No. 687,745. Patented Dec. 3, 1901.

F. H. GROVER.

MULTIPLYING ATTACHMENT FOR CAMERAS.

(Application filed Nov. 3, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

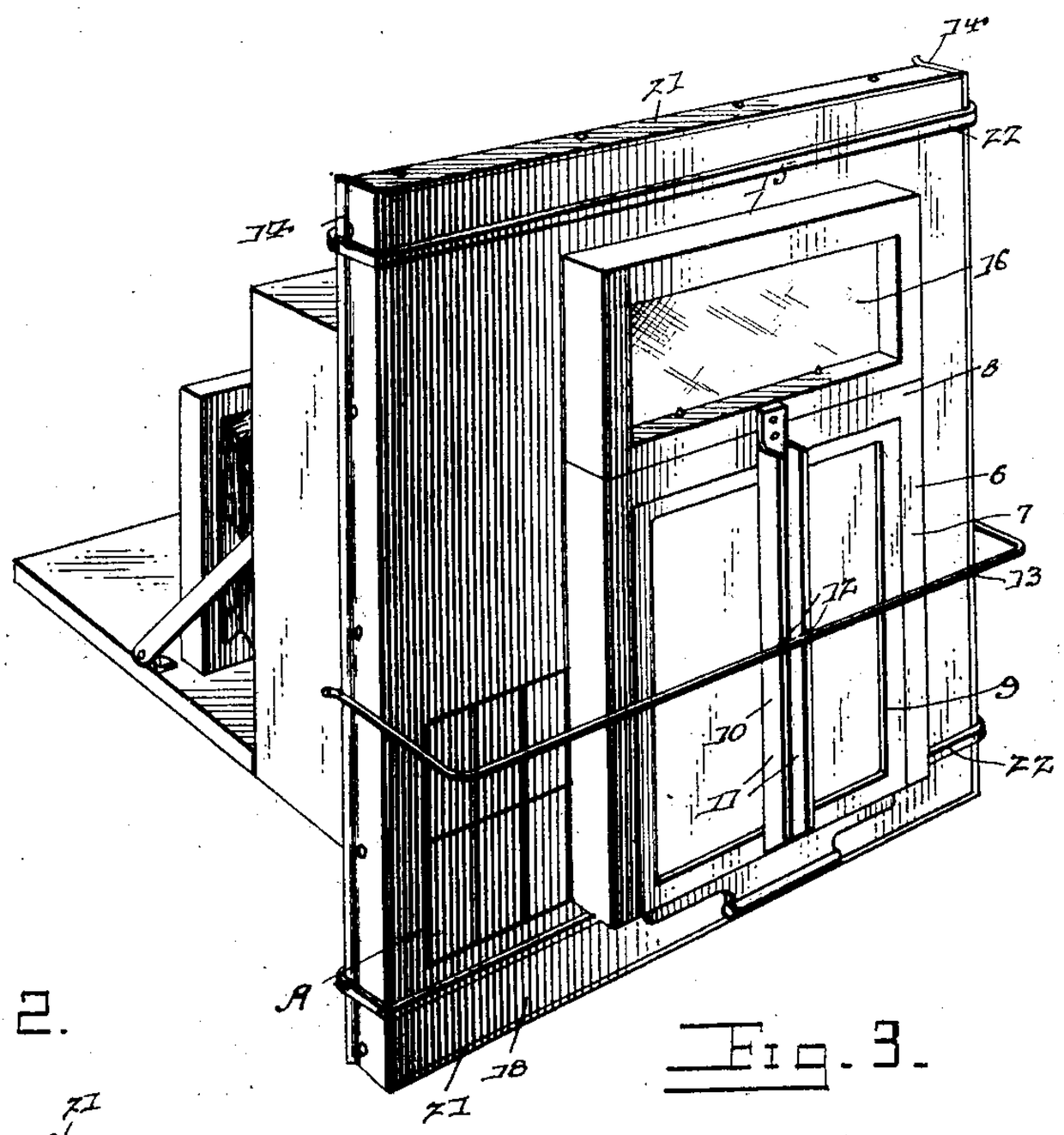

Fig. 2.

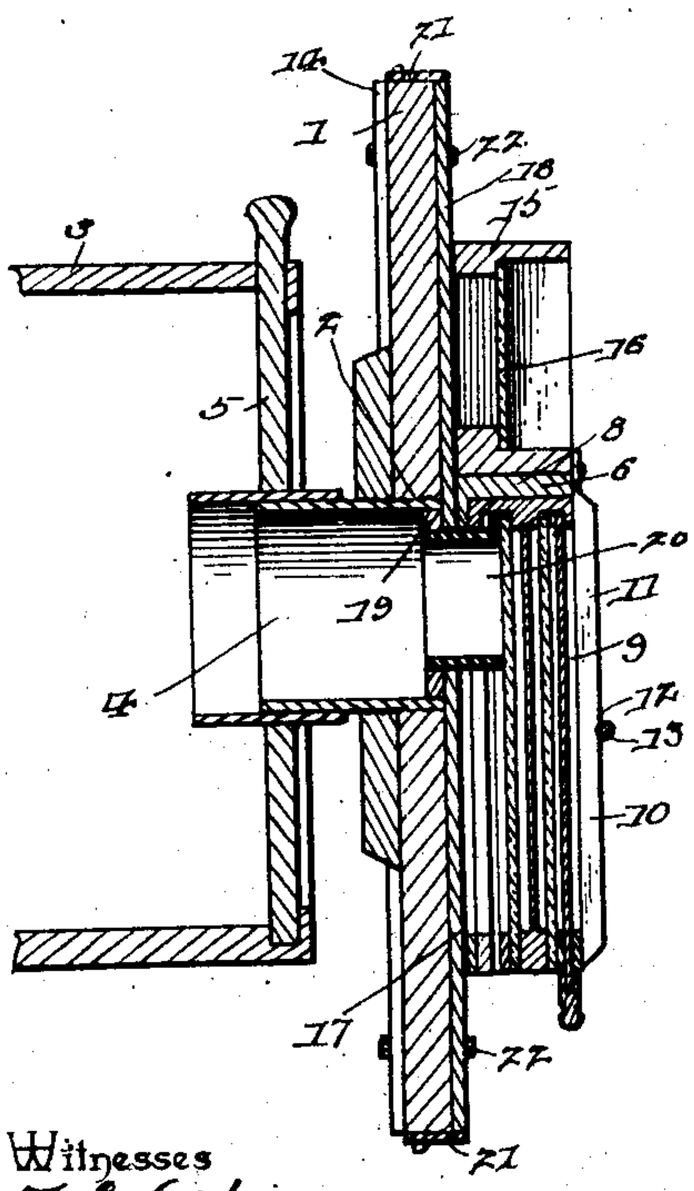

Fig. 3.

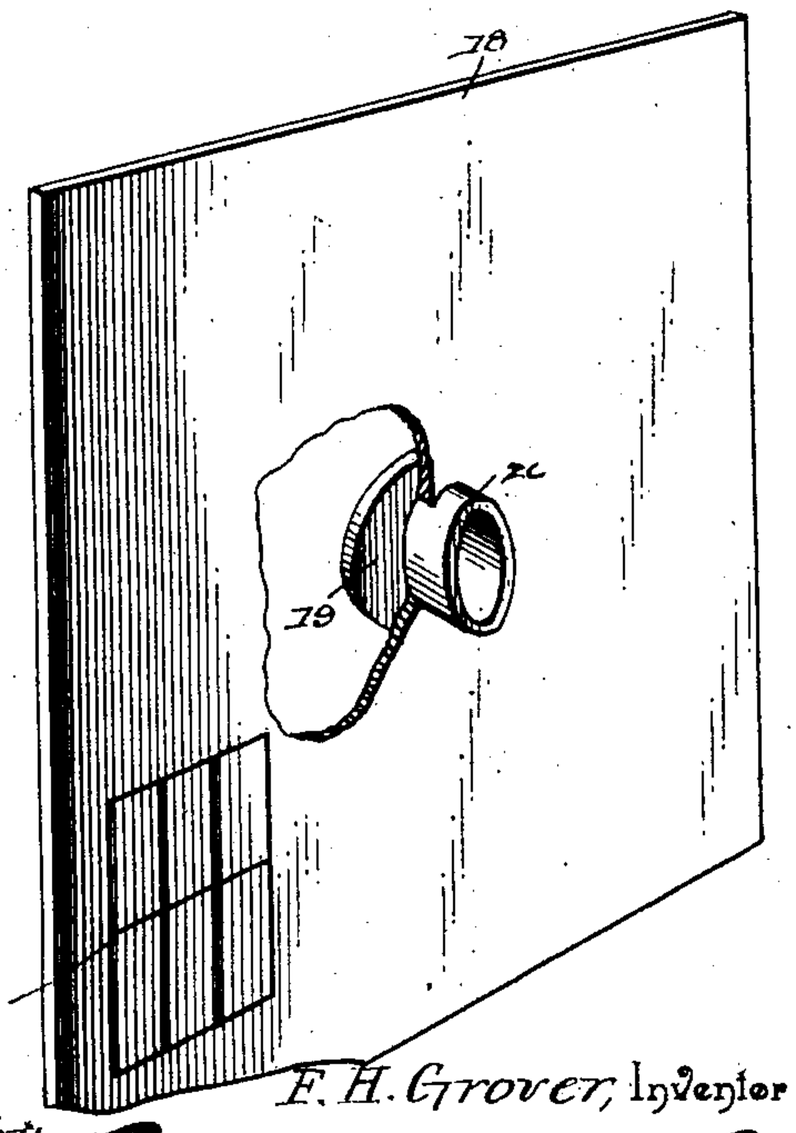

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Fig. 4.

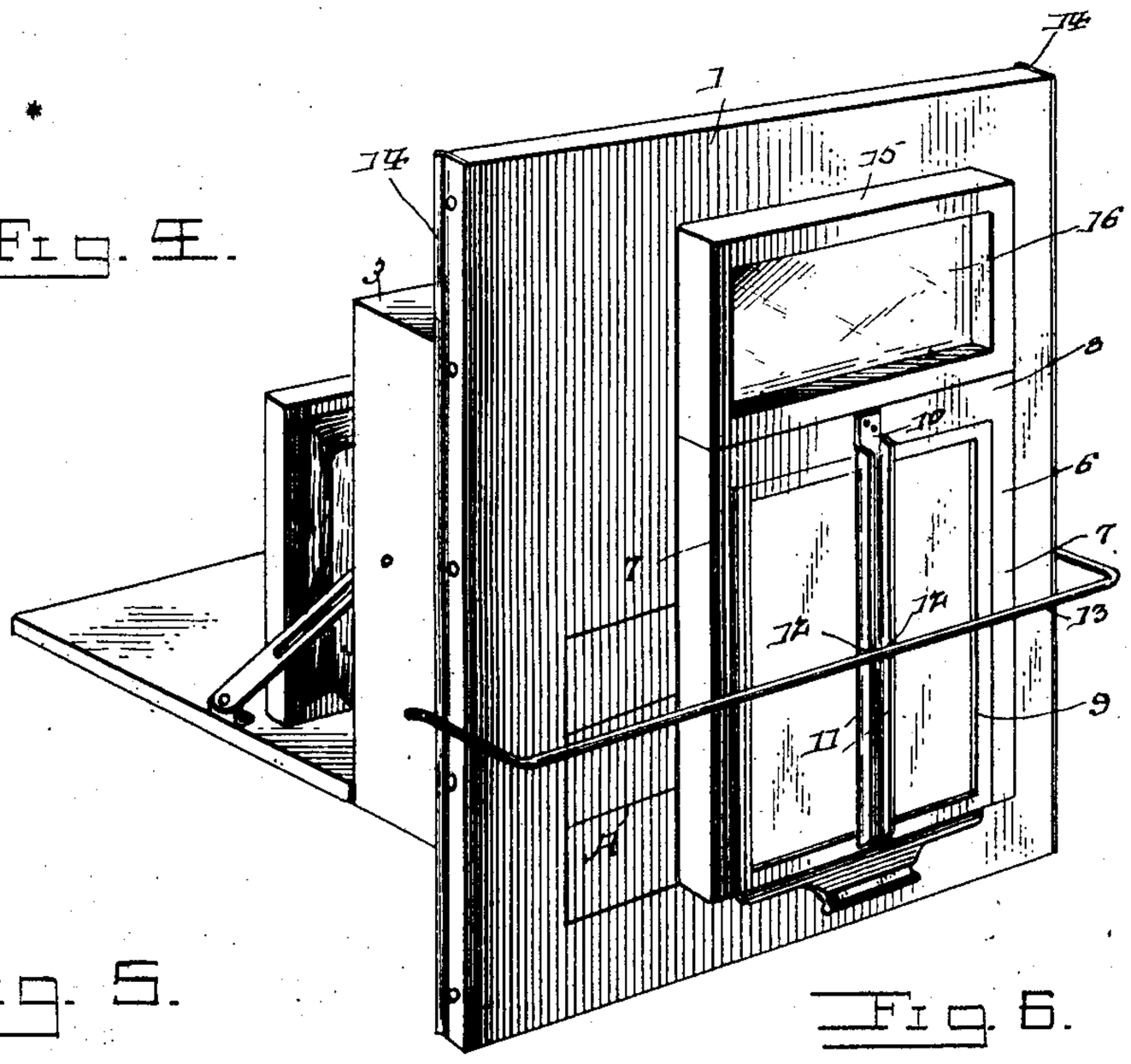


Fig. 5.

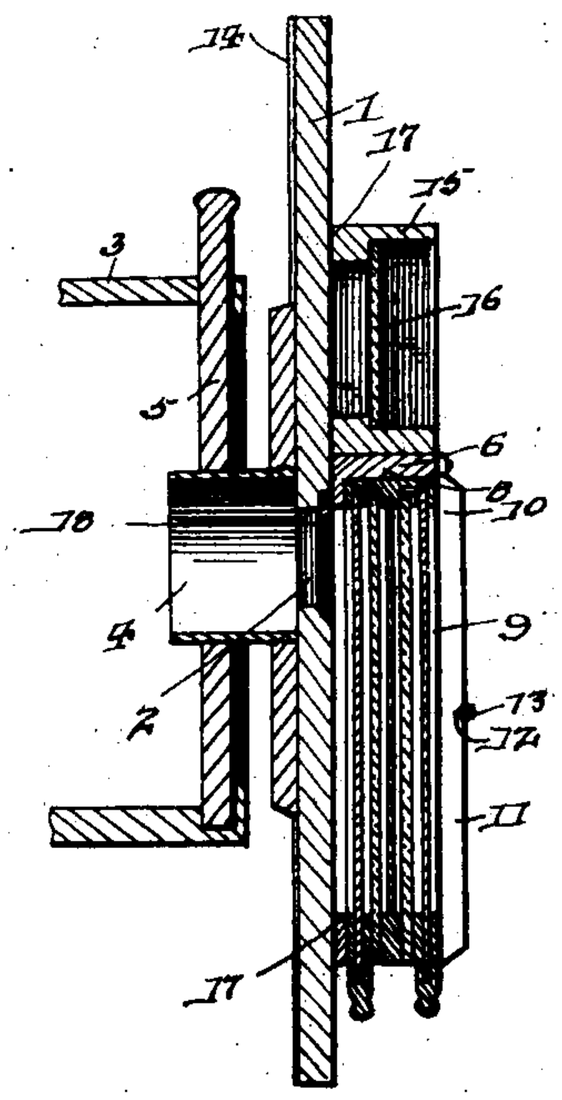
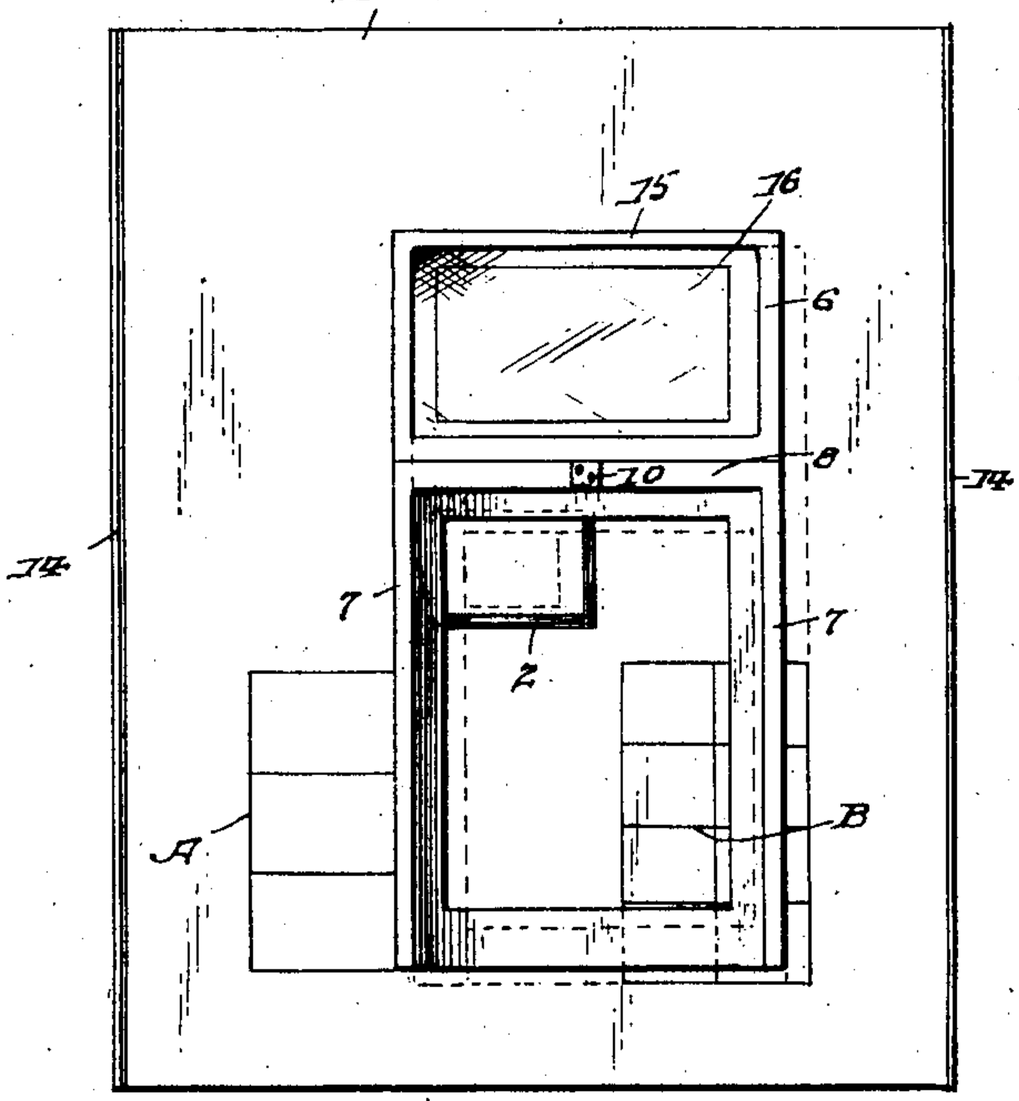


Fig. 6.



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UNITED STATES PATENT OFFICE.

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MULTIPLYING ATTACHMENT FOR CAMERAS.

SPECIFICATION forming part of Letters Patent No. 687,745, dated December 3, 1901.

Application filed November 3, 1900. Serial No. 35,397. (No model.)

To all whom it may concern:

Be it known that I, FRANK H. GROVER, a citizen of the United States, residing at Fremont, in the county of King and State of Washington, have invented a new and useful Multiplying Attachment for Cameras, of which the following is a specification.

This invention relates to photographic cameras, and has for its object to provide improved means for independently exposing separate portions of a sensitive plate so as to take pictures of smaller sizes than that of the plate and at the same time utilize the entire sensitive surface of said plate.

It is furthermore designed to provide a device in the nature of an attachment, so that it may be applied to any character of photographic camera, and, finally, to arrange means for adjustably supporting an ordinary plate-holder, so that the latter may be conveniently adjusted with respect to the exposure-opening of the camera to accurately expose separate portions of the plate without having any of said exposed portions overlapped.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a perspective view showing the present attachment applied to the back of a camera. Fig. 2 is a central longitudinal sectional view thereof. Fig. 3 is a detail perspective view of one of the interchangeable diagram-cards. Fig. 4 is a perspective view of a modified form of the device. Fig. 5 is a longitudinal sectional view thereof. Fig. 6 is an elevation of the device to illustrate the adjustment of the plate-holder.

Corresponding parts are designated by like characters of reference in all of the figures of the drawings.

Referring particularly to Figs. 4, 5, and 6, 1 designates a rectangular board or plate, which forms the body of the present camera attachment and is provided with a central exposure-opening 2, designed to be alined with the lens of an ordinary camera 3. Surrounding the exposure-opening and projecting at the front side of the plate 1 is a tube 4, which is preferably formed in telescopic sections, as shown in Fig. 2 of the drawings, so as to be longitudinally adjustable to accommodate the device to different cameras and to connect the attachment to the back of the camera. It will be understood that the attachment may be applied to "snap-shot" cameras and to "portrait" cameras by employing a removable slide or plate 5 to take the place of the usual plate-holder in the former class of cameras and as a substitute for the ordinary ground-glass plate of portrait-cameras. This removable plate has a central opening in line with the lens of the camera and for the reception of the outer end of the connecting-tube 4, as plainly shown in Figs. 2 and 5 of the drawings.

Instead of placing the plate-holder within the box of the camera it is applied to the outer or rear side of the body-plate 1, and for this purpose I have provided a carrier for the plate-holder comprising an open rectangular frame 6, which is provided with the opposite longitudinal flanges 7 and the inner or intermediate transverse flange 8. These flanges may be separate from the body of the frame, or the inner faces of the sides thereof may be rabbeted, so as to form grooves for an ordinary plate-holder 9, which is slid into the carrier from the open end thereof. A plate spring-tongue 10 has one end secured to the intermediate portion of the transverse flange or shoulder 8, from which it extends longitudinally across the open space between the opposite sides of the carrier, so as to bear against the plate-holder and secure the latter to the carrier. This spring-tongue is provided with the opposite outwardly-directed longitudinal flanges 11, and the latter are provided with the corresponding notches 12 for the reception of the intermediate portion of a substantially U-shaped wire clamp 13, whereby the carrier is detachably and adjustably held to the body-plate 1. The opposite side portions of this clamp form spring-

arms, which have their free extremities bent or notched, so as to form catches for engagement with the respective metallic flanges 14, secured to the opposite vertical edges of the body-plate 1 and projecting at the front face thereof.

Opposite the open end of the frame there is provided an end cross-bar 15, which coöperates with the sides of the frame and the intermediate cross-bar 8 to form a skeleton frame for the reception of a ground-glass plate 16 for use to focus the camera. It will be understood that the plate-holder carrier may be adjusted freely over the outer or rear side of the body-plate by means of the adjustable spring-clamp 13, whereby the glass plate may be placed over the exposure-opening of the body-plate to focus the camera and afterward adjusted so that the sensitive plate covers the said opening and in proper position for being exposed by the manipulation of the camera-shutter in the common manner. It is preferable to provide the inner side of the carrier with a facing of felt or suitable material 17, as indicated in Fig. 2, so that there may be a snug fit between the frame of the carrier and the back of the body-plate for the purpose of excluding all light from gaining access between said parts and striking the sensitive plate.

From the foregoing description it will be understood that the carrier may be conveniently adjusted over the entire back of the body-plate for the purpose of exposing different portions of the sensitive plate carried by the usual plate-holder, and in order that the carrier may be conveniently and accurately adjusted to expose every portion of the sensitive plate without overlapping any of the exposures I provide an adjusting diagram or scale upon the back or exposed side of the body-plate, as best shown in Fig. 6 of the drawings. In Fig. 6 the carrier has been shown in position to expose the upper left-hand corner of the plate, the plate-holder being omitted to more plainly illustrate the relative position of the carrier, the exposure-opening in the body-plate, and the sections of the diagram or scale. Commonly there are provided four adjusting-scales, one for each corner of the body-plate; but I have shown only two, which are designated by the letters A and B. Each scale or diagram consists of a rectangular figure, divided by lines into a plurality of smaller rectangular figures corresponding to the size of the exposure-opening of the body-plate. It will be understood that a plurality of reducing-frames are provided for the exposure-opening, one of which is designated by the numeral 18. For this reason it is necessary to provide separate scales, corresponding to the size of the exposure-opening. The scale A is for the largest size of the exposure-opening. The outer edge of the base or bottom end of the carrier is alined with the bottom line of said scale, and the left side of the carrier is placed upon the right side of the scale, as shown in full lines in Fig. 3, whereby the upper left-hand corner of the plate covers the exposure-opening in the body-plate. After exposing this portion of the sensitive plate the carrier is moved upwardly until the base or bottom end thereof is alined with the next-above transverse division-line of the scale, whereby the sensitive plate will be moved upwardly just the width of the exposure-opening, so that a new exposure may be had which does not overlap the former exposure. This adjustment is repeated until the length of the sensitive plate has been exposed, after which the carrier is moved laterally to the left until its left-hand side corresponds to the next longitudinal divisional line, whereby the sensitive plate is moved laterally to the extent of the length of the exposure-opening, so that by adjusting the carrier downwardly in the manner of the upward adjustment the other half of the sensitive plate may be successively exposed. Thus the entire surface of the sensitive plate is exposed, so as to effectually use the same without overlapping any of the multiple exposures. Should a smaller exposure-opening be employed, the scale having the corresponding divisions is used—as, for instance, the scale B—the position of the carrier being indicated by the dotted lines.

It will of course be understood that the body-plate 1 may be turned into positions at right angles and the carrier may be started with any of the divisions in any scale without requiring any other adjustment of the parts.

The scale A corresponds to an exposure-opening equal to one-half of the width of the sensitive plate, so that said scale has two vertical divisional lines, in order that the carrier may be moved from one of these lines to the other to expose one half of the plate and then the other half thereof. Also the exposure-opening is equal to one-fourth of the length of the plate, and therefore the scale is provided with four transverse lines, which are parallel and spaced at intervals equal to one-fourth of the length of the plate, whereby four exposures may be had on each half of the plate, making a total multiple exposure of eight. Likewise the scale B corresponds to an exposure-opening of one-third the width of the sensitive plate and one-fifth of the length thereof, whereby this scale has three vertical or longitudinal divisional lines and five transverse divisional lines, making a total of fifteen exposures upon a single plate. Thus the right-angularly related divisional lines or marks of the scales correspond in number to the proportionate part of the plate exposed by the different sizes of exposure-openings. In other words, the scale-marks are spaced according to the size of the exposure-opening, and the number of marks in any one series corresponds to the number of times the exposure-opening may be applied to the sensitive plate without overlapping and in the direction of said series.

From the foregoing description it is apparent that the form of the device shown in Figs. 4, 5, and 6 is limited to four sizes and shapes of exposures, and in order that there may be no limit within the size of the exposure-opening in the back or body plate there is provided a plurality of removable and interchangeable diagram-cards, one of which has been shown in Figs. 1, 2, and 3 of the drawings. The card 18 is preferably square and corresponds in size to the back or body 1 and is also provided with a central opening to be alined with the central opening of the back. It will thus be apparent that the size and shape of this opening may vary with the different cards within the compass of the exposure-opening in the back. Upon one side of the card and surrounding the central opening thereof is a marginal flange 19, which is designed to fit snugly within the exposure-opening of the back. Projecting at the opposite side of the card is a rubber tube 20, which is secured to the card, surrounds the opening therein, and is designed to provide a flexible flange, for a purpose as will be hereinafter described.

To hold the card in place flat against the back of the device, said back is provided with the end flanges 21, which project outwardly and coöperate with the flanges 14 to form a continuous marginal flange, which snugly embraces the marginal edge of the diagram-card. Suitable fastenings, such as elastic bands 22, embrace the opposite end portions of the back and the card, so as to hold the latter in place while the plate-holder is being adjusted.

It will of course be understood that the exposed side of this card is provided with a scale or diagram, as hereinbefore explained for the form shown in Figs. 4, 5, and 6 and as indicated in the lower left-hand corner of the card.

The plate-holder carrier is applied in precisely the same manner as hereinbefore described, the only difference in the two forms being that in the first the diagram is fixed or permanently attached to the back, while in the latter the diagram is removable and interchangeable. It will now be seen by reference to Fig. 5 that the flexible tube is designed to bear against the sensitive plate, so as to effectively confine the rays of light, and thereby form a distinct marginal division-line between the several exposures of each plate. It is essential that the flange or tube be flexible in order that it may be crumpled or accommodate itself to the usual slide in front of the plate-holder and then expand into contact with the sensitive plate, when the slide is withdrawn to expose the plate. Also a flexibly-expansive flange will not scratch or otherwise damage the plate. Moreover, the shape of the opening in the card may be varied, so as to give a circular or elliptical exposure or any other shape desired.

It will be observed that the flexible tube or flange 20 forms a continuation of the ray-tube 4, whereby the latter has one end longitudinally adjustable and its opposite end elastically yieldable.

What is claimed is—

1. The combination with a camera-back, having an exposure-opening, of a plate-holder carrier, which is freely movable in directions at right angles across the outer side of said back, and a substantially U-shaped spring-clamp removably and adjustably embracing the carrier and the back, and also having its opposite sides formed into spring-catches for engagement with opposite edges of the back.

2. The combination with a camera-back, having an exposure-opening therein, of a plate-holder carrier, comprising a skeleton frame, having a spring-tongue extending across the opening of the frame, and a substantially U-shaped spring-clamp adjustably and removably embracing the spring-tongue, the carrier and opposite edges of the back.

3. A camera, having an opening in the back and alined with the lens, and a multiple-exposure attachment comprising a body having an exposure-opening therein, and a ray-tube encircling the opening, carried by and projected at the front of the body, and constructed for detachable engagement with the opening in the back of the camera, and means for adjustably supporting a plate-holder upon the outer or rear side of the body.

4. The combination with a camera, having an opening formed in the back and in line with the lens thereof, of a multiple-exposure attachment, comprising a back, having an exposure-opening, a ray-tube encircling the exposure-opening and rotatably adjustable within the opening in the back of the camera, and a plate-holder carrier, which is adjustable across the exposure-opening of the back.

5. A camera having an opening in the back and alined with the lens thereof, and a multiple-exposure attachment therefor, comprising a body having an exposure-opening, a ray-tube encircling the opening, fixedly carried by and projected at the front of the body, and also having a rotatably-adjustable connection with the opening in the back of the camera, and means for adjustably supporting a plate-holder upon the rear or outer side of the body.

6. A multiple-exposure attachment for photographic cameras, comprising a plate or slide to take the place of the usual plate-holder, and provided with an opening for alinement with the lens of a camera, a back, having an exposure-opening, a ray-tube encircling the exposure-opening, projecting at the front side of the back, and constructed for detachable engagement with the opening in the removable slide, and a plate-holder carrier, which is adjustable across the exposure-opening and carried upon the rear side of the back.

7. A multiple-exposure device, having an exposure-opening, means for adjusting a plate-holder in directions at right angles across the exposure-opening, and an adjusting-scale formed upon the exposed side of the device,

and comprising two series of parallel lines intersecting at right angles, each series having a number of lines corresponding to the number of times the exposure-opening may be applied in the direction of the series to a sensitive plate of predetermined area.

8. A multiple-exposure attachment for photographic cameras, comprising a back, having an exposure-opening therein, a longitudinally-adjustable telescopic ray-tube embracing the opening and projecting at one side of the back, and means for adjustably holding a plate-holder against the opposite side of the back and over the exposure-opening.

9. A multiple-exposure attachment for photographic cameras, comprising a back having an exposure-opening therein, means for adjustably supporting a plate-holder against the outer side of the back and over the exposure-opening, and means for interchangeably securing a plurality of scale-cards to the back.

10. A multiple-exposure attachment for photographic cameras, comprising a back having an exposure-opening therein, means for adjustably supporting a plate-holder upon the back and covering the exposure-opening, and a diagram-card applied to the back, located between the latter and the plate-holder, and provided with an exposure-opening, having a flexible marginal flange to bear against a sensitive plate.

11. A multiple-exposure attachment for photographic cameras, comprising a back, having an exposure-opening therein and a marginal flange, means for adjustably supporting a plate-holder upon the back and covering the exposure-opening, a detachable diagram-card embraced by the flange of the back, and having an exposure-opening corresponding to the opening in the back, a marginal flange surrounding the opening of the card and snugly received within the opening of the back, and a flexible marginal flange surrounding the opening and projecting at the opposite side of the card.

12. A multiple-exposure attachment for photographic cameras, comprising a back, having an exposure-opening, a longitudinally-adjustable ray-tube surrounding the opening and projecting at one side of the back, and means for adjustably supporting a sensitive plate upon the opposite side of the back and covering the exposure-opening.

13. A camera, having a yieldably-adjustable sensitive-plate-engaging ray-tube, located in advance of the position of the plate-holder.

14. A camera, having an automatic yieldably-adjustable sensitive-plate-engaging ray-tube, located in advance of the position of the plate-holder.

15. A camera, having a flexible sensitive-plate-engaging ray-tube.

16. A camera, having an elastically-flexible sensitive-plate-engaging ray-tube.

17. In a multiple-exposure attachment for cameras, a body, having an exposure-opening, and a ray-tube encircling the opening and projecting in opposite directions therefrom, one end of the tube being formed into an elastically-flexible sensitive-plate-engaging marginal flange.

18. In a multiple-exposure attachment for cameras, a body, having an exposure-opening, and a ray-tube encircling the opening and projected in opposite directions therefrom, one end of the tube being longitudinally adjustable and the opposite end being formed into an elastically-yieldable sensitive-plate-engaging marginal flange.

19. The combination with a camera having an opening in the back thereof and in line with the lens thereof, of a multiple-exposure attachment therefor, having an exposure-opening, and a ray-tube encircling the opening, the tube being detachably fitted in the opening in the back of the camera and forming a supporting connection between the attachment and the camera.

20. A multiple-exposure attachment for cameras, having an exposure-opening, a ray-tube carried thereby, encircling the exposure-opening, and projected at the front of the attachment for connection with a camera, and means for adjustably supporting a sensitive plate upon the back of the attachment and over the exposure-opening.

21. A multiple-exposure attachment for cameras, comprising a body having an exposure-opening formed therein, a plate-holder carrier, having a spring-tongue to bear against the plate-holder, and a substantially U-shaped clamp adjustable and removable extending across and in engagement with the spring-tongue, the opposite terminals of the clamp being constructed for adjustable and detachable connection with the body.

22. A multiple-exposure attachment for cameras, comprising a body having an exposure-opening therein, a plate-holder carrier, having a frictional plate-holder-engaging supporting device, and a clamp having a detachable engagement with the supporting device, and an adjustable connection with the body, whereby the plate-holder carrier is adjustably supported upon said body.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

FRANK H. GROVER.

Witnesses:
F. C. PLUMMER,
F. HOCHBRUNN.