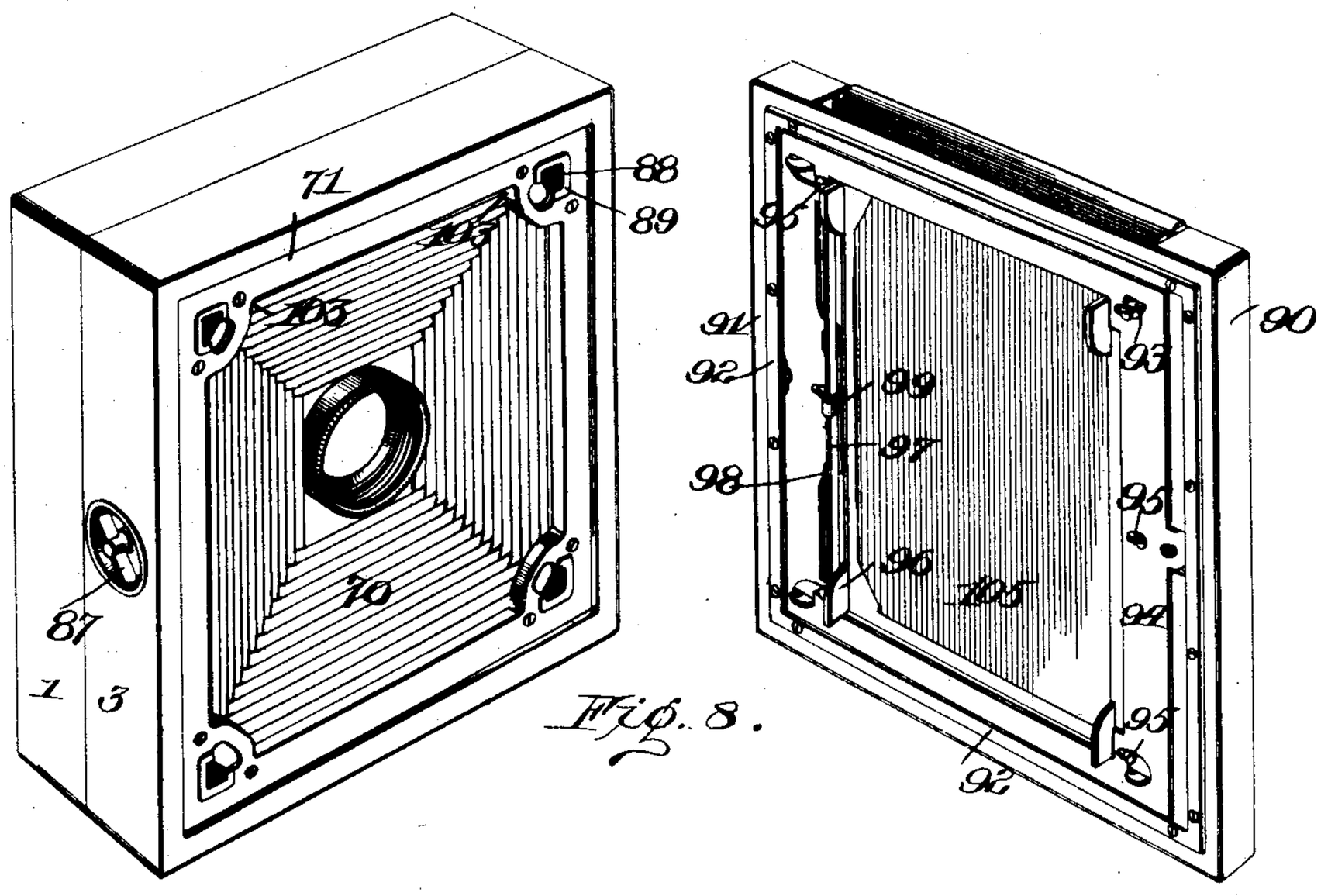

Fig. 8.

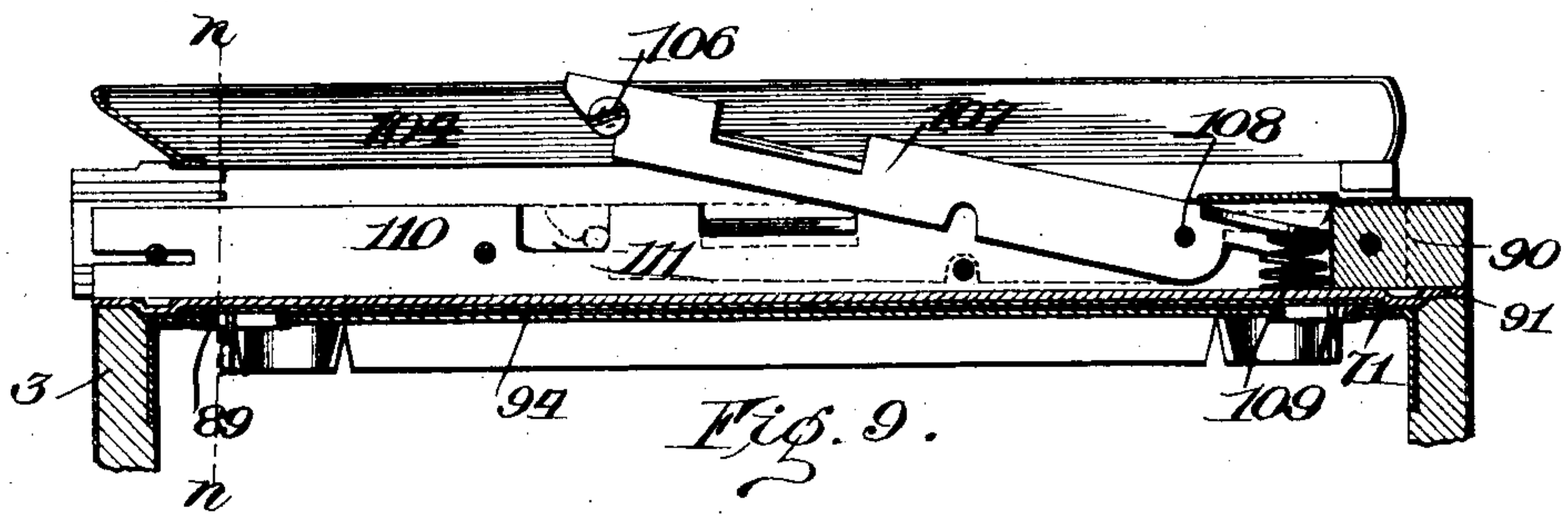

Fig. 9.

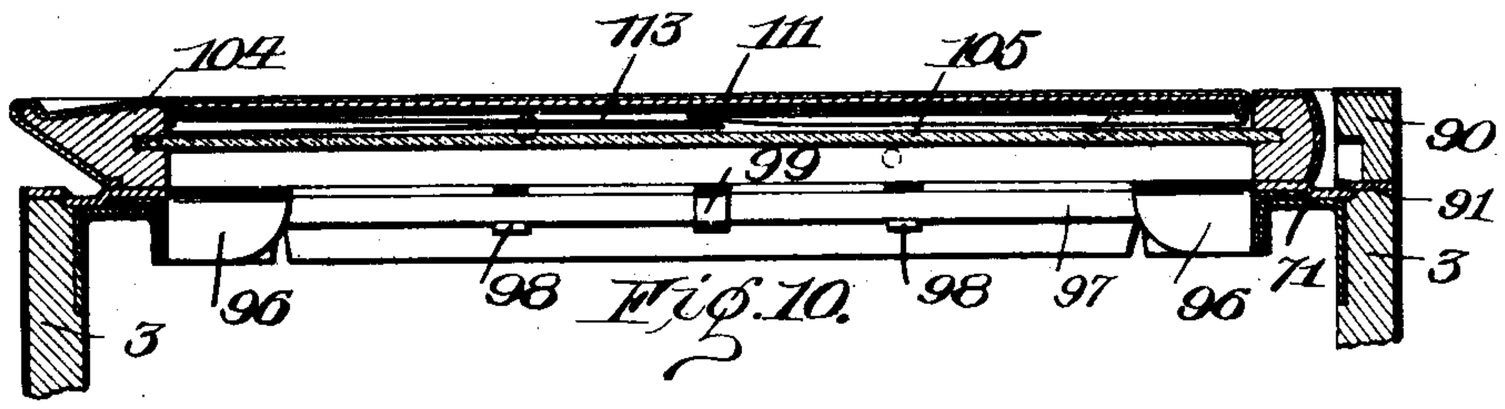

Fig. 10.

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UNITED STATES PATENT OFFICE.

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PHOTOGRAPHIC CAMERA.

SPECIFICATION forming part of Letters Patent No. 713,596, dated November 18, 1902.

Application filed September 24, 1900. Serial No. 30,960. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. BROWNELL, of the city of Rochester, county of Monroe, and State of New York, have invented certain new and useful Improvements in Photographic Cameras; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My present invention relates to photographic cameras, particularly of that type known as folding cameras, and which are capable of being folded or collapsed into small compass, so as to enable it to be readily carried in the hand of the operator; and it consists in certain improvements some of which are particularly applicable to folding cameras, and especially to the particular form shown, and others which may be applied to or used in connection with other forms of cameras, all as will be hereinafter fully described and the novel features pointed out in the claims at the end of this specification.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a folding camera embodying my improvements, showing the front extended for use. Fig. 2 is a sectional view on the line *f f* of Fig. 1. Fig. 3 is a perspective view showing the connection of the swing-back to the frame. Fig. 4 is a sectional view on the line *g g* of Fig. 1. Fig. 5 is a side elevation, partly in section, showing the adjustments of the swing-back. Fig. 6 is a rear elevation of the camera with the rear door open, showing the focusing-hood. Fig. 7 is a sectional view on the line *j j* of Fig. 1. Fig. 8 is a perspective view showing both the rear of the swing-back frame and the reversible back frame removed therefrom. Fig. 9 is a section on the line *k k* of Fig. 1 with a plate-holder inserted. Fig. 10 is a horizontal sectional view on the line *m m* of Fig. 1; Fig. 11, a perspective view of the rear of the camera, showing the focusing-hood open; Fig. 12, a sectional view taken on the line *n n* of Fig. 9 with the plate-holder removed; Fig. 13, a detailed perspective view showing the device for operating the back-holding catches.

The camera forming the subject-matter of my present invention is adapted to be folded into small compass, with the operating parts all inclosed, so that it may be readily carried by the operator, and to this end the camera-body proper embodies an open frame or casing 1, to the lower front edge of which is hinged a lid or door 2, and to the rear side is applied an open frame 3, carrying at its rear the focusing-screen or ground glass and connected to the frame 1 at the sides in such manner that it may be adjusted rearwardly and turned or tilted with relation to the frame 1 and operate as a tilting swing-back for maintaining in vertical position the plate or film when the front of the camera and lens is elevated or depressed. The lid or door 2 is preferably formed of sheet metal, having the side and end flanges 4, adapted to fit within the front edge of the frame 1, and having its rear edge turned over to form a hinge member, through which extends the pintle or rod 5, also operating in suitable ears in a plate 6, secured to the lower side of the frame 1. The dimensions of the lid or door are such that it will fit snugly within the front of the frame 1 and may be fastened with its outer surface flush with the frame by means of a suitable spring-catch, such as 7, adapted to engage a suitable projection arranged upon said lid. The door 2 is provided with an aperture in its outer face and upon its inner face with a nut or threaded socket 8, adapted to receive the screw of a tripod-head.

9 indicates suitable links pivoted to the door 2 and slotted for the accommodation of the shanks of the headed pins 10, secured to the inner side of the frame 1, said links being provided with springs 11, which coöperate with the pins 10 and force the links vertically, so that the lateral slots in the ends will engage the pins and normally hold the door at right angles, as shown in Fig. 1. The door 2 in the present arrangement constitutes a camera bed or support for the front carrying the lens-support 40 and, if desired, suitable shutter mechanism.

As far as the operation of the mechanism forming the subject-matter of the present invention is concerned it is immaterial what means are employed for carrying and adjust-

ing the lens-support, it being sufficient that the latter is capable of a vertical and lateral adjustment; but I have shown the support as combined with the camera-focusing device described in my application, Serial No. 75,814, and which is a division of this case. Without describing the mechanism in detail it is sufficient to say that a suitable way is arranged upon the support 2 and two superposed supplemental extension way-plates 14 and 28 are adjustable upon it. Mounted upon the plate 28 and adjustable longitudinally thereof is a carriage 46, and upon the latter a frame or support 50, having standards 42 and adjustable laterally of the carriage 46 and the lens 40, is mounted on the standards and is capable of a vertical adjustment. For a further description of these devices a reference is made to the other application, though different forms of lens-support might be used.

The front end of the bellows 70 is, as usual, secured to the rear end of the lens-frame, and the rear end of said bellows is attached to a metal frame 71, secured to the rear of the swing-back frame 3. The swing-back frame 3 is provided with the guide-plates 75, having segmental slots therein struck from a center located slightly in the rear of the frame 71 and in the center of the ground-glass focusing-screen and of the sensitive film or plate, as will be described, and operating in these guides are lugs or ears 76, punched from the end of plates 77, the sides of which plates are formed with nanges 78, entering corresponding grooves 79 in the inner sides of the frame or casing 1, as shown in Figs. 3 and 4. The plates 77 are each provided with a longitudinally-extending slot 80, through which passes the shank of a screw 81, coöperating with a nut 82 in the sides of the casing 1, and 83 indicates guide-links pivoted at their forward ends upon the screw 81 and having at their rear ends slots 84 for the accommodation of the screws of the securing device for holding the swing-back. A spring-washer 85 is arranged between the head of the screw 81 and the links 83 to offer slight frictional resistance to the movement of the parts, also to enable the sides of the swing-back to be moved out of parallelism with the frame, if desired.

86 indicates a nut provided with an annular shank passing through the slot in the segmental plate and through the slot in the inner end of the link 83. A thumb-screw 87 is arranged in a depression in the outer portion of the swing-back, passing through the latter and screwing into the nut 86 for the purpose of clamping the parts in adjusted position, one of these screws being arranged upon each side of the camera, as will be understood. From this construction it will be seen that by loosening the screws 87 the swing-back may be moved rearwardly to disengage the rabbeted connection between it and the frame 1, and the former may be tilted so that the focusing-glass or the sensitive surface carried by the swing-back may be maintained in vertical position and then secured by tightening up the screws 87, the various positions assumed by the parts being indicated by the full and dotted lines in Fig. 5. The links 83 being fastened by the securing-screws and pivoted to the frame serve to brace the swing-back somewhat and prevent all the supporting strain from being borne by the arms or plates 77.

The feature of adjusting the swing-back upon a center exactly coincident with the surface of the focusing-glass and the sensitized plate or film is particularly advantageous, as the focus is not changed by the tilting of the camera-bed, and while I prefer to place the lugs on the plate 77 and the slot in the plates 77 this could be reversed. It will be understood that when in the broader claims the term "focusing screen or glass" is used it is intended to refer as an equivalent to a sensitive plate or film, as the same devices could be used in cameras in which no focusing device or ground glass is employed as cameras having a scale for focusing and a roll-holder attached either permanently or otherwise.

The frame 71, to which the rear end of the bellows is attached, is provided at the corners with sockets or recesses 88, preferably having bushings 89 around them of harder metal than the frame and providing a holding-surface for the catches that secure the removable back pieces or frame in position. 90 indicates the back frame of the camera, preferably of wood, and provided on its front side with a metal plate or frame 91, having the projection or rib 92 coöperating with a corresponding groove in the swing-back to form a light-tight joint therewith. Upon the forward face of the plate 91 are arranged a series of movable spring-operated catch projections or hooks 93, preferably formed integral with a metal frame 94, extending around the opening in the frame 91 and guided to move in the direction of the length of the catch projections on the projections or ears 96 and held on the plate by screws 95, passing through suitable elongated slots formed therein. The plate 91 is further provided with inwardly-extending centering projections or ears 96, located at the four corners of the opening, and between two of these ears extends a flat or leaf spring 97, engaged by lugs or ears 98 and 99 on one side of the frame 94 in such manner that the spring will throw the catch-plate to the left, Figs. 8 and 12, and cause the engagement of the hooked ends 93 with the edges of the apertures 88 in the plate 71. The catch-plate is adapted to be moved against the tension of the spring to disengage the back frame from the swing-back by means of an operating device or handle 100, pivoted at 101 to the plate 140 and adapted to engage an ear 201, projecting from the rear of the catch-plate, as shown in Fig. 20.

102 indicates a vertically-movable pin resting upon the plate 100, its upper end being operable from the exterior of the casing to

force the catches into engagement, if this should be necessary, the upper end of said pin being concealed by the leather or other flexible exterior covering of the camera.

The opening in plate 71 at the rear of the swing-back is square, while that in the back frame and which regulates the size of the exposure is preferably oblong, and the straight sides of the centering lugs or projections 96 are placed apart a distance equal to the diameter of the opening in the plate 71, and when the back frame is applied to the swing-back these centering lugs or projections 96 will engage the frame 71 near the corners, (at the positions marked 103 in Fig. 8,) thus bringing the beveled ends of the catches 93 within the openings 88, so that by pressing the frame 90 against the swing-back the parts will become locked together, so that the slide of the plate-holder (which latter is carried by the back frame) may be drawn either vertically or horizontally, as desired. The feature of providing a plurality of catches at separated points, as the corners, forms a secure fastening, and as all the catches must engage there is no liability of the hooks being left insecurely fastened.

The frame 90 is provided with a movable ground-glass or focusing screen 105, secured in a frame 104, and the latter is beveled at one end, as shown in Fig. 10, and provided at the opposite sides and forward of the center with studs or pins 106, adapted to coöperate with the hooked ends of the catches 107, pivoted at 108 in the frame, and the hooked ends thrown inward by springs 109, arranged beneath the rear ends of said catches. The plates 110 at the top and bottom of the aperture of the ground-glass frame and to which catches 107 are pivoted are provided with recesses 111 (see Fig. 9) to prevent the accidental longitudinal movement of the focusing-screen frame, and the hooked ends of the catches 107 are beveled and slightly rounded, so that to apply the ground-glass frame it is only necessary to insert the pins 106 into the recesses 110, then move the frame to the right, Fig. 9, when the catches will secure them, and the pivotal point of the glass-frame being forward of the center the plate-holder may be readily inserted in the beveled end of the frame and then moved rearward to the position shown in Fig. 9, the glass-frame tilting and the springs 109 yielding, so as to cause the proper operation. If desired, the catches 107 may be released from the glass-frame by pressing upon their rear ends; but this is not necessary, as by rounding the points of the hooks the latter will yield when the frame is moved longitudinally.

The camera as a whole is compact, the parts are easily adjusted, and the majority of them being made of sheet metal they can be formed and assembled cheaply and, if desired, by unskilful operators.

The feature of the reversible and interchangeable back frame is particularly desirable in a camera of this description, as the catches for fastening it being operable simultaneously the necessary changes can be effected by holding the camera in one hand and disengaging and removing or, if desired, applying the back with the other.

I do not claim herein nor show in detail the focusing devices and extension-bed, as these form the subject-matter of a divisional application, Serial No. 75,814.

I claim as my invention—

1. In a camera, the combination with the frame, and bed, of a swing-back, a focusing-surface carried thereby, and segmental guides between the frame and swing-back struck from a center coincident with the surface of the focusing-surface when in normal position.

2. In a camera, the combination with the frame, and bed, of a swing-back, and a focusing-surface carried thereby, a pair of plates having segmental slots therein struck from a center coincident with the center of the focusing-surface, and a pair of coöperating plates having projections operating in the segmental slots, one pair of plates being secured to the frame and the other to the swing-back, and clamping devices for securing the plates when adjusted relatively.

3. In a camera, the combination with the frame, and bed, of a swing-back and a focusing-surface carried thereby, a pair of plates secured to the swing-back having segmental slots therein struck from a center coincident with the center of the surface, a pair of plates adjustably connected to the frame and having projections operating in the segmental slots, and means for clamping the parts in adjusted position.

4. In a camera, the combination with the frame, and bed, guides upon the frame, and the plates movable on the guides having the projections at their rear ends, of the swing-back, the focusing-surface thereon, the plates secured to the swing-back having the segmental slots in which the projections on the other plates operate, and means for securing the swing-back in adjusted position.

5. In a camera, the combination with the frame, and bed, of the swing-back, the segmental guiding-plates secured to the frame and swing-back respectively, and the links extending from the center of the segmental guides on the swing-back to the frame.

6. In a camera, the combination with the frame, the bed, and the plates movable rearwardly upon the frame, of the swing-back, and segmental guiding devices between the plates on the frame and the swing-back, and means for securing the parts in adjusted position.

7. In a camera, the combination with the frame, the bed, and the plates adjustable rearwardly of the frame, of the swing-back, and slotted segmental guides between the swing-back and the plates on the frame, the secur-

ing-screws on the swing-back for locking the parts.

8. In a camera, the combination with the frame, the bed, and the plates adjustable rearwardly on the frame having the projections thereon, of the swing-back, the plates thereon having the segmental slots for receiving the projections on the frame-plates, and the clamping-screws and nuts for securing the plates.

9. In a camera, the combination with the frame, the bed, and the plates guided to move rearwardly on the frame and having the segmental guides, of the swing-back, the segmental guides thereon coöperating with those on the plate, the securing-screws, and the links coöperating with the securing-screws and the frame.

10. In a camera, the combination with the frame, the bed, and the plates guided on the frame having the segmental guides at the rear, of the swing-back, the segmental guides thereon coöperating with those on the plates, the securing-screws, and the links pivoted to the frame and having the slots for the securing-screws.

11. In a camera, the combination with the frame, the bed, and the plates guided on the frame having the longitudinal slots, and pins extending through the slots, of the swing-back, segmental guides between the swing-back and rear ends of the arms on the frame, the slotted links pivoted upon the pins on the frame, and the securing-screws clamping the segmental guides and the links together.

12. In a camera, the combination with the bed, the frame having the guides, the flanged plates having the slots at their forward end and the projections at the rear ends, and the pin extending through the slots in the plates, of the swing-back having the segmental guides therein, the clamping-screws, and the links pivoted on the pins on the frame and having the slots through which the clamping-screws pass.

13. The combination with a camera-back, of a reversible rear frame therefor, a plurality of separated catches for securing the frame upon the back, and connections between them for causing their simultaneous operation.

14. The combination with a camera-back, of a reversible rear frame therefor, a plurality of separated catches located on said frame and adapted to secure it removably to the camera-back, and connections between said catches for causing their simultaneous operation.

15. The combination with a camera-back, of a reversible rear frame therefor, a plurality of separated, automatically-engaging catches located on said frame and adapted to coöperate with the camera-back, and connections between said catches for causing their simultaneous operation.

16. The combination with a camera-back, of a reversible rear frame therefor, centering projections between the back and frame, and a plurality of spring-operated catches on the rear frame coöperating with the camera-back and connected for simultaneous operation.

17. The combination with a camera-back, having the engaging shoulders, of a reversible rear frame having the centering projections, and a movable spring-operated plate provided with the catches engaging the shoulders on the camera-back.

18. The combination with a camera-back having an opening therein, of a reversible rear frame having centering projections engaging the sides of the opening, and a plurality of automatically-engaging catches arranged between the back and frame for operating to hold the frame on the back when moved in the direction of the centering projections.

19. The combination with a camera-back having an opening therein, of a reversible rear frame applicable thereto, and a movable catch-plate located upon one of the parts and having a plurality of catches thereon for engaging the other part and securing them together.

20. The combination with a camera-back having an opening therein, of a reversible rear frame applicable thereto provided with centering projections engaging the sides of the opening near the corners, and catches arranged between the frame and back near the corners for holding them in engagement.

21. The combination with a camera-back having an opening therein, and the recesses, of a removable rear frame having the centering projections engaging the sides of the opening near the corners, and the movable catch-plate on the frame having the catch projections entering the recesses in the back.

22. The combination with a camera-back having an opening therein, and the recesses, of the removable rear frame, the movable plate thereon having the hooked catches engaging the recesses on the back, and the spring for operating said plate in a direction to cause the engagement of the catches.

23. The combination with a camera-back, the plate thereon having the central opening, and the recesses at the corners, of the removable rear frame, the plate on the inner side thereof having the central opening and provided with the centering projections, the movable catch-plate having the hooked projections thereon, and a spring for operating catch-plate.

24. The combination with the camera-back, and the plate 71 having the recesses 88 at the corners, of the removable frame 90 having the plate 91 having the centering projections 96, the plate 95 having the hooked projections 93, and the spring 97 for operating the plate 95.

25. In a camera, the combination with a frame, of the levers 107 pivoted thereon having the hooked forward ends of the springs

for operating them, and the glass-frame provided with pins at the sides detachably engaged with the hooked ends of the levers.

26. In a camera, the combination with a frame having the recesses 110 at the sides, of the levers 107 pivoted on the frame having the hooked ends extending partially across the recesses 110, the springs for operating the levers, and the glass-frame having the pins 106 thereon adapted to enter the recesses and engage the hooked ends of the levers.

27. In a camera, the combination with a frame, of the levers pivoted thereon having the hooked forward ends, springs for operating the open sides of the hooks toward the frame, and a removable ground-glass frame having the pivots engaged by the hooked ends of the levers and adapted to turn therein upon the insertion of a plate-holder between the support and the ground-glass frame.

28. A camera comprising a case, one or more slidable bearings mounted on the same, a swing-back frame pivoted to the slidable bearings, and means for releasing said bearings.

29. A camera comprising a case, one or more slidable bearings, a swing-back frame pivoted to said slidable bearings, and means for locking the slidable bearings in their inner and outer positions.

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