without waiting reserved seats in express trains and luggage transport. These passports were thus considered in the present case equal to the yearly certificates of members of the central executive committee of the U. S. S. R. Special reception committees at the frontier stations (including Odessa) met foreign guests proceeding to the celebration as soon as they disembarked and assisted in getting the necessary tickets or reserved seats without delay.

A BILL providing for "an inventory of the water resources of the United States" will be introduced at the forthcoming session of congress, according to the *Electrical World*. The proposed legislation authorizes the director of the United States Geological Survey to make this inventory for use in setting up a comprehensive plan "for developing both surface and ground waters for domestic and industrial supplies, irrigation, navigation, power and other uses and for the conservation and control of flood water." An appropriation of $400,000 is sought for the first year's work and $500,000 for each year for nineteen years thereafter. The purpose of the bill is to expand the work of the water resources division of the Geological Survey and vest in that agency, among other things, the authority to make a general survey of the country's streams. An ineffectual effort was made at the last session to obtain legislation which would have enabled the Federal Power Commission to make such a survey, using license fees for the purpose. The Power Commission and the Corps of Engineers, however, were directed to report to Congress the cost of such a survey.

A SCIENTIFIC deep sea expedition which left Hamburg in April recently arrived at Cape Town after a successful cruise. The expedition traversed the Atlantic between America and Africa fourteen times and succeeded in studying scientifically submarine currents. The claim is made that this is the first time this has been accomplished. Reports from the expedition declared that its investigation proved that warm currents from the north Atlantic flow at a considerable depth for a distance of about 2,000 miles south of the equator, where they rise to the surface. Similar currents from the southern polar regions pass northward. The waters of these currents were found to contain such forms of organic food as is sought by whales and certain other fish. The expedition, financed entirely by private subscription, is in charge of Dr. Metz, director of the Berlin Institute of Oceanography. It will proceed to the southern Polar regions, making Bouvet Island its base and sailing eastward from there.

AT the 1924 meeting of the National Conference on Pharmaceutical Research the executive committee of that organization was directed to take a census of pharmaceutical research. Accordingly a questionnaire was prepared for distribution and was sent to some 270 persons interested in pharmaceutical research. These question sheets brought returns which when tabulated recorded the names of 239 research workers who may be classified as follows: Hospital pharmacists, 3; retail pharmacists, 10; pharmacists, engaged in medical school and chemical school work, 16; governmental scientists doing pharmaceutical research, 19; non-pharmaceutical teachers and students doing pharmaceutical research (chiefly on the synthesis of medicinal chemical), 28; manufacturing pharmacists, 72; pharmaceutical teachers and their students, 91.

ACCORDING to *Eugenical News*, the Royal Academy of Science at Amsterdam has nominated a commission charged with the examination of the total physical anthropological status of the Netherlands. Professor Bolk, anatomist at Amsterdam, is chairman. The government has added to this commission the medical general-inspector of the navy and army. The commission has been divided into five sub-commissions—(a) historical anthropology, (b) head-index, (c) pigmentation, (d) length and (e) biochemical indices—and hopes to terminate the work in from four to five years.

UNIVERSITY AND EDUCATIONAL NOTES

AN estate of $550,000 was recently bequeathed to the University of Wisconsin by the late J. Stephen Tripp, of Prairie du Sac.

THE will of the late Charles W. Eaton, of Haverhill, gives the major portion of his estate, estimated at $300,000, to the Massachusetts Institute of Technology, to be used for the advancement of the general purposes of the institution.

AN endowment fund of $100,000 to maintain the surgical research laboratory in connection with the school of medicine of the University of Kansas is provided in the will of the late Mrs. Nellie S. Boylan.

PROFESSOR HENRY T. MOORE, head of the department of psychology of Dartmouth College, has been elected president of Skidmore College, Saratoga Springs, N. Y., to succeed the late Dr. Charles H. Keyes. Professor Moore was recently elected to a professorship at the University of Michigan, from which he is seeking a release.

DEAN HAROLD S. BOARDMAN, of the College of Technology at the University of Maine, has been elected acting president of the university to fill the vacancy caused by the resignation of Dr. Clarence C. Little.

PROFESSOR A. A. BENNETT, of the University of Texas, has been appointed head of the department of mathematics at Lehigh University.

DR. ROBERT CALVERT has been appointed head of the industrial chemistry division at the University of Maryland.

DR. LEROY T. PATTON, associate geologist of the bureau of economic geology and technology of the University of Texas, has been appointed professor and head of the department of geology of Texas Technological College at Lubbock, Texas.

DR. G. G. NAUDAIN, of Iowa, has been appointed professor of chemistry at Kansas State Teacher's College, Pittsburgh, Kansas.

AT George Washington University, Dr. Colin M. Mackall, of St. Johns College, Annapolis, has been appointed professor of chemistry and James R. Randolph, of the U. S. Bureau of Standards, assistant professor of mechanical engineering. Dr. Franklin L. Hunt, of the U. S. Bureau of Standards, will give lectures on physics and Dr. James R. Eckman on chemistry.

PROFESSOR H. TIETZE, of the University of Erlangen, has been appointed to a professorship of mathematics at the University of Munich.

PROFESSOR HANS EPPINGER, of the first medical clinic at the University of Vienna, has been called to the chair of internal medicine at the University of Prague.

DISCUSSION AND CORRESPONDENCE

THE CONSERVATION OF MOMENTUM AND THE WIDTH OF CRITICAL POTENTIALS DETERMINED BY THE METHOD OF ENERGY LOSS

IT is readily deduced from the law of the conservation of momentum that when two bodies of widely different masses collide, either elastically or inelastically, the velocity of the heavier undergoes little change. Hence, if the collision is inelastic, the increase in internal energy of the masses is almost entirely at the expense of the kinetic energy of the smaller. But if the masses are comparable, then the velocity of both is altered and the internal energy is increased at the expense of the kinetic energy of each in an undetermined proportion. The kinetic energy of one mass may even be increased beyond its initial value while that of the other is decreased by a correspondingly greater amount.

These remarks bring to light a possible reason for the failure to detect the excitation of atoms by high speed positive ions, using the method of energy loss, for the success of the method depends entirely on the fact that an electron retains almost the entire excess of energy after an inelastic collision. The apportionment of the excess between ion and atom will lead to a blurring of the critical potential. A further complication results from the fact first pointed out by Franck,[1] that an ion of mass m must possess energy to amount $\frac{m+M}{M} V_R$ in order to excite a stationary atom of mass M and critical potential V_R.

It may be shown that the width of the blurred critical potential is

$$\Delta V' = \frac{4\,m\,M}{(m+M)^2}\sqrt{V\left(V-\frac{m+M}{M}V_R\right)}$$

where V is the energy of m before impact. The center of the band is at

$$V' = \frac{m^2+M^2}{(m+M)^2}V - \frac{M}{m+M}V_R$$

Taking the case of mercury, $V_R = 4.6$v., $M = m$, and $V = 10.2$v (one volt above the minimum): $\Delta V' = 3.2$v., $V' = 2.8$v. The process will therefore result in the formation of low velocity positive ions of no definite energy, rather than in a homogeneous group.

Actually, the method of energy loss is one of great experimental difficulty when applied to positive ions, and has seldom been used. Consequently the failure to detect their action experimentally must be sought elsewhere. It is suggested that their great mass may be a sufficient cause for low probability of inelastic impact.

The inability of this method to detect ionizing potentials follows from similar considerations. In this case the energy in excess of the critical potential must be shared between the ionizing and ionized electron, resulting in a group of electrons whose energy is distributed in an unknown manner between almost zero and almost the entire excess energy. On any reasonable assumption, the distribution will possess a maximum at one half the excess energy. This would account for the presence of some of the pseudo-Maxwellian electron groups of high temperature found in discharge tubes by Langmuir and his coworkers. The very low velocity electrons observed by Eldridge[2] and attributed to the process of ionization are not explained.

CARL ECKART

EDISON LAMP WORKS,
HARRISON, N. J.,
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1 *Zeit. f. Phys.*, June, 1924.

2 *Physical Review, 20,* 456 (1920).