

A NEW CAMERA TIMER FOR TIME-LAPSE CINEMATOGRAPHY*

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By "time-lapse" or "stop-motion" cinematography we mean motion pictures of comparatively slow actions that appear to be speeded up when projected upon the screen. We may presume that film records of actions taken at any lower frequency than normal projection speed would belong to this category because they are more or less speeded up when projected. For practical reasons we may say, however, that useful time-lapse work ranges between one frame per second and one frame per hour.

Historically speaking the use of time-lapse cinematography may be traced back to the early days of the motion picture art. It has been employed extensively in the natural sciences to demonstrate, for example, the process of plant growth, the opening of flowers, slow chemical reactions, *etc.*

The taking of motion pictures of this type is, of course, very simple, aside from some experience in determining the proper time-intervals between exposures. Provided the illumination is constant, the camera needs only to be operated at the proper speed by hand or motor. When focusing upon the object sufficient space should be allowed in the field of view for its increase of size. Pictures have occasionally been taken over a period of several days, two or three cameramen working in shifts.

Many types of driving mechanism, more or less complicated, have been constructed, mostly home-made affairs, serving only limited purposes, and it has been felt, due to an increase of time-lapse work in recent years, that there is a demand for a standard device available to everybody.

The camera timer to be described (Figs. 1 and 2) is the result of 20 years of practical experience in time-lapse cinematography as applied in a scientific and industrial research laboratory where accuracy and excellence of results are of prime importance and where the attention of the operator should be focused upon the object itself rather than upon the manipulation of the camera. Therefore, such a timer must be compact and portable, automatic, and easy to operate and foolproof.

The timer consists of a number of units assembled in a box that may be set upon a tripod or other suitable stand and connected to the camera by a telescope shaft with two universal joints or by a flexible shaft. Shaft extensions are on either side of the timer so that the instrument panel faces the operator at all times, whether the camera is horizontal, as for straight photography, or vertical for close-up and microscopic work.

The apparatus consists of the following parts: (1) Minute device, (2) hour device, (3) camera motor, (4) frame (exposure) counter, (5) relay mechanism for intermittent and continuous operation, (6) automatic light-control mechanism, (7) instrument panel; *Auxiliaries*: (1) Voltmeter and ammeter for measuring light output, (2) time limit switch, (3) auxiliary light circuit.

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(4) receptacle for panel light, (5) remote-control button for single exposures and animation work.

The minute device consists mainly of a synchronous motor, a contact disk assembly, and a commutator switch. It can be set to take 1, 2, 3, 4, 6, and 8 pictures per minute.

The hour device is of similar construction, with synchronous motor, contact disk assembly, and commutator switch for 1, 2, 3, 6, 12, and 24 pictures per hour. It has, in addition, a contact mechanism that insures uniformly exposed pictures.

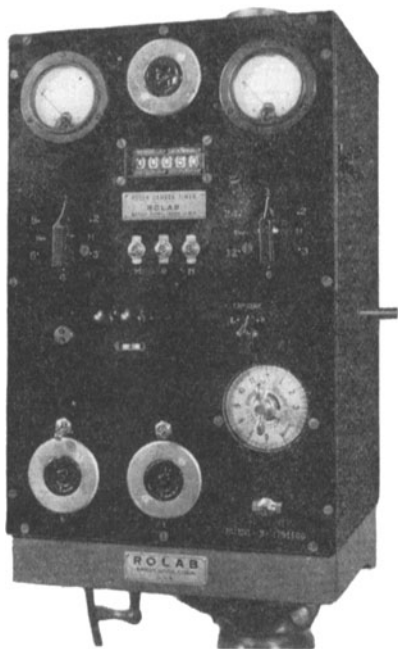


FIG. 1. Camera timer.

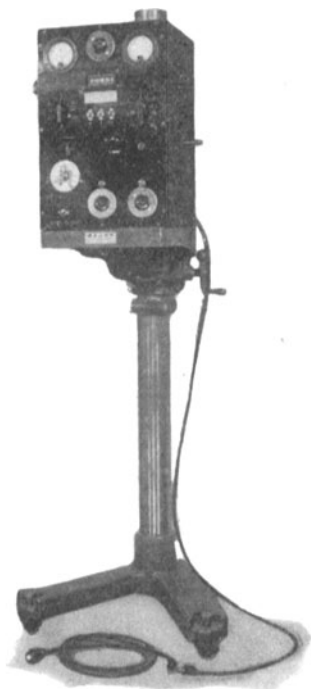


FIG. 2. Camera timer mounted on stand.

The camera motor is of the silent precision type, with speed governor and gear-shift assembly for two speeds. The frame-counter counts single exposures and can be re-set at any time.

The mechanism for intermittent and continuous operation plays an important part in the timer, and the intermittent operation may be considered a most valuable feature. It may be pointed out here that the majority of home-built devices, operating continually, have a definite drawback because any change of time-interval requires lengthy readjustment of gears, pulleys, light, and camera objective, besides the making of exposure tests. In the Roger camera timer a change

of frequency may be accomplished simply by turning a dial on the instrument panel. This does not change the exposure-time previously found to be correct, and was made possible by the intermittent operation of camera and light-source. Between exposures, and after having turned one revolution, the motor stops completely at the moment the camera shutter is closed. A cycle begins with an impulse from the minute or the hour device, which activates the relay and starts the motor with intermittent mechanism. The light turns on and off in synchronism with the camera shutter, and the motor stops again at the end of one revolution.

A single lever on the panel may be turned to disengage the intermittent mechanism with the result that the camera now operates continuously with two adjustable speeds for frequencies over 8 pictures per minute.

The timer, as mentioned before, is composed of a number of units. It is therefore possible to make up simplified models to suit particular purposes. The following outfits are being manufactured:

Camera timer with hour device only.

Camera timer with minute device only.

Motor and intermittent mechanism only, for animation work; hour or minute device may be supplied separately if needed.

The camera timer can be supplied without meters and time-limit switch.

Forerunners of this timer have been in use about ten years in a number of laboratories. At the Rockefeller Institute for Medical Research it has been used by Dr. Alexis Carrel and the author for making micro-cinema studies of living cells of tissue and blood, and of bacteria. Some of the results have been reported previously in the JOURNAL. The U. S. Department of Agriculture has been using a timer in its Motion Picture Department for about four years, for recording plant and animal life. Timers have been and are being used extensively by the Rolab Laboratories. Some of the work that has been done includes the following subjects:

Growth of various plants, mushrooms, and other fungi; opening of flowers; budding of yeast starting from a single cell; growth of bacterial colonies and single bacteria; action of bacteriophage on coli bacteria; capillary action of dyed liquids in the grain of wood; formation of ice crystals and their penetration into pores of wood to prove adhesion (legal evidence),

Growth of tissue and blood cells, including cell division and phagocytosis; growing nerve fibers; blood circulation,

Formation of wax crystals in various motor oils at very low temperatures, to show point of solidification with regard to winter starting; taken in freezing chamber using polarized light.

Behavior of thin layers of paraffin at low temperatures; formation of Liesegang rings; swelling experiments, cataphoresis of colloidal particles for the motion picture *Colloids and Their Behavior*,

Animated pictures of various kinds and animated plastilina models.

Camera timers may also be used for the reading of instruments of various kinds of periodic time-intervals.