

review would be incomplete without favorable reference to the illustrations, all of which have been provided by Mr. George B. Cummins, of Purdue University. Unnecessary apology is made because space does not permit the depiction of variation in the

shape and size of the spores. The illustrations are well done and will be much appreciated by all users of the book.

FRANK D. KERN

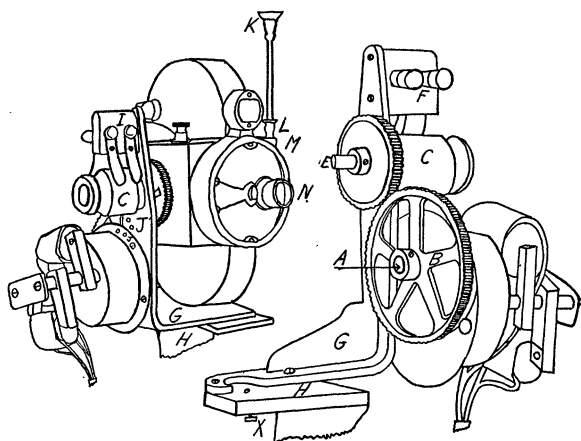
THE PENNSYLVANIA STATE COLLEGE

SCIENTIFIC APPARATUS AND LABORATORY METHODS

FLEXIBLE CONTROL OF SPEED AND FOCUS FOR MOTION PICTURE CAMERAS

MANY phenomena of nature that progress slowly can be studied to advantage from motion picture photographs taken at appropriate intervals of time. The film may be speeded up to a convenient duration and repeatedly shown until the process is familiar to the experimenter and his audience. Such equipment has been used for many years¹ and the chief remaining difficulties to be solved in adapting the motion picture camera for such records are a constant speed motor and a simple means of focusing the camera.

The larger double telechron motor (M-43) is light enough to be attached readily by a bracket (G) to the stand (H) supporting the camera, Figs. 1 and 2.



FIGS. 1 and 2. Telechron motor and the attachment to the stand (H) which supports the motion picture camera.

As there is practically no vibration, no special mounting is necessary when the stand is placed on a rubber kneeling pad held by bolts to the baseboard with a rubber stopper between the stand and the bolthead. A motor may be obtained with a built-in reducing gear so that the motor shaft (A, Fig. 1) will turn one revolution per minute. Suitable gears (B and D) may be interposed to give the camera drive shaft (E) any desired speed. One of the bolts holding the motor should have several positions (JJ', Fig. 2) to allow for the different distances between the shafts when the gear combinations have a different total

¹ O. O. Heard, *Jour. Biol. Photog. Assoc.*, 1: 4-19, 1932; O. W. Richards, *ibid.*, 2: 39-55, 1933.

number of teeth. These inexpensive gears may be changed easily to give the outfit the necessary flexibility which is lacking in the commercial models now on sale at prohibitive prices. A drum (C) is provided with electrical contacts (F and I) so that a magnetic shutter may be operated synchronously with the camera.

The telescope (K) of a nasal pharyngoscope² may be used to see the focus of the image on the film in the camera. A bracket (M) gives strength and support and a movable stop (L) holds the pharyngoscope at the proper level in the camera. The stop will also hold it above the film when it is not being used or it may be removed entirely from the camera and a stop placed in the hole to exclude light. The tube of the pharyngoscope is small enough to pass between the shutter and the film gate of the camera. This is usable only when the camera shutter is open but does save the cost of a beam-splitter.

This arrangement is especially useful when photographing small objects or making titles. When the camera is used with the lower powers of the microscope, sufficient light is passed for focusing with the aid of the pharyngoscope. With the higher powers of the microscope, there is not enough light for visual focusing in the above manner and, in that case, a beam-splitter is required. Even when the beam-splitter is used, the pharyngoscope is useful in timing the shutter and in addition, it may be used to focus the image of a watch on the corner of the film frame by means of suitable auxiliary lenses. A detailed description of the complete apparatus will be published in the near future.³

OSCAR W. RICHARDS

OSBORN ZOOLOGICAL LABORATORY
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AN APPARATUS FOR CONSTANT DELIVERY OF EQUAL WEIGHTS OF TWO OR MORE LIQUIDS

AN apparatus which delivers several liquids at a constant rate and at the same speed for each liquid

² This focusing device was described at the second annual meeting of the Biol. Photog. Assoc. in Rochester, September, 1933.

³ A grant from the Bache Fund of the National Academy of Sciences made possible the construction of this apparatus, which will be described in detail in the *Jour. Biol. Photog. Assoc.*, 1934.