TABLE II

IMMUNIZING EFFECT IN DOGS OF IRRADIATED BRAIN ANTIRABIES VACCINE

Vaccination of dogs	Day of death from rabies	Per cent. mortality from rabies
Irradiated vaccine, 30 cc, 1 dose		0
Irradiated vaccine, 10 cc, 3 doses		0
Chloroformized vaccine, 6 cc. 1 dose	20, 23, 40, 43	67
No vaccine—controls	17, 20, 25, 27, 30, 30, 37, 41	100

dogs given chloroformized vaccine, 67 per cent.; none of the sixteen dogs given irradiated vaccine, 0 per cent.

Total mortalities to date among vaccinated and non-vaccinated dogs following test inoculation of rabies virus are shown in Text-Fig. 1 as follows: 115 of 136 non-vaccinated dogs, 84 per cent.; 45 of 62 receiving 5 cc of commercial phenolized canine vaccine subcutaneously, 72.6 per cent.; 22 of 44 receiving 5 cc of commercial chloroformized canine vaccine, 50 per cent.; 25 of 32 receiving less than 20 cc of the 1 per cent. irradiated vaccine, 78 per cent.; 2 of 10 receiving 20 cc, 20 per cent.; whereas only one of 35 dogs given 30 cc, and in one test 40 cc, succumbed to the test injection, 3 per cent.

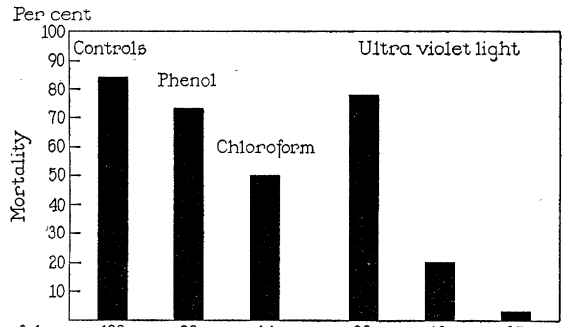

FIG. 1.

This irradiated vaccine retains its immunizing capacity after 9 months' storage at 40° F.

Experiments on further concentration of vaccine and optimum route of inoculation are in progress.

LESLIE T. WEBSTER
J. CASALS

THE LABORATORIES OF THE
ROCKEFELLER INSTITUTE
FOR MEDICAL RESEARCH

SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN INEXPENSIVE APPARATUS FOR DRYING FROM THE FROZEN STATE

SPECIALLY prepared calcium sulfate, "Drierite," has been suggested[1] as an economical desiccant for drying biological materials *in vacuo* from the frozen state. A simple, inexpensive apparatus has been devised for application of this principle to the preservation of virus and serum proteins.

The apparatus, shown in Fig. 1, is constructed about the large size (25 quart) National Canner Retort,[2] (A), which serves as the desiccant chamber. This retort can be purchased at low cost and most of the associated parts can be assembled in the laboratory. The retort comes equipped with a rubber gasket and an inside wire rack. In the cover are 4 fittings with $\frac{1}{8}$ inch standard pipe threads. The fittings are removed and 2 holes closed with standard plugs. A third opening is used as a vacuum release through the attached calcium chloride bottle (B). The fourth opening is rebored and threaded for a $\frac{3}{8}$ inch pipe elbow for the vacuum lead (C) ($\frac{1}{2}$ inch pressure tubing). In the center of the cover an additional hole is drilled and tapped with a $\frac{1}{2}$ inch pipe thread; into it is screwed an 8 inch length of $\frac{3}{4}$ inch O.D. brass tubing (D) for connection with the manifold (E). Into the lower end of (D) is sweated another brass tube (F) which extends within the retort to $\frac{1}{2}$ to 1 inch of the bottom.

The manifold (E) is $1\frac{1}{4}$ inch O.D. brass tubing 16 inches long. The 16 outlets (G) are 5/16 inch O.D.

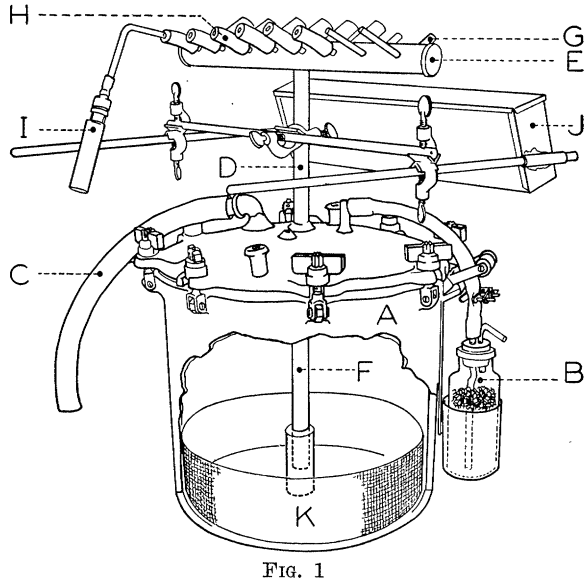

FIG. 1

brass tubing $1\frac{1}{4}$ inches long placed $1\frac{7}{8}$ inches apart at an angle of 60° from vertical. All brass to brass joints and manifold caps are soldered or brazed and

[1] E. W. Flosdorf and S. Mudd, *Jour. Immunol.*, 34: 469, 1938.

[2] National Pressure Cooker Company, Eau Claire, Wisconsin.

the threaded joints in the cover are sealed with "Apiezon."[3] Short lengths of ¼ inch pressure tubing (H) are used to connect the freezing and drying containers (I) to the manifold outlets. Construction and mounting of supports and of 2 sheet copper trays (J) for holding freezing mixture are evident. Castor oil may be used on the bevelled rubber gasket for sealing the retort.

The "Drierite" is held in 3 circular baskets (K) of hardware cloth, 3½ inches high by 11 inches in diameter, constructed with a tubular central opening through which passes the pipe extension (F). The 3 baskets are stacked in the wire rack supplied with the retort and may be removed separately or as a unit for regeneration of the desiccant. Details of the regeneration procedure are given by Flosdorf and Mudd[4] and for this a cheap gas oven is applicable.

The desiccant chamber holds 25 pounds of "Drierite," the total capacity of which is 400 cc without regeneration. The single run capacity is 125 to 150 cc and a Cenco Hyvac pump has proven adequate. Either preliminary freezing with a Dry-Ice-alcohol mixture or the degassing-self-freezing procedure[5] may be used, though the former method is recommended. Standard freezing and drying containers and connections obtainable on the market are used.

The apparatus shown may be constructed for approximately $35.00 or less and has been flexible and reliable in practice. It occupies only 4 square feet of table space.

A. R. TAYLOR
J. W. BEARD
DUKE UNIVERSITY SCHOOL OF MEDICINE

CONVENIENT HEAT FILTER FOR TISSUE ILLUMINATOR[1]

IN the quartz rod tissue illuminator described by Knisely[2] and in use at our laboratories, a large amount of heat accompanies the passage of light through the tissues. This occurs because some 85 per cent. of the energy consumed by the usual electric light bulb used as the light source is emitted as heat. The heating of the tissues being examined is usually minimized by flowing a continuous stream of properly warmed Ringer's solution over the area under observation. This treatment is not very convenient experimentally, and, as Knisely points out,[3] somewhat disrupts normal physiological processes. It was found in our laboratory that the insertion of a double thickness of inexpensive "heat-filter" glass (Cenco 87305) at the break in the quartz rod light conductor cuts down the heat transmitted to the tissue to at least one seventh of its previous value, yet reduces the intensity of light transmitted by only a small fraction. In general, this means that the heat transmitted is so small as to be safely absorbed by the tissue and thus the use of Ringer's solution as a cooling agent may be avoided.

HERBERT A. POHL
CARNEGIE INSTITUTION OF WASHINGTON,
BALTIMORE, MD.

[3] Sealing Compound "Q," James G. Biddle Company, 1211–13 Arch St., Philadelphia, Pa.

[4] E. W. Flosdorf and S. Mudd, *op. cit.*

[5] *Ibid.*

[1] Aided by a grant from the Rockefeller Foundation Fluid Research Fund of the School of Medicine, Johns Hopkins University.

[2] M. H. Knisely, *Anat. Rec.*, 58 (Suppl.): 53; *Proc. Soc. Exp. Biol. and Med.*, 32: 212; *Anat. Rec.*, 64 (Suppl.): 499.

[3] M. H. Knisely, *Anat. Rec.*, 64 (Suppl.): 499, 1935.

AN ELECTRONIC RELAY FOR HEAT CONTROL

SEVERAL letters have been sent us stating that the relay in the circuit we described[1] chatters when operated on 115 volts a-c. Our relay, equipped with a 50 × – 115-volt 60 cps coil, does not chatter but we also have found that many of the same type do. This chattering can be avoided by connecting a 450-volt 4 microfarad condenser (the electrolytic tubular type can be used) between the point marked C in Fig. 1 of the previous article and the No. 3 prong of the socket for the 25L6G tube. The positive terminal of the condenser should be connected to C. Using this condenser and shorting the 1000 ohm resistor nearest C, we have also been able to use the Potter and Brumfield relay, type PRA-1 with a 110-volt 60 cps coil, whose contacts are rated to carry 20 amperes a-c. There are, of course, many other makes of relays that can be used.

ALBERT C. HALL
LAWRENCE J. HEIDT
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

[1] SCIENCE, 92: 133.

BOOKS RECEIVED

BEAUCHAMP, WILBUR L., JOHN C. MAYFIELD and JOE Y. WEST. *A Study-book for Everyday Problems in Science.* Third edition. Pp. vi + 346. Illustrated. Scott, Foresman. $0.84.

BROWN, H. P. and A. J. PANSHIN. *Commercial Timbers of the United States.* Pp. xxi + 554. 312 figures. McGraw-Hill. $5.00.

Cowles Commission for Research in Economics; Report of Sixth Annual Research Conference on Economics and Statistics at Colorado Springs, July, 1940. Pp. 99. The Commission, University of Chicago.

HUNTINGTON, ELLSWORTH. *Principles of Economic Geography.* Pp. x + 715. Illustrated. Wiley. $4.00.

Johns Hopkins University Circular, November, 1940; Report of the President of the University, 1939–1940. Pp. 149. The University.

SALTER, WILLIAM T. *The Endocrine Function of Iodine.* Pp. xviii + 351. 40 figures. Harvard University Press. $3.50.

SCHUMANN, CHARLES H. *Technical Drafting.* Pp. xiv + 793. 857 figures. Harper. $3.50.

STUTZER, OTTO. *Geology of Coal.* Translated and revised by ADOLPH C. NOÉ. Pp. xiii + 461. 198 figures. University of Chicago Press. $5.00.