A Photoelectric Drop Counter[1]

JAMES A. RILEY

Section of Neuroanatomy and *Department of Pharmacology, Yale University School of Medicine*

A photoelectric counter (Fig. 1) has been devised which, it is hoped, will eliminate the numerous operating difficulties presented by currently used instruments designed for counting drops. This instrument has been found useful in the study of the action of cholagogues and of diuretics and can be equally useful in the study of other physiological and pharmacological processes.

In this instrument, light reflected from the surface of the drop is used to initiate an electrical impulse which is amplified and recorded on the usual kymograph. As the drop falls through the beam of light there will be a unique point in the trajectory of the drop at which the reflected beam passes through the slits S_1 and S_2 (see Fig. 1).

The source of light is a 150-watt projection bulb (GE type T-8) placed just outside the focal point of a lens, the focal length of which is about 6 cm. This gives a converging beam with an angle of convergence of 35° for outside rays. The photocell is a high-vacuum GE type

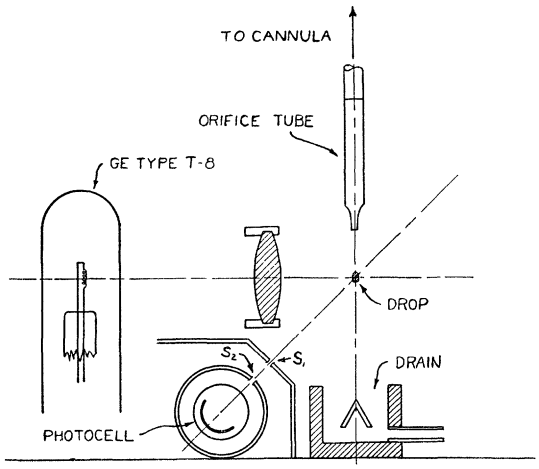

FIG. 1

FP-22 with S-1 response operated at 250-v anode potential and coupled to the amplifier with a 10-megohm load resistor.

The amplifier (Fig. 2) is a conventional resistance-capacitance coupled, single-sided circuit utilizing two 6F5-GT tubes with a total voltage gain of about 5,000. The output stage is a 6C5 tube with a relay in the plate circuit. By means of a variable bias from the power supply, the 6C5 is biased above cut-off, and this variable bias provides a means of varying the over-all sensitivity of the amplifier. The photocell is coupled to the amplifier in a forward circuit arrangement. The relay in the 6C5 plate circuit is a four-pole, single-throw type closing at 2.5 Ma and can be used to close any type of recording circuit. In the present instrument it closes the 115-v, a-c primary circuit of a transformer, the output of which is 8 v and is used to drive a solenoid timer.

This instrument is very simple in operation, requiring only turning on the switch and clamping in the orifice tube. The latter is removable to permit cleaning. As the beam of light is about 4 mm in diameter at the place at which the drop passes, the adjustment of the orifice tube is not critical.

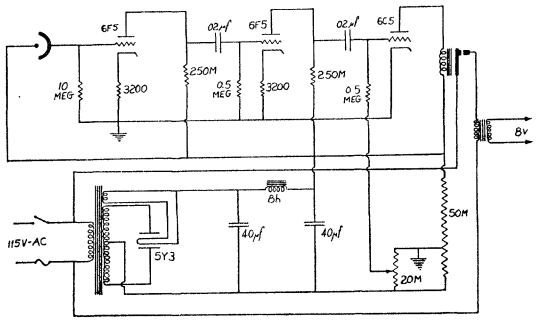

FIG. 2

With an orifice of 2 mm, this instrument is capable of handling some 30 ml of fluid/min, which is broken into discrete drops. There is no lower limit, and the instrument is capable of being run for an indefinite period. Because the amplifier is R-C coupled, a solid stream will not be recorded. At a capacity of 30 ml/min the drop rate is about 500/min. Using larger drops at this counting rate, a larger volume of fluid may be recorded. The size of drop is variable over a wide range, and operation is in no way dependent on viscosity, color, or opacity of the fluid.

Preparation of Acellular Homogenates From Muscle Samples

WILLIAM E. POEL

Laboratory of Physical Biology, National Institutes of Health, Bethesda, Maryland

The preparation of acellular homogenates from tissue samples is required in certain biochemical experiments. For softer tissues, this problem has been met with varying degrees of success by such methods as grinding with sand or glass powder, forcing the tissue past the wall of a cylinder and a tight-fitting, motor-driven plunger, grinding the tissue after mincing and freezing it, or homogenizing it in a Waring blendor (*1–4*).

None of the individual methods listed is adequate for preparing acellular homogenates of tougher tissues, such as skeletal or cardiac muscle, which can be assayed quantitatively.

The method herein described is based upon the complete pulverization of a tissue sample at a temperature of approximately −70° C by pounding and the subsequent homogenization of any desired amount of the pulverized,

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