relays is the relatively large current which passes across the contacts. This objection has been eliminated by the use of the new Thyratron regulator tube, type FG-27, made by the General Electric Company. This is a mercury vapor tube capable of controlling a peak current of five amperes by means of a grid in which a current of less than 0.1 milliampere may flow. Thus by inserting the toluol-mercury regulator in the grid circuit of the Thyratron unit the current passing across the mercury surface has been reduced over a thousand fold. The circuit is as shown in Fig. 1.

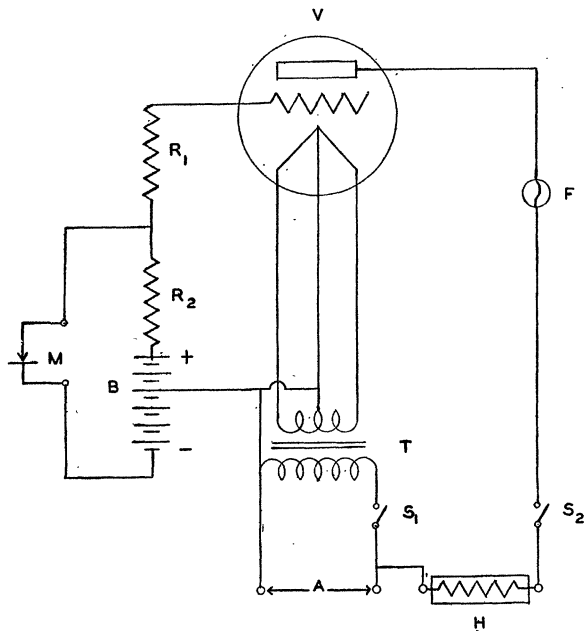

FIG. 1. *A*, 110-volt *alternating-current* source; *B*, two standard size 4½-volt "C" batteries; *M*, contacts of toluol-mercury thermoregulator; *F*, five-ampere, auto-type fuse; *H*, submerged heater resistance unit; R_1, one megohm cartridge resistor; R_2, 100,000 ohm cartridge resistor; S_1 and S_2, switches; *T*, five-volt, 25-watt center-tapped transformer; *V*, Thyratron tube, type FG-27.

It is recommended that resistance R_1 be at least one megohm to prevent the backing up of the plate current through the toluol thermoregulator. The value of R_2 should lie between 25,000 and 100,000 ohms; its purpose is to prevent the rapid discharge of the battery and the fouling of the mercury surface when the contact *M* is closed. The fuse *F* is inserted to project the Thyratron should the heater unit become grounded by water. The Thyratron is unique among thermionic tubes in that its filament is center tapped. The plate return must be made through this center tap to prevent the plate current adding itself to the filament current in one arm of the filament. The optimum position on the battery of the lead from the center tap varies from tube to tube but is usually about as represented. The filament switch S_1 *must* remain closed for at least five minutes before closing the switch S_2 in the plate circuit. Failure to observe this precaution may seriously decrease the useful life of the tube. Working at full load the efficiency of the entire unit is about 75 per cent.

In choosing a heater unit to be used in conjunction with the Thyratron relay one must bear in mind that only half of each cycle is utilized and that a 15-volt drop obtains across the tube. Hence, if 110 volts is being used, the value of the desired heater unit should be multiplied by a factor of about 2.3. Thus, if 200 watts must be dissipated, a unit of $200 \times 2.3 = 460$ watts rated capacity must be chosen.

Incidentally, we have found it very convenient to utilize the rectifying properties of the Thyratron to charge laboratory storage batteries. For this purpose it is only necessary to insert the batteries in the plate circuit in such a way that the battery cathode is connected to the plate. In this way as many as nine cells may be charged without interrupting experimentation, since the tube functions simultaneously as a relay and as a rectifier.

Our experience with the above described unit has been most gratifying. Using an ordinary large uninsulated metal water bath, temperature control to at least 0.005° C. has been maintained in experiments lasting over a period of days. For physical chemical experiments in which well insulated water baths are used, control to within 0.001° C. is easily realizable. Servicing of the unit consists solely in replacing the "C" batteries twice each year; the life of the Thyratron may be estimated to be at least a thousand hours of actual operation.

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SOCIETIES AND ACADEMIES

THE SPOKANE MEETING OF THE NORTHWEST SCIENTIFIC ASSOCIATION

THE seventh annual meeting of the Northwest Scientific Association was held at Spokane, Washington, in the Davenport Hotel on Monday and Tuesday, December 29 and 30, 1930. The meetings were presided over by the president, Francis A. Thomson, president of the State School of Mines, Butte, Montana.

At the opening general session, on December 29, an address was delivered by T. C. Spaulding, dean

of the school of forestry, State University, Missoula, Montana, on the subject, "Some Aspects of Present Day Research in the Inland Empire." Following the address members engaged in a general discussion.

In the afternoon the general session was devoted to a program presented by the medical section.

The annual dinner of the association was held the same evening in the Hall of the Doges, Davenport Hotel. The annual address of the retiring president was given by Dr. John A. Kostalek, University of Idaho, Moscow, Idaho, on the subject "The Utilization and Conservation of our Carbon Resources."

The general sessions of the second day included a business meeting and a luncheon of the association. At the former meeting, in addition to other matters of business, the association instructed the secretary to arrange for affiliation with the American Association for the Advancement of Science as an academy, retaining the present name. At the latter meeting an address was given on the subject "The Advent of the Railroads into the Pacific Northwest," by Dr. E. A. Bryan, State College of Washington, Pullman, Washington.

At this meeting, also, in addition to the customary resolutions, a resolution was passed commemorating the services of Dr. M. F. Angell, deceased, a valuable member of the organization and its first president.

In addition to the general sessions, section meetings were held by the following groups on both days of the meeting: Botany-zoology, chemistry-physics, education, psychology, engineering, forestry, geology-geography and social science.

Northwest Science, the official publication of the association, is now entering upon its fourth year of existence and has conclusively demonstrated its usefulness as an avenue for publication in this region.

The following officers were elected:

President, President E. O. Holland, Washington State College, Pullman, Washington; *Vice-president,* Carl Von Ende, University of Idaho, Moscow, Idaho; *Secretary-treasurer,* J. W. Hungate, State Normal School, Cheney, Washington; *Councilor,* President C. H. Clapp, State University, Missoula, Montana; *Trustee,* J. W. Hungate, State Normal School, Cheney, Washington.

Section Officers

Botany-Zoology: Chairman, Charles W. Waters, State University, Missoula, Montana; *Secretary,* Charles E. Cone, Ephrata High School, Ephrata, Washington.

Chemistry-Physics: Chairman, B. C. Neustel, Whitworth College, Spokane, Washington; *Secretary,* Rudolf Meyer, Lewis and Clark High School, Spokane, Washington.

Education: Chairman, R. F. Hawk, State Normal School, Cheney, Washington; *Secretary,* I. N. Madsen, State Normal School, Lewiston, Idaho.

Engineering: Chairman, Richard McKay, Washington Water Power Company, Spokane, Washington; *Secretary,* Ellery Fosdick, Washington Water Power Company, Spokane, Washington.

Forestry: Chairman, J. H. Ramskill, State University, Missoula, Montana; *Secretary,* K. D. Flock, U. S. Forest Service, Missoula, Montana.

Geology-Geography: Chairman, Otis W. Freeman, State Normal School, Cheney, Washington; *Secretary,* F. B. Laney, State University, Moscow, Idaho.

Medicine-Surgery: Chairman, C. M. Anderson, Spokane, Washington; *Secretary,* Clarence Lyon, Spokane, Washington.

Social Science: Chairman, T. S. Kerr, State University, Moscow, Idaho; *Secretary,* Louis E. Livingstone, Lewis and Clark High School, Spokane, Washington.

J. W. HUNGATE

SECRETARY-TREASURER,
CHENEY, WASHINGTON

SPECIAL ARTICLES

ON THE MONOMETHYL-GLUCOSE OF PACSU

FOR an investigation now in progress in this laboratory, 4-methyl-glucose was required, and as Pacsu[1] had prepared a substance to which he ascribed this structure, we undertook its preparation by his procedure. However, in a recent paper, Brigl and Schinle[2] describe 2-methyl-glucose with physical properties practically identical with those given by Pacsu for his methyl-glucose. Moreover, the 2-methyl-1, 1-diethylmercapto-d-glucose of Brigl and Schinle is apparently identical with the methyl-1, 1-diethylmercapto-d-glucose which resulted when we extended Pacsu's procedure to diethylmercaptoglucose. These considerations led us to subject the methyl-glucose of Pacsu to more rigorous test.

On treatment with phenylhydrazine in methyl alcohol solution, the methyl-glucose gave a methyl-hexose phenylhydrazone which had the same properties as the corresponding derivative of the 2-methyl-glucose of Brigl and Schinle. Moreover, like their 2-methyl-glucose, on heating with excess phenylhydrazine in dilute acetic acid solution, it lost the methyl group and gave glucosazone, and not a methyl-hexosazone, as reported by Pacsu. Additional supporting evidence was obtained from the study of the glucoside formation and from the study of the products of oxidation.

Thus, the identity of the methyl-glucose of Pacsu

[1] E. Pacsu, *Ber. chem. Ges.,* 58, 1455 (1925).

[2] P. Brigl and R. Schinle, *Ber. chem. Ges.,* 63, 2884 (1930).