LABORATORY AND SHOP NOTES

A Simple Design for a Cloud Chamber

We have recently constructed a cloud chamber of simplified design, and have found it to give remarkably good electron tracks. The principle used is not a new one, but the method of assembly may be of interest. Fig. 1 is a picture of the assembled chamber and Fig. 2 shows it in cross section, with the piston in the cocked position. The pressure of the air inside the chamber must be kept at a few pounds per square inch above atmospheric. It is filled through the bicycle tire valve which is soldered into the brass plate, as shown in Fig. 2. The piston is raised to the cocked position by connecting the compressed air line (10 to 20 lb./sq. in.) to the pipe at A. The chamber expands when A is opened to the atmosphere. Manual operation can be accomplished by using a T-joint in the air line, the side outlet of which is opened and closed by means of the thumb. For automatic operation an electrically operated valve can be used. The speed of expansion is easily controlled by constricting the opening A or by varying the pressure above the piston. The expansion ratio is varied by changing the level of the piston in the cocked position, by means of the knurled hand nut and lock nut. As shown, the piston is in the highest possible position. The range of expansion ratios possible is from 1 to 1.4.

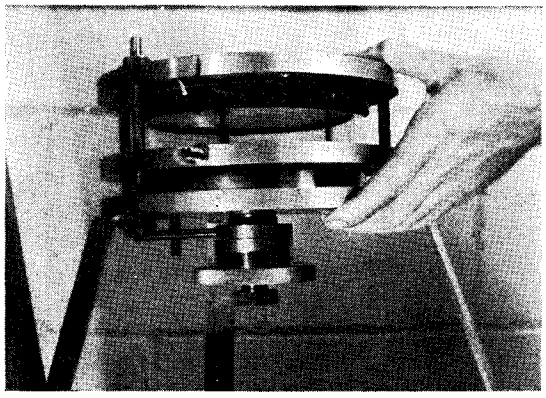

FIG. 1.

The piston is covered with a piece of black velvet, wetted with ethyl alcohol, which furnishes the vapor. The rubber used throughout is $\frac{1}{16}$ inch "pure gum" sheet. The clearing field is provided by a ring of thin sheet metal held between the glass top plate and the rubber gasket; this is maintained at about 100 volts with respect to the piston.

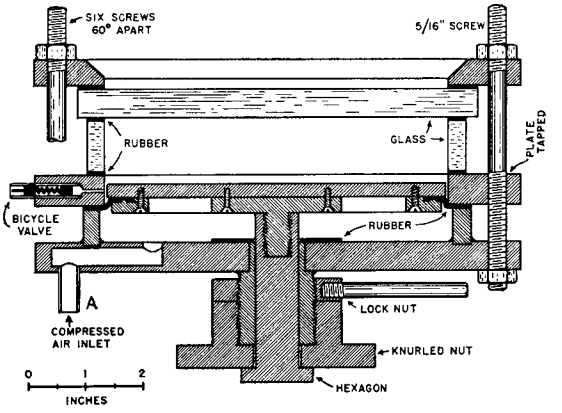

FIG. 2.

The shop time required to build the cloud chamber described was about 20 man-hours and the cost of material was about $20.

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Light Source for Cloud Chamber Illumination

In the use of incandescent lights with cylindrical lenses for producing a flat sheet of light for the illumination of a cloud chamber, a line source is highly desirable. This not only aids greatly in the economical use of the light, but reduces the amount of stray light which strikes the floor and top of the cloud chamber. A source which we have developed has given such encouraging results that we believe it warrants further experimentation by others who face the problem of illuminating a cloud chamber.

A sketch of the source is shown in Fig. 1. A 20 mil tungsten wire is stretched between two $\frac{1}{4}$ inch brass rods, one of which is free to slide, and is kept under a slight tension by a spring. This keeps the wire from sagging as it expands when lighted. The spring should not be stiffer than necessary to slide the rod, because the tungsten is quite weak when heated to nearly its melting point. The tube is flushed continuously with ordinary tank nitrogen, which enters through the inlet indicated and escapes around the end plugs, which fit rather loosely. The flow is adjusted so that the volume of the tube is displaced about once for each "shot." To remove the smoke which results

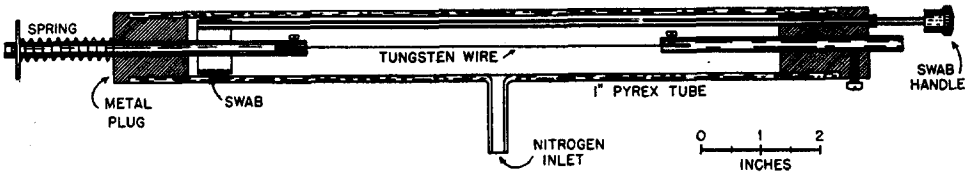

FIG. 1.

from the combustion of impurities in the tank nitrogen, a ring-shaped swab is provided. By pulling this back and forth once every ten or twenty shots the glass can be kept clear. The 20 mil (6 inch long) wire used at present is flashed at 22 volts and 40 amperes, and is cold between shots. About $\frac{1}{2}$ second is allowed for it to reach full intensity before the camera is opened. By placing the source 9 inches from the cloud chamber and by using a cylindrical lense of 2 inch focal length very satisfactory pictures of electron tracks have been taken at $f:1.9$, $\frac{1}{5}$ second exposure on Super X film. By silvering the black half of the glass tubing the intensity of light could doubtless be nearly doubled. Also the parallel quality of the light will allow the source to be placed closer to the chamber without increasing the illumination of the floor. Heating of the glass is very small when using a 20 mil wire, and therefore considerably larger wires could be used with the same size glass tubing. Because of the expansion of the nitrogen in the tube when the wire is flashed, it is desirable to place a flask of at least $\frac{1}{2}$ liter volume in the nitrogen line near the tube. The tungsten wire lasts for from 200 to 400 photographs and requires less than 5 minutes for replacement.

The tube described was tried with a vacuum inside instead of nitrogen, but it was not possible to obtain nearly as much photographically useful light.

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BRIEF NOTICES OF NEW BOOKS

Foundations of College Physics. SAMUEL ROBINSON WILLIAMS, Amherst College. Pp. 630+x, Figs. 531, 15×24 cm. Ginn & Company, Boston, 1937. Price $4.00.

Oeuvres Astronomique de Gassende. PIERRE HUMBERT, Université de Montpellier. Pp. 32, 16½×25½ cm. Hermann & Cie., Paris, 1936. Price 8f.

Origins of Clerk Maxwell's Electric Ideas as Described in Familiar Letters to William Thomson. Edited by SIR JOSEPH LARMOR. Pp. 56, 18½×26½ cm. University Press, Cambridge, and Macmillan Company, New York, 1937. Price $1.00.

Outline of Atomic Physics. O. H. BLACKWOOD, ELMER HUTCHISSON, THOMAS H. OSGOOD, ARTHUR E. RUARK, W. B. ST. PETER, GEORGE A. SCOTT, A. G. WORTHING, University of Pittsburgh. Second Edition. Pp. 414+x, illustrated, 15×23½ cm. John Wiley & Sons, New York, 1937. Price $3.75.

Parallaxes Dynamiques des Étoiles Doubles. M. D. BARBIER. Pp. 32. Hermann & Cie., Paris, 1936. Price 10f.

Précis de Physique. G. SOMON, Faculté des Sciences de Dijon, AND A. DOGNON, Faculté de Médecine de Paris. Pp. 1080+viii, Figs. 830, 14×20 cm. Masson et Cie., Paris, 1937. Price 100f.

Sound. A Textbook. ARTHUR TABER JONES, professor of physics, Smith College. Pp. 450+xii, Figs. 141, 14½×22 cm. D. Van Nostrand Company, New York, 1937. Price $3.75.

Sound Waves. Their Shape and Speed. DAYTON CLARENCE MILLER, professor of physics, Case School of Applied Science. Pp. 164+xii, Figs. 64, 15×22 cm. Macmillan Company, New York, 1937. Price $2.75.

Textbook of Physics. L. B. SPINNEY, professor of physics, Iowa State College. Fifth edition. Pp. 722+xii, Figs. 481, 15×22 cm. Macmillan Company, New York, 1937. Price $3.75.

Théorie de l'Émission de la Lumière des Nébuleuses. H. ZANSTRA. Pp. 40, Figs. 3, 16½×25½ cm. Hermann & Cie., Paris, 1936. Price 15f.

Universe Surveyed. Physics, Chemistry, Astronomy, Geology. HAROLD RICHARDS. Pp. 722+xviii, Figs. 94, 15×23 cm. D. Van Nostrand Company, New York, 1937. Price $3.50.