valued at $15,204,539 came into this country from foreign lands, thus bringing the total value of imports as designated above up to $33,869,951.

UNIVERSITY AND EDUCATIONAL NEWS

MR. ANDREW CARNEGIE'S gifts to the Carnegie Institute and Institute of Technology have now reached a total of $27,000,000, his latest contribution announced at Founder's Day, on April 29, being $2,700,000. Of this latter amount $1,200,000 is for new buildings and $1,500,000 for endowment. The address at the Founder's Day exercises was delivered by Dr. Romulo S. Naon, the Argentine ambassador, who spoke on "The Triumph of True Pan-Americanism and Its Relation to World Peace."

THE campaign to raise $1,385,000 for the Stevens Institute of Technology in Hoboken, N. J., has been successfully concluded. The entire indebtedness of the college, amounting to $385,000 has been cancelled, leaving $1,000,000 to be used for the erection of new buildings and for endowment.

THE University of Pennsylvania, Columbia University and the Stevens School of Technology mechanical engineering departments have received funds amounting to $5,000 each, in accordance with the provisions of the will of the late Admiral George W. Melville.

GIFTS amounting to $72,908, to be devoted to cancer research at the Harvard Medical School, have been announced. Of this sum $50,000 is provided by the will of Philip C. Lockwood, of Boston.

THE new buildings of the medical school of Washington University, St. Louis, were dedicated on April 29. The three large buildings, which contain laboratories, dispensaries, lecture rooms and libraries, cost $1,200,000 and, with the new Barnes Hospital, the St. Louis Children's Hospital and St. John's Hospital, form an important group of buildings devoted to medical and surgical purposes. Addresses were delivered by Dr. William Henry Welch, professor of pathology at Johns Hopkins University; by President A. L. Lowell, of Harvard University; by Dr. Henry S. Pritchett, president of the Carnegie Foundation for the Advancement of Teaching, and by President George E. Vincent, of the University of Minnesota.

THE University of South Dakota has completed the erection of a fireproof chemical laboratory at a cost of $100,000.

THE thirty-fourth session of the legislature of Nebraska recently adjourned appropriated the sum of $150,000 for the erection of a teaching hospital on the campus of the University of Nebraska College of Medicine at Omaha, Nebraska. The appropriation has been approved by the governor.

THE tuition fee at Harvard University has been increased to $200, which will take effect at the beginning of the year 1916–17, but will not apply to a student now registered, unless he changes his department. No infirmary, laboratory or graduation fees will be charged.

PROFESSOR IRA C. BAKER has resigned his position as head of the civil engineering department of the University of Illinois, which he has held for thirty-four years. He will continue to give a limited number of courses. Dr. F. H. Newell, consulting engineer of the U. S. Reclamation Service, has been appointed to succeed Professor Baker as head of the department of civil engineering. He entered upon his work at the university on May 1.

DR. ANDREW HUNTER, of the medical department of Cornell University, has accepted an appointment to the chair of pathological chemistry in the University of Toronto.

DR. A. A. KNOWLTON, associate professor of physics at the University of Utah, has been elected professor of physics at Reed College. It will be remembered that Dr. Knowlton was not reelected at the University of Utah because of the president's charge that he had made remarks unfavorable to the administration of the university. President Foster of Reed College went to Salt Lake City to investigate the situation. He talked with both factions of the board of regents, with many members of the faculty, including those who have resigned and those who have not, with other citizens, with students and with the president.

As a result of this investigation at first hand, Dr. Foster was convinced that Dr. Knowlton and the other men of the faculty at Salt Lake City have assumed no greater freedom of speech than every member of the Reed College faculty has as a matter of course.

DISCUSSION AND CORRESPONDENCE

ON THE PRODUCTION OF RARE GASES IN VACUUM TUBES

To the Editor of Science: A number of investigators, among them Sir J. J. Thomson, Sir W. Ramsay, Winchester, and Collie, have found that helium and neon are produced in vacuum tubes by electrical discharges. These gases were not accompanied by argon, and therefore not due to leaks in the apparatus.[1] A thoroughly satisfactory explanation of the appearance of the gases remains to be given, although a very plausible hypothesis has been advanced by Professor Winchester. Winchester[2] finds that helium and neon are given off from aluminium electrodes only during the first few hours of long-continued discharges, and he therefore concludes that the gases must have been occluded on the surfaces from the atmosphere.

This explanation agrees with a number of facts. For example, we may explain a *second* liberation of helium and neon, sometimes noticed in vacuum tubes after many hours' continuous running, by supposing that a surface layer (*e. g.*, slag), imbedded in the metal when it was poured, becomes exposed when the electrode is partly "spluttered" away. The non-appearance of these gases when very heavy discharges (*i. e.*, large currents) are used, as in one experiment with uranium, by Collie,[3] would mean that the surface layer is spluttered away before any considerable amount of gas has been liberated.

There is an alternative explanation which fits the facts equally well, if we admit the possibility of changes of a radioactive nature taking place in an ordinary vacuum tube. But there is, in the first place, no good evidence that ordinary inactive matter can be transformed by the radiations of radioactive substances;[4] and consequently, in view of the great energy of the α particles, there is reason for supposing that the swiftest ions in a vacuum tube are equally incapable of producing disintegration of atoms (or rather, according to recent views, disintegration of nuclei; the resultant positive charge upon which determines the chemical properties of atoms[5])—unless, perhaps, there were present in the tube enormous differences of potential. Nevertheless, in an experiment by Sir W. Ramsay,[6] evidence is given which suggests an inter-relationship between the elements helium, neon and oxygen.

Certain experiments performed by the writer upon the conduction of electricity at contacts of dissimilar solids[7] show that, however carefully a metal may be cleaned in air, or in pure electrolytic oxygen, a surface film remains, sufficient to give electrical properties to such a surface, markedly different from those obtaining upon a surface that is cleaned mechanically in vacuo, or in pure electrolytic hydrogen. This being the case, it is seen that all electrodes hitherto employed in the production of rare gases have had a layer of oxide on the surface—traces of which must have remained until all the original surface had been removed by the action of the discharge.

In view of this fact it seems desirable that a tube be constructed, with electrodes similar to those used by Winchester[8] (which were found to liberate the gases rapidly); it being possible to clean these electrodes on all sides,

[1] T. R. Merton, Roy. Soc., *Proc.*, Ser. A, 90, pp. 549–53, August 1, 1914.

[2] G. Winchester, *Phys. Rev.*, N. S., Vol. 3, pp. 287–94, April, 1914.

[3] J. N. Collie, Roy. Soc., *Proc.*, Ser. A, 90, pp. 554–56, August 1, 1914.

[4] Rutherford, "Radioactive Substances and their Radiations," 1913, § 116.

[5] Rutherford, *Phil. Mag.*, Vol. 27, 6 ser., pp. 488–98, March, 1914.

[6] Sir W. Ramsay, Collie, and Patterson, *Nature*, Vol. 90, p. 653, February 13, 1913.

[7] R. H. Goddard, *Phys. Rev.*, Vol. 28, No. 6, pp. 405–28, June, 1909.

[8] Winchester, *loc. cit.*