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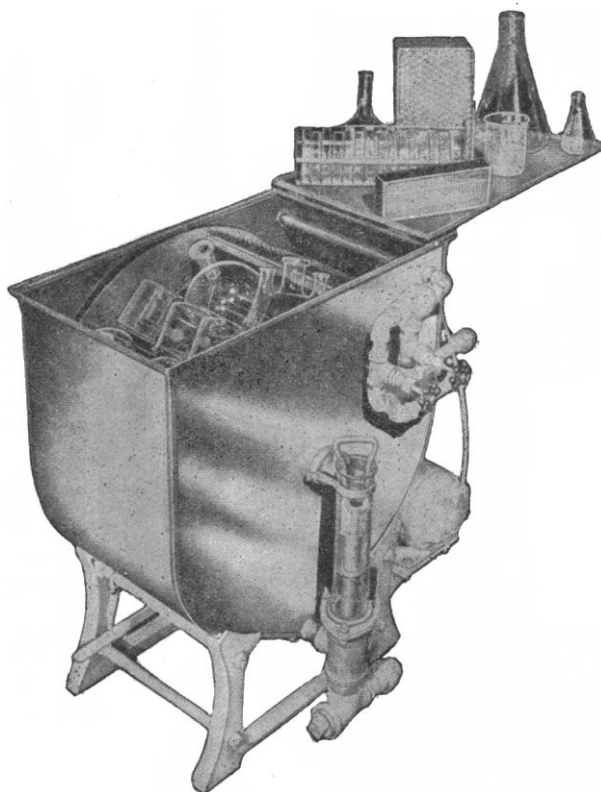
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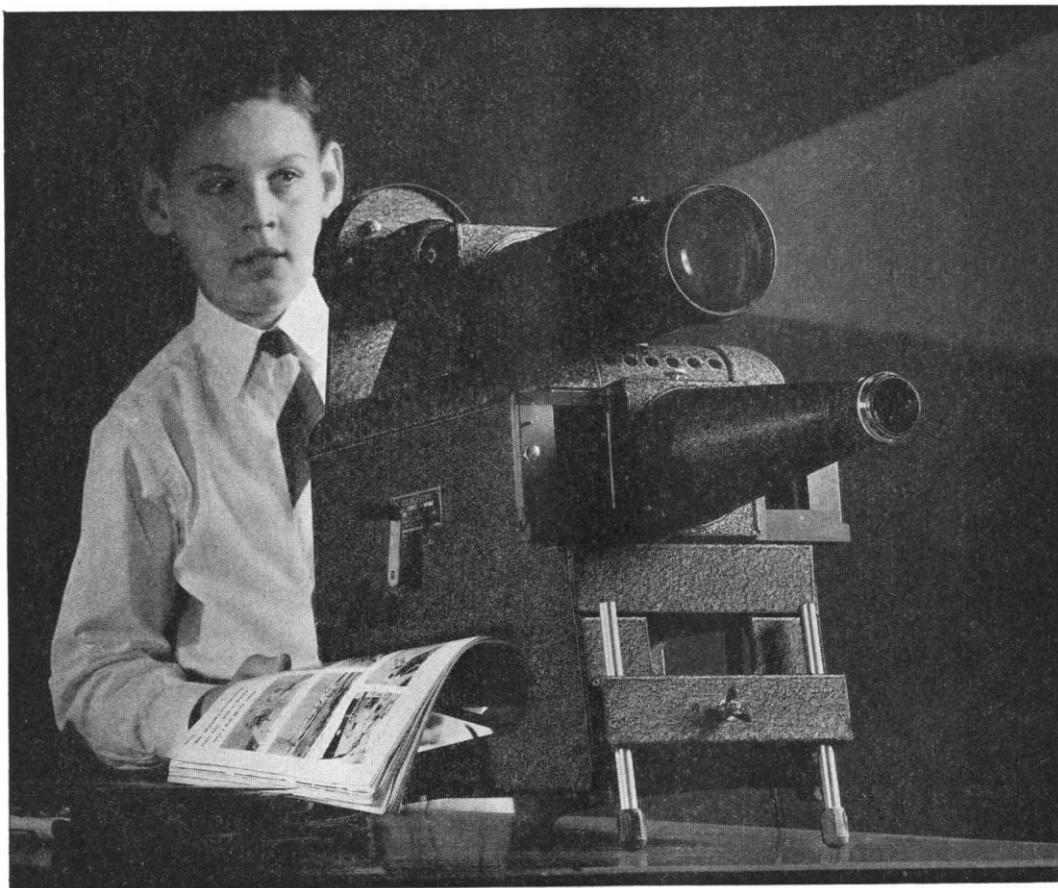
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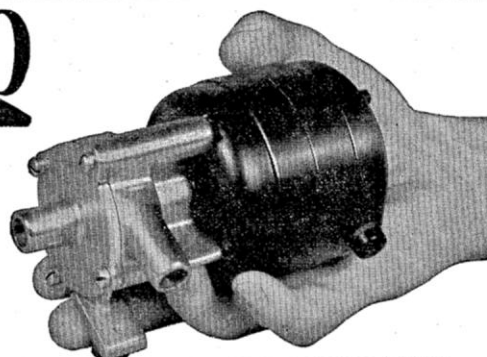
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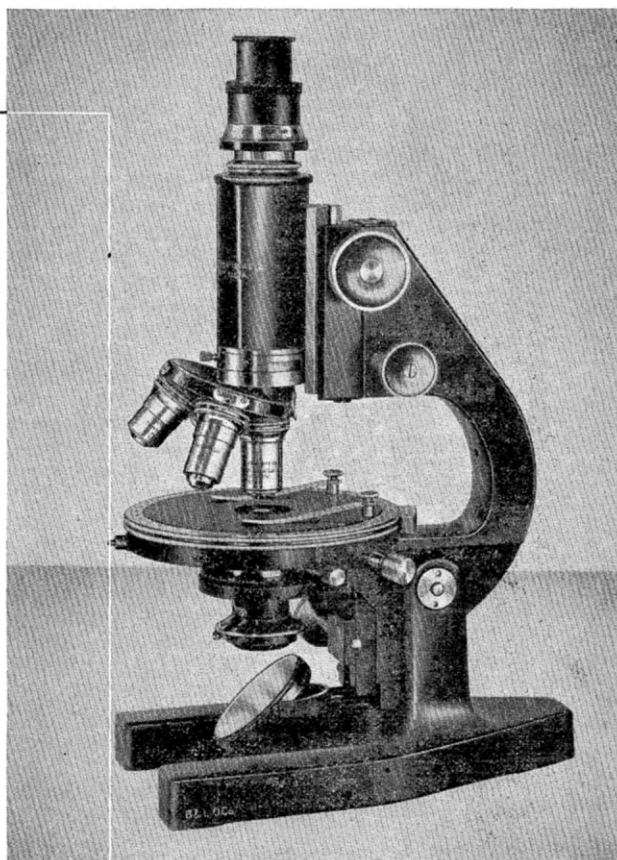
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CONSIDERATIONS CONCERNING THE FUNDAMENTS OF THEORETICAL PHYSICS¹

By Dr. ALBERT EINSTEIN

INSTITUTE FOR ADVANCED STUDY, PRINCETON, N. J.

SCIENCE is the attempt to make the chaotic diversity of our sense-experience correspond to a logically uniform system of thought. In this system single experiences must be correlated with the theoretic structure in such a way that the resulting coordination is unique and convincing.

The sense-experiences are the given subject-matter. But the theory that shall interpret them is man-made. It is the result of an extremely laborious process of adaptation: hypothetical, never completely final, always subject to question and doubt.

The scientific way of forming concepts differs from

¹ Address before the Eighth American Scientific Congress, Washington, D. C., May 15, 1940.

that which we use in our daily life, not basically, but merely in the more precise definition of concepts and conclusions; more painstaking and systematic choice of experimental material; and greater logical economy. By this last we mean the effort to reduce all concepts and correlations to as few as possible logically independent basic concepts and axioms.

What we call physics comprises that group of natural sciences which base their concepts on measurements; and whose concepts and propositions lend themselves to mathematical formulation. Its realm is accordingly defined as that part of the sum total of our knowledge which is capable of being expressed in mathematical terms. With the progress of science, the

and tables. The author has found that when this is redissolved in the usual ether-alcohol solvent and allowed to stand for a week or so, almost all of the refuse will sink to the bottom of the jar. The nitro-cellulose may then be poured into petri dishes to a depth of a quarter of an inch. A little chloroform poured on top will aid in the solidification which should proceed until the celloidin is dry enough to cut with the shears or a razor. Cut into squares of approximately an inch, gather these on a No. 1 or longer pin, and allow to dry completely. These may then be used in place of the troughs in the position as shown in Fig. 1. The use of a pin diminishes the chance of pro-

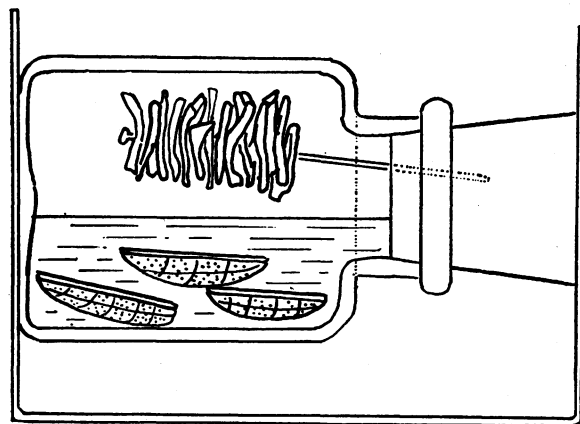


FIG. 1.

ducing a leaky cork after several changes and with the increase of absorbing surface the time required to concentrate the 10 per cent. celloidin is shortened by several days. This is also dependent upon the number of times the pins are changed each day; usually twice being sufficient. If mounted material is placed in the bottles with the cardboard side up and if the oven shelf is raised a bit in front, the hazard of finding some of the material sticking out of the celloidin is much reduced. For most cytological material the nitro-cellulose series may also be cut down to changes of 2, 6 and 10 per cent. without any apparent damage to the material. The above recommendations reduce the time factor which some investigators find objectionable in a method of imbedding which is otherwise quite superior to paraffin.

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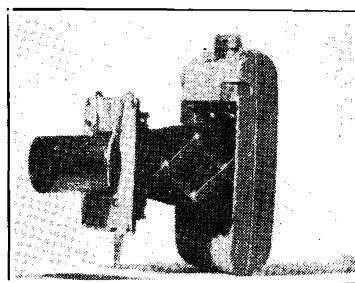


FIG. 1

An eye-piece is clipped to the camera and then placed in the microscope. In order to focus the camera, a piece of ground glass or tracing paper 33 × 45 mm is placed over the opening of the camera, with the back removed. The roll of film, which costs but 10 cents, is placed in the camera and six exposures are made with varying times. At least one of the exposures will give a sharp negative which can be printed directly or enlarged many times since the grain is very fine.

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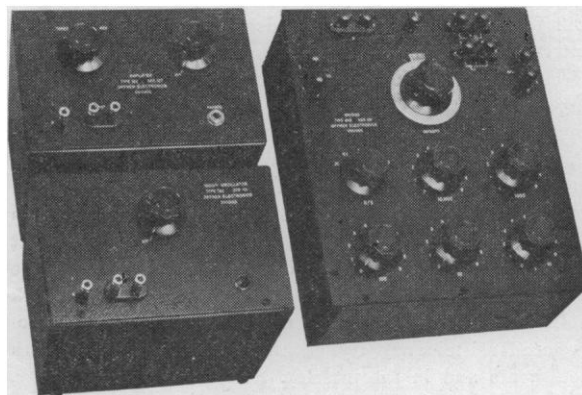
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