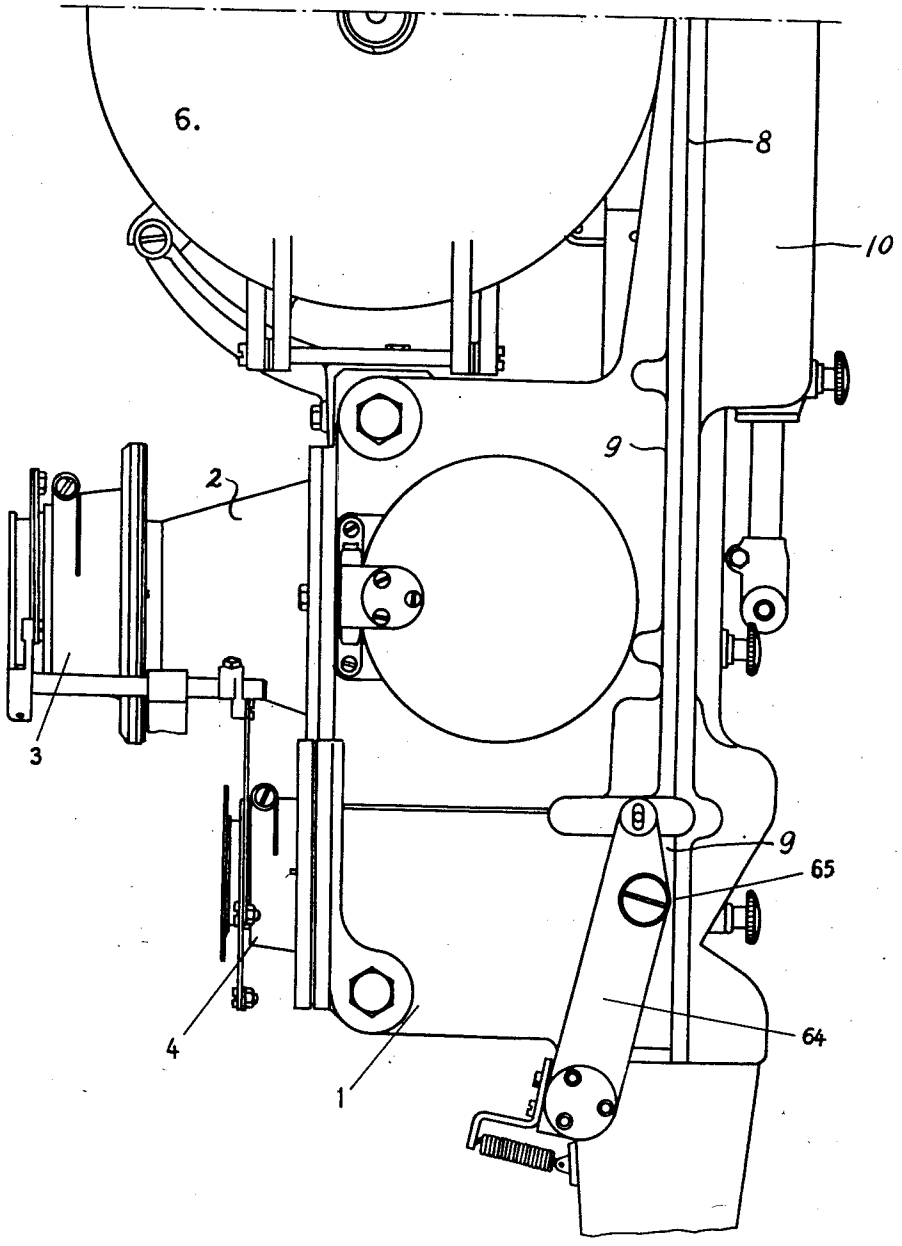
March 2, 1943. E. ZOLLINGER 2,312,683

PHOTOGRAPHIC APPARATUS

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Fig. 1



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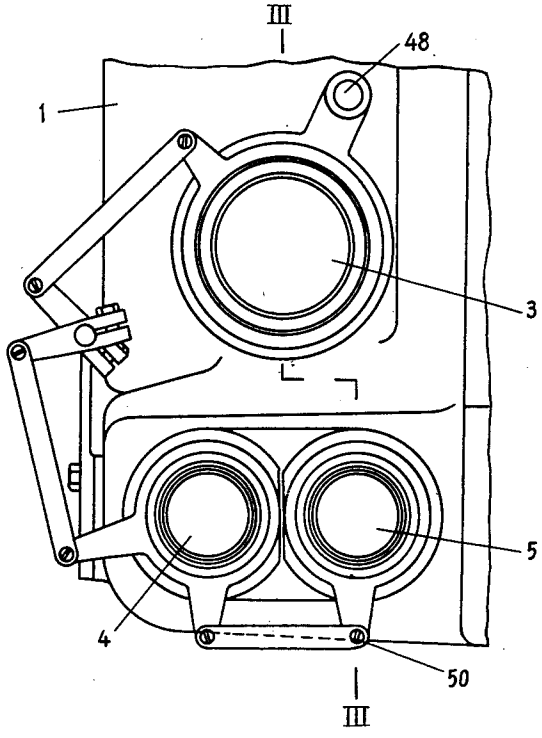


Fig. 2

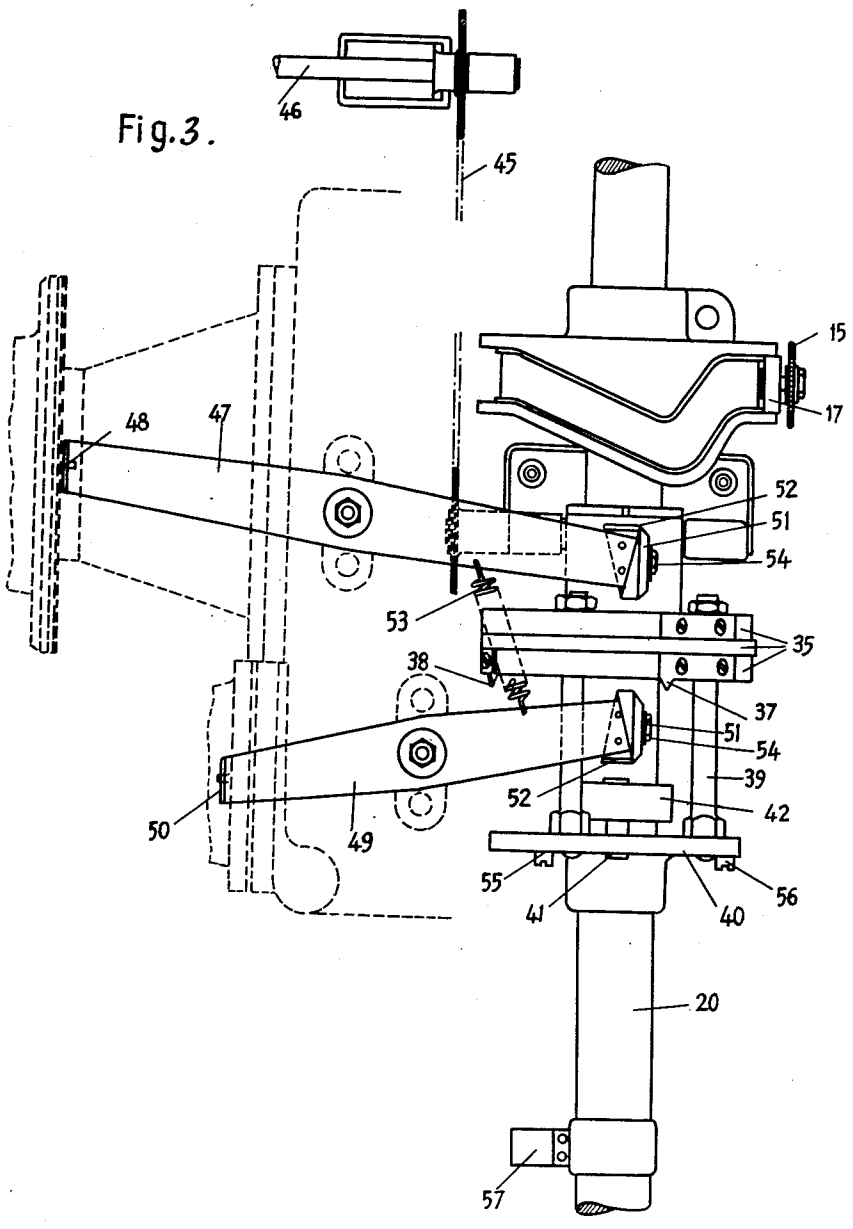
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Fig. 3.



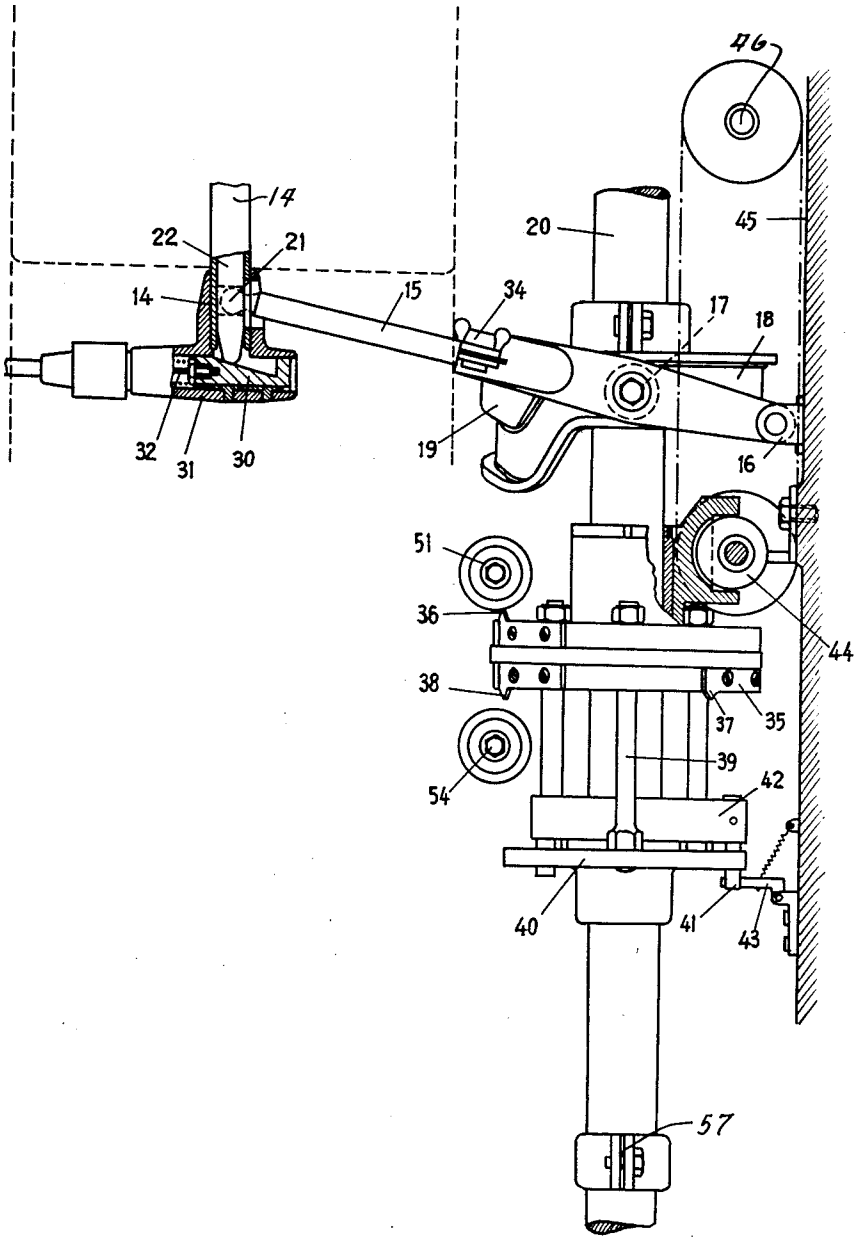
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Fig. 4.



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PHOTOGRAPHIC APPARATUS

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Fig. 5

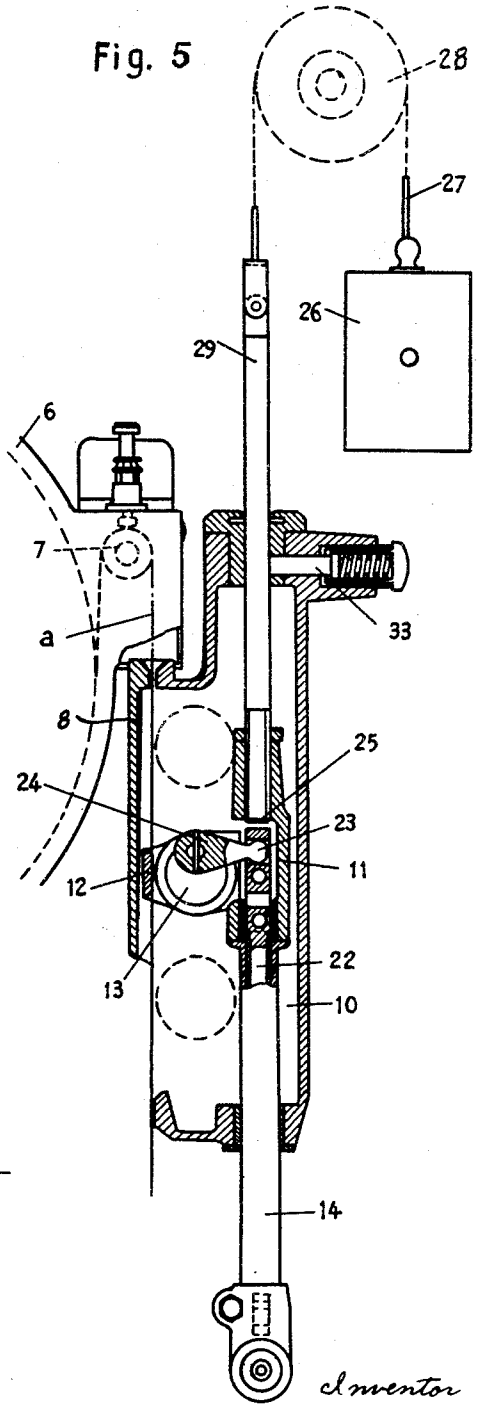


Fig. 6.

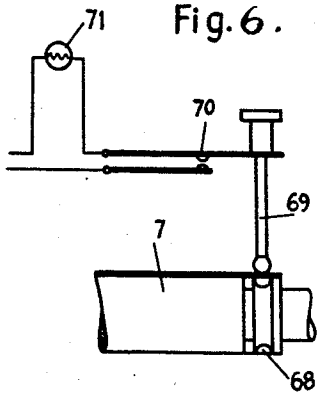
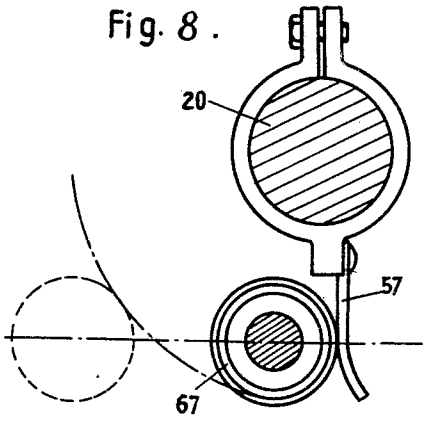


Fig. 8.



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Fig. 7.

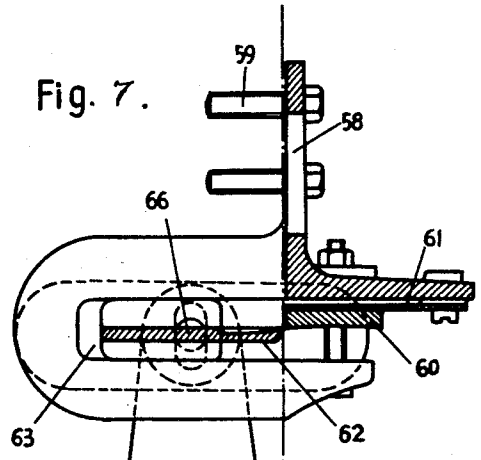
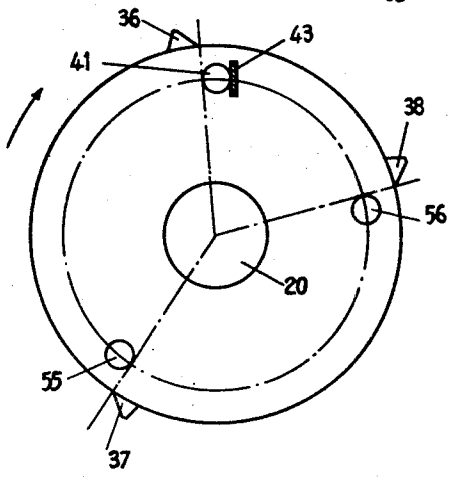


Fig. 9.



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UNITED STATES PATENT OFFICE

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PHOTOGRAPHIC APPARATUS

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Application March 29, 1940, Serial No. 326,731

7 Claims. (Cl. 95—36)

This invention relates to photographic apparatus of the type in which insertion of a coin or pressure of a button produce in the desired succession release of the shutter, feed of the light-sensitive strip unrolling from a coil and cutting of the exposed portion of said sensitive strip, the cut portion being conveyed to the various chemical treatments.

An object of this invention is to provide in an apparatus of the type referred to above three photographing units, viz. a large-size and two small-size units, the latter being arranged side by side in succession to the large-size unit in the direction of feed of the light-sensitive strip. The two small-size photographing units are preferably spaced apart in such manner that the images can be observed through a stereoscope.

A further object of this invention is to provide in an apparatus of the type referred to above a gripping device for feeding the strip, in which one of the jaws is rigidly carried by a slide which receives a reciprocating movement, the other jaw being rotatably mounted on said slide and having an eccentric surface so that, as the forward movement starts, the jaws are drawn together for gripping the strip and carrying it along by an extent corresponding to the height of the small size while, as the return stroke starts, the jaws are drawn apart and freely slide on the strip.

A further object of this invention is to provide in a feed device of the type referred to above, means by which the angle of rotation of the eccentric jaw during the return stroke is limited by an adjustable stop in order to adjust the useful length of the slide movement.

A further object of this invention is to provide in an apparatus of the type referred to above selective releasing means for the shutters of the photographing units correlated with the feed means for the light-sensitive strip, so that feed of the light-sensitive strip and release of the shutter or shutters take place automatically in the desired succession.

A further object of this invention is to provide in an apparatus of the type referred to above means for varying the time of exposure in accordance with the optical characteristics of the objective and illumination of the subject.

The above and further objects of this invention will appear from the following description in which reference is made to the accompanying drawings, in which:

Figure 1 is an elevation of the set of objectives and feed device for the light-sensitive strip of the automatic photographing apparatus;

Figure 2 is a front view of the objectives;

Figure 3 is an elevation of the control shaft for releasing the shutters and feeding the strip;

Figure 4 is a view at 90° to Fig. 3;

Figure 5 is a detail view of the strip feed device;

Figure 6 shows a detail;

Figure 7 is a detailed view of the strip cutting device;

Figure 8 is a detailed view of the cutting device control;

Figure 9 is a diagram showing operation of the apparatus.

Referring to the drawings, 1 denotes the casing which is formed with an inner upper compartment constituting the large-size camera and two juxtaposed compartments constituting the small-size cameras.

The top compartment carries a cone 2 for the large objective 3, the small-size objectives 4 and 5 being directly fitted to the lower compartments.

A distributor 6 is mounted above the casing 1 and has rotatable therein a spool on which the sensitive strip coil is fitted, said strip *a* unwinding and travelling over the guide roller 7 (Fig. 5) down into the guide slots 8 and against the bottom 9 of the cameras.

A slide 11 is mounted for displacement in an enlargement 10 of the guide slot and comprises a cross member 12 and an eccentric roller 13, between which the light-sensitive strip *a* extends. The alternating motion is imparted to the slide through a hollow push-rod 14 by a lever 15 pivoted to a bracket 16 secured to the casing of the cameras and carrying at an intermediate point a roller 17 engaged by a groove 18 in the cam disc 19 keyed on the control shaft 20.

The lever 15 ends by a spherical pin 21 engaged by a seating formed near one end of a rod 22 mounted for axial displacement in the hollow push-rod 14 and having at its other end a seat engaging the spherical head 23 of an arm 24 keyed on the eccentric pin of the roller 13. The rod 22 may move with respect to the push-rod 14 and slide 11 by a small extent determined by the stop 25. Consequently, on oscillation of the lever 15, the rod 22 first and the push-rod 14 next are displaced; on the upward movement the roller 13 is first removed from the cross member 12 opening the pincers, whereupon the slide is moved upwardly without touching the light-sensitive strip *a*; on the downward move-

ment the roller 13 is first brought against the cross member 12, thereby gripping the strip *a* which is pulled down by the slide.

The weight of the slide and push-rod is balanced by the counterweight 26 connected to the rope 27 travelling over the grooved pulley 28 and anchored to the rod 29 fixedly connected to the slide 11.

The relative displacement of the rod 22 and push-rod 14 may be adjusted by means of the wedge 30 (Fig. 4) mounted for displacement in a transverse tubular expansion 31 at the lower end of the push-rod. The wedge 30 may be displaced by means of the Bowden transmission 32, in order to vary the stroke of the rod 22 with respect to the push-rod 14, i. e. the idle stroke of the pincers for adjusting the feed of the strip with respect to the cameras. When the top portion of the wedge 30 is underneath the rod 22, during the downward feed movement of the slide the pincers are prevented from gripping and the stroke is idle, that is the strip is not carried along.

The rod 29 is screwed in the slide 11 for the purpose of permitting adjustment of the stop 25 and of the useful length of the slide movement.

An elastic damper 33 which resiliently brakes the rod 29 ensures the proper succession of the movements involving the pincers and slide.

The lever 15, which is divided for facilitating assembly, the two sections being clamped together by the bolt 34, is rocked by the cam 19 twice on each turn of the control shaft 20. As the strip *a* is fed on each rocking movement by a length corresponding to the height of the small-size, on each turn of the shaft 20 the strip is fed by the height of the large size.

The control shaft 20 carries underneath the cam 19 the release means for the shutters of the objectives. This device is constituted by a disc 35 freely fitted on the shaft 20 and carrying on one face a tooth 36 for actuating the large-size shutter and on its other face two teeth 37 and 38 for actuating the small-size shutters. The disc 35 is rigidly connected by means of bolts 39 to a flange 40 loosely mounted on the shaft 20 and coupled for rotation by means of a pin 41 to a disc 42 rigidly fixed on said shaft.

The pin 41 extends through a hole in the flange 40 for engagement with a fixed abutment 43 which determines starting of each photographing operation and is abutted by the pin 41 when the apparatus is in its inoperative position. The abutment 43 may be removed by means of a remote control of any suitable type, for instance an electromagnet (not shown), from the path of the pin 41 for starting the apparatus.

The disc 35 may be axially displaced on the shaft 20 by means of the eccentric 44 remotely controlled by the operator through the sprocket chain 45 and drive shaft 46. As the disc 35 is lifted, the tooth 36 comes into a position for engaging in rotation the lever 47 (Fig. 3) acting on the control button 48 of the large-size shutter; as the disc 35 is lowered, the teeth 37 and 38 are brought into a position for engagement in rotation with the lever 49 acting on the control button 50 of the small-size shutters.

A disc 51 is fixedly mounted on the ends of the levers 47 and 49 cooperating with the associated teeth on the disc 35, the axis of the disc 51 being parallel to the tangent to the path of the teeth and the disc having a cylindrical rim 52 gradually variable in height. The teeth move beyond the rim and the time elapsing between the two oscillations of the lever under the action of a tooth first and of the return spring 53 next determines the time of exposure. Timing depends upon the height of the region of the rim beyond which the tooth has moved. The disc 51 is fixed to the lever by means of a bolt and nut 54. By releasing the nut, the disc may easily be given the desired angular adjustment for timing the exposure at will.

Angular adjustment of the disc 51 may at will be effected at a distance from the outside of the apparatus by means of a suitable drive.

The lower face of the flange 40 has secured thereto stop pins 55 and 56 which successively contact on rotation with the abutment 43 and serve, as will be explained hereafter, for making small-size exposures.

An arm 57 (Figs. 7 and 8) is keyed on the control shaft 20 underneath the shutter control and actuates the strip cutter. The cutting device is carried by an attachment angle 58 and is secured by means of bolts 59 in a suitable position to the machine frame, so as to operate in the plane separating the large-size camera from the small-size cameras. The cutting device includes a stationary knife 60 carried by resilient tongues 61 secured to the angle bar 58 and a knife 62 movable in a cross slot 63 extending transversely of the guide slot for the strip. The movable knife is moved by the lever 64 pivoted at 65 and having at one end a slot engaging the pin 66 of the knife and, at its other end, a roller 67 engaging with the arm 57.

When the strip has almost fully unrolled, this is shown by an indicating device. Figure 6 shows a visible indicator. A groove 68 is formed at one end of the roller 7 and is normally covered by the strip which is pressed by the push-rod 69 maintaining in this position the switch 70 open. When the strip is at end, the push-rod sinks into the groove, the switch 70 closes and the lamp 71 lights up.

Correlation of the various operations of the apparatus in their proper succession is clearly shown by the diagram in Fig. 9. Supposing a large-size exposure is to be made, the disc 35 is lifted so as to bring the tooth 36 into its operative position and the teeth 37 and 38 and stops 55 and 56 into their inoperative position. The fixed abutment 43 is moved by the electromagnet out of the path of the pin 41. The shaft 20 is set in motion by an electric motor through a friction clutch. The stop 36 strikes the lever 47 which releases the shutter of the large-size objective whereupon the roller 17 on the lever 15 sinks into one of the bulges of the groove 18 in the cam 19 and the lever 15 moves down and carries along the strip by an extent corresponding to one-half the height of the large-size. On further rotation of the shaft the lever is raised and moves the slide 11 upwardly; the tooth 37 and stop 55 move over the disc 51 of the lever 41 and stop 43, respectively, but do not engage them, the disc 35 being raised; the roller 17 on the lever 15 then sinks into the second bulge and the lever brings down the strip by the same extent as before, whereupon the lever 15 rises again moving the slide 11 upwardly, the tooth 38 and stop 56 move over their associated parts without actuating them, finally, the arm 57 rocks the lever 64 which actuates the knife 62, thereby cutting the strip. The exposed sheet falls into the guide and is brought to the developing and fixing baths.

When it is desired to make small-size expo-

sures, the disc **35** is lowered; the tooth **36** becomes inoperative and the teeth **37** and **38** become operative, the length of the stop pin **41** secured to the disc **42** being such that it is kept in engagement with the fixed abutment **43**. By temporarily displacing the abutment **43** by means of the electromagnet, the shaft **20** is set in rotation, the tooth **36** moves idly, the lever **15** lowers the slide feeding the ribbon by an extent corresponding to the height of the small-size (that is, to one-half the height of the large size), the lever **15** then idly moves the slide **11** upwardly, the stop **55** abuts the abutment **43** which has in the meantime resumed its initial position as the electromagnet has become disenergized.

The shaft **20** stops; in order to make the exposure the fixed abutment **43** is again temporarily displaced; the shaft **20** then resumes rotation and the tooth **37** releases the small-size shutters, the strip is again pulled down, the slide idly rises, the shaft stops again, as the pin **56** has engaged the abutment **43**; the pin **56** is again removed from the abutment **43**, the shaft **20** resumes rotation and brings the tooth **38** against the lever **49** releasing the small size shutters and four small-size exposures are made on the sheet, which is then cut from the strip.

When it is desired to make two small size exposures only, the wedge **30** is acted upon (Fig. 4) in order to annul the action of the pincers during one downward movement of the slide **11**.

At the end of each turn of the shaft **20**, the pin **41** abuts the abutment **43** stopping operation of the apparatus.

What I claim is:

1. Photographic apparatus comprising a large size camera, two small size cameras arranged side by side and in succession to the large size camera, a reciprocally sliding device for intermittently feeding a light-sensitive strip through said cameras, a lever for operating the shutter of the large size camera, a second lever for operating the shutters of the small size cameras, a cutting member for cutting off the exposed portion of said light-sensitive strip, a control shaft carrying a cam for imparting to said feed device a strip feed movement twice on each rotation of said shaft, a disc axially displaceable but not rotatable for actuating, in one position, the lever actuating the shutter of the large size camera and, in its other position, the lever actuating the shutters of the small size cameras, and an arm for actuating the cutting device in the desired succession.

2. Photographic apparatus comprising a large size camera, two small size cameras arranged side by side and in succession to the large size camera, the small size cameras being of the same height as the large size camera, a guide for a light-sensitive strip on its travel through said cameras, a slide in said guide having a cross member and an eccentric roller for the feed of the light-sensitive strip, a lever for operating the shutter of the large size camera, a second lever for operating the shutters of the small size cameras, a cutting member for cutting off the exposed portion of said light-sensitive strip, a control shaft carrying a cam for imparting to said slide a reciprocating movement and at the same time removing the eccentric roller from the cross member on the return movement and moving said roller towards the cross member on the feed movement for seizing the light-sensitive strip and conveying it through the cameras by an extent corresponding to the height of the small size picture twice on each rotation of said control shaft, a disc axially displaceable at will but fixed against rotation for actuating, in one position, the lever operating the shutter of the large size camera once on each rotation of said control shaft, and in its other position the lever operating the shutters of the small size cameras twice on each rotation of said control shaft, an arm for actuating the cutting off device, and stop means operable at will and cooperating with said disc for feeding said light-sensitive strip and operating the shutters and the cutting device in the desired succession.

3. Photographic apparatus, as claimed in claim 2, in which the cam acts on the slide with the aid of means comprising a hollow push-rod fixed on the slide, a rod mounted for axial displacement in said push-rod and acting on the eccentric roller, and a cam-operated lever which first moves the rod and then the push-rod.

4. Photographic apparatus, as claimed in claim 2, in which the cam acts on the slide with the aid of means comprising a hollow push-rod fixedly connected with the slide, a rod mounted for axial displacement in said hollow push-rod and acting on the eccentric roller, an adjustable rod for varying the feed movement of the light-sensitive strip, a lever for first displacing the rod and then the push-rod, and remotely controlled means in the push-rod for adjusting and annulling at will the action of the rod on the eccentric roller.

5. Photographic apparatus, comprising a large size camera, two small cameras arranged side by side and in succession to the large size camera, the small size cameras being one-half as high as the large size camera, a guide conduit for the light-sensitive strip on its travel through said cameras, a slide having a cross member and an eccentric roller for feeding the strip, a hollow push-rod fixedly connected with the slide, a rod displaceably mounted in said push-rod and acting on the eccentric roller for moving it to its seizing position against the cross member on the feed movement and to its opening position remote from the cross member on the return movement of the slide, a lever which first displaces said rod and then said push-rod, a control shaft, a cam mounted on the control shaft and of such shape as to impart to said lever two rocking movements on each turn, a second lever operating the shutter of the large size camera, a third lever operating the shutters of the small size cameras, and a toothed disc connected in rotation with but displaceable on said shaft, so as to be brought at will to a position for actuating the lever operating the large size camera shutter and to another position for operating the lever of the small size camera shutters, said cam or said disc being keyed on the control shaft, so that the slide and shutters are actuated in the desired succession.

6. Photographic apparatus, comprising a large size camera, two small size cameras arranged side by side and in succession to the large size camera, the small size cameras being of a height equal to one-half the height of the large size camera, a pincers for gripping the light-sensitive strip and feeding it through said cameras by an extent corresponding to the height of the small size cameras, means for automatically closing the pincers at the beginning of the feed movement and for opening them at the beginning of the return movement, a lever for re-

leasing the shutter of the large size camera, a further lever for releasing the shutters of the small size cameras, a common control shaft, means on said shaft for actuating the feed device for the light-sensitive strip, a toothed disc connected for rotation with but displaceable on said shaft so that it can be brought at will in a position for actuating the release lever for the large size camera or the release lever for the small size cameras, and means on the levers for adjusting the exposure of the film by timing the contact of said teeth with said levers.

7. Photographic apparatus as claimed in claim 6, in which the means for adjusting the contact of the teeth with the shutter-operating levers comprises a disc adjustably secured to one end of said lever, and a rim on said disc gradually variable in height.

ERNESTO ZOLLINGER.