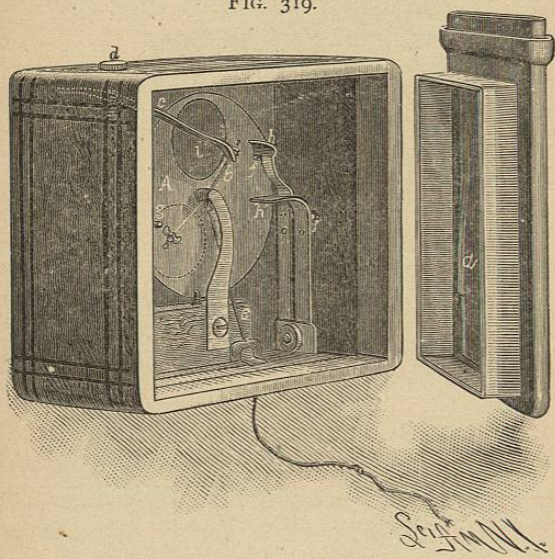


In the present case, the plate holder proper is made of brass and fitted to the camera box, from which it is never removed, except in case of some disarrangement of the interior parts of the camera. The holder consists of a flat sheath, made of suitable size to readily admit the plate, and provided with an opening in the front side, of the size of the field of the lens. This opening is surrounded by a flange which fits light-tight into the camera box.

Two light bowed springs, *a*, are soldered to the back of

FIG. 319.



Interior of Pocket Camera.

the sheath, and tend to press the plate forward to bring the film into the focal plane.

The end of the sheath, which projects upward above the top of the camera box, is of suitable size to be received in the stiffened ends of the bags, and a channel is formed around the end of the sheath near its upper end by soldering an angled strip of brass around the mouth of the sheath, as shown Fig. 319. Into this channel the stiffened end of the bag is inserted before it is unfolded. The channel is blackened, so that when the end of the bag is inserted in it, no

light can enter. Now, by straightening the bag and shaking the camera, the plate contained by the bag will be made to fall into the holder. The bag can now be folded against the back of the holder and held there by one of the elastic bands extending over the top and under the bottom of the box. The removal of the plate from the camera is simply the reverse of what has just been described; that is, the bag is unfolded, and the camera being inverted, the plate is dropped into the bag, when the bag is again folded and removed from the holder.

The shutter of this little camera is both simple and effective. It admits of instantaneous and time exposures, and can readily be adjusted to any required speed without opening the camera box.

The shutter consists of a light metallic disk, *A*, provided with a central boss arranged to turn on a stud projecting from a plate secured to the inner surface of the front of the box. A stout but fine cord, *b*, is attached by one end to a small loop soldered to the face of the shutter and wound once around the boss of the shutter; the remaining end passes through a hole in the end of the spring, *c*. A screw, *d*, passes through the top of the camera, through a slot in the spring, *c*, the nut being fitted to the slot of the spring and provided with shoulders which support the spring. By turning the screw, *d*, the spring may be made to turn the shutter with more or less rapidity, as may be required. A cord, *e*, inserted in an eye on the boss of the shutter and wound in a direction opposite that of the cord, *b*, passes out through a hole in the box and serves to set the shutter.

The shutter is provided with two small studs, *f g*, the stud, *f*, being arranged near the periphery of the disk, in position to be engaged by the spring catch, *h*, when the shutter is drawn around by the cord, *e*, preparatory to making an instantaneous exposure. The stud, *g*, is placed in such a position relative to the catch, *h*, that its engagement with the catch will hold the shutter open, or with its opening, *i*, coincident with the opening of the tube, as indicated in dotted lines.

The catch, *h*, is provided with a wire arm, *j*, which

extends behind the catch, *h*, in such a way as to allow the catch, *h'*, to move a short distance before releasing the catch, *h*. Each catch is provided with a stud which projects through the camera box and presses against the leather covering, forming two small convex projections, *l, m*. When an instantaneous exposure is desired, the shutter is released by pressing the projection, *l*. When a time exposure is to be made, the button, *m*, is pressed. This operation first throws the catch, *h'*, into the path of the stud, *g*, then releases the stud, *f*, allowing the shutter to turn until the stud, *g*, strikes the catch, *h*. This will arrest the shutter in an open position. When the catch, *h'*, is released, the shutter closes. For time exposures the camera box may be placed on any convenient support.

For instantaneous exposures, the camera may be held in the hand. One desiring to make a camera of this kind, and having the proper facilities, could substitute a toothed sector and pinion for the shutter boss and the cords used in operating it.

The camera lens is of the spherical, wide angle kind, with a fixed focus for all distances from five feet upward.

The camera box is 2 inches deep and $3\frac{1}{2}$ inches square, outside measurement. The camera was designed especially as a tourist's companion for taking lantern views, and it has served its purpose very well indeed.

SIMPLE PHOTOGRAPHIC AND PHOTO-MICROGRAPHIC APPARATUS.

While first class photographic instruments can be made only by makers having the greatest skill and large experience, an ordinary camera that will serve the purposes of the amateur may be made by the amateur himself with the expenditure of an insignificant sum for materials.

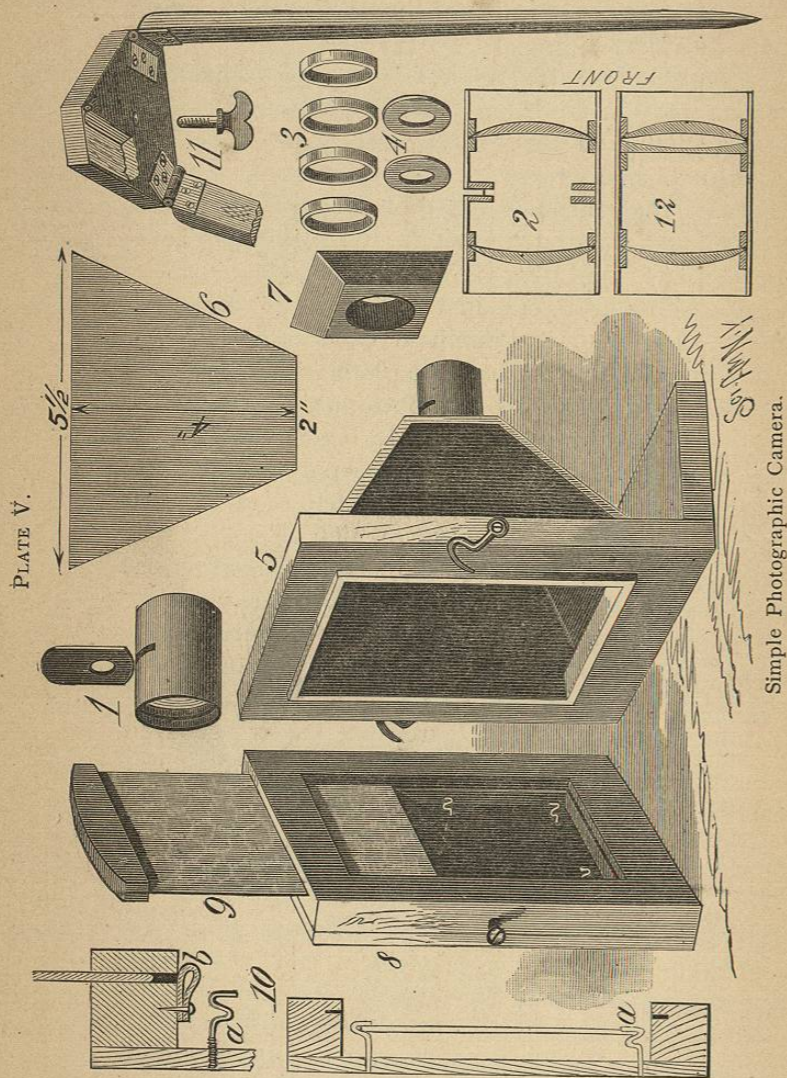
Nos. 1 to 12, Plate V., show a camera tube, box, and tripod, the materials of which cost less than a dollar. The construction is within the range of any one having a little mechanical ability. The camera is intended for 4 by 5 plates; therefore the size of the plate holder and the focal length of

the tube will determine the size of the camera box. To avoid turning the camera or plate holder, the box is made square, and the inside dimensions of the plate holder are such as to permit of placing the plate either horizontally or vertically, according to the subject to be photographed. The plate holder is $5\frac{1}{4}$ inches square inside, and is provided with a wooden back of sufficient thickness to support the hooks employed for holding the plate. There are four V-shaped wire hooks, *a*, at the bottom of the holder, two for receiving the end edge of the plate, and two farther apart, and arranged higher up, for receiving the side edge of the plate; and near the top of the holder there are three Z-shaped hooks, *a*, one in the center for engaging the end edge of the plate, and one near each side of the holder for receiving the side edge of the plate. The top of the frame is slotted, and the sides and bottom are grooved to receive the slide, which covers the plate before and after exposure. To the under surface of the upper part of the frame of the plate holder is attached a looped strip of elastic black cloth, such as broadcloth or beaver, which closes over the slot of the plate holder, as shown at 10, Plate V., when the slide is withdrawn, and thus shuts out the light. The interior of the plate holder, as well as the slide, should be made dead black, by applying a varnish made by adding three or four drops of shellac varnish to one ounce of alcohol, and stirring in lampblack until the required blackness is secured.

The main frame of the camera box is made square, and is secured at right angles to the base board. The frame is provided with a narrow bead or ledge that will enter the front of the plate holder and exclude the light.

To the front of the frame are secured four trapezoidal pieces of pasteboard, of the form and size given at 6. These pieces of pasteboard are secured to each other and to the camera box frame by tape, glued on as shown. If the box is made of junk board, it may be nailed together with wire nails. In this manner a pyramidal box is formed which is strong, light, and compact. In the smaller end of the box is fitted the beveled, centrally apertured block shown at 7. The aperture of this block must be made to fit the camera tube.

shown at 1 and 2, after having received a lining of plush or heavy felt. The camera tube may consist of paper or



metal. Paper answers well, and costs nothing. The internal diameter of the tube is determined by the diameter of the

lenses. Ordinary meniscus spectacle lenses of eight inch focus are employed. These lenses are secured in place by paper rings, shown at 3, the inner rings being glued in place, the outer ones being made removable for convenience in cleaning the lenses. The lenses are arranged with their convex sides outward; the distance between them is $1\frac{1}{4}$ inches, and in one side of the tube, half way between the lenses, is made a slot to receive the diaphragms, as shown at 1 and 2. Upon each side of the slot, within the tube, are secured flat rings, shown at 4, which together form a guide for the diaphragms, as shown at 2 Plate V.

The tube is adjusted at the proper focal distance from the plate by temporarily securing at the back of the box a piece of ground glass or tracing paper, in exactly the same plane as that occupied by the plate in the plate holder. The tube is then moved back and forth until a focus is obtained which shows the image fairly sharp throughout the field. In arranging for a fixed focus, it is perhaps best to favor the foreground rather than the distance. The tube should move with sufficient friction to prevent it from being easily displaced. By using a small diaphragm, it will be found unnecessary to focus each object separately.

At 12, Plate V., is shown a combination of cheap lenses, which is effective for portraits and for other classes of work in which focusing is admissible. It consists of two meniscus lenses, each of $8\frac{1}{2}$ inches focus, having their convex sides arranged outwardly and a plano-concave lens, 16 inches focus, arranged with its concave side against the concave side of the outer lens of the system. The plano-concave and the rear meniscus lenses are arranged $1\frac{1}{2}$ inches apart. Diaphragms may be used as in the other case, and a box about 8 inches deep will be required.

The tripod is formed of a triangular centrally apertured board, to which are hinged three tapering wooden legs, by means of ordinary butt hinges, as shown at 11, Plate V. The base of the camera box is secured to the tripod by means of an ordinary thumb screw.

This outfit will enable the amateur to cultivate his tastes, and learn much about photography. Dry plates will, of