PROFESSOR JOSEPH LOVERING.

Death has again invaded the ranks of the National Academy of Sciences, and now claims for its own Professor Joseph Lovering, of Harvard University, who fell a victim to the prevalent influenza at his home in Cambridge, Mass., on January 18, 1892.

This eminent scientist was the son of Robert Lovering, a surveyor by profession, and his wife, Elizabeth Simonds, and was born in Charlestown, now a part of Boston, Mass., on December 25, 1813. He studied in the public schools and under the direction of his pastor, Rev. James Walker, afterward president of Harvard College, who fitted him to enter the sophomore class at Harvard in 1830. Three years later he was graduated, standing fourth in his class, and at commencement delivered the Latin salutatory oration. Two years later he took the degree of A.M., and on that occasion delivered a valedictory oration in Latin. Among his classmates in college were Francis Bowen, Henry W. Warren, Jeffries Wyman, and Morrill Wyman, all of whom subsequently became professors in Harvard, and Robert T. S. Lowell, the elder brother of James Russell Lowell.

After graduation he taught for a year in Charlestown, but his inclinations were toward theology, and he spent two years in the Harvard Divinity School. He had early shown a fondness for mathematics, and while in the divinity school continued to pursue studies in that science during his leisure. Accordingly in 1836, on the illness of Professor John Farrar, he was appointed tutor in mathematics and physics, and two years later, on the retirement of Professor Farrar, he was succeeded in the possession of the Hollis chair of mathematics and natural philosophy by Mr. Lovering, who then continued in the active occupancy of this chair until 1888, when, having completed fifty years' service as professor, he retired and was made emeritus.

Professor Lovering was the first member of the faculty at Harvard to have passed half a century in the service of his alma mater and the second in the length of his service to the university, Henry Flynt having in the earlier history of Harvard been connected as tutor to the university for the period of fifty-five years. In other ways Prof. Lovering served his college. In 1853–4 he was a regent, during the absence of Prof. Cornelius C. Felton, and when that scholar was advanced to the presidency of Harvard, Prof. Lovering succeeded him permanently as a regent, which post he then held until 1870. Also in 1884 he became director of the Jefferson Physical Laboratory, which office he retained for four years.

The growth of the Harvard Astronomical Observatory was largely due to Prof. Lovering. He was associated with Prof. William C. Bond, in 1840, when, with but few instruments and indifferent facilities, a beginning of the astronomical work was made in the Dana house in Cambridge. From this small effort the present astronomical observatory has been developed. It was at this time that the great scientist, Alexander Von Humboldt, induced the Royal Society of London to make simultaneous observations on terrestrial magnetism in Great Britain and the colonies. The co-operation of the United States was sought, and one of the three stations in America was located in Cambridge, where the making of the observations was under the direction of Profs. Bond and Lovering. Several of the undergraduates of the university lent their aid to this work, and among these was Thomas Hill, who subsequently became president of Harvard, and Benjamin A. Gould, the famous astronomer.

Prof. Lovering was associated with Benjamin Peirce in the publication of the "Cambridge Miscellany of Mathematics and Physics," to which he contributed articles on "The Internal Equilibrium of Bodies," "The Application of Mathematical Analysis to Physical Research," "The Divisibility of Matter," and similar subjects, which attracted wide attention throughout this country and the scientific world. In 1867, when Prof. Peirce was called to the superintendency of the U. S. Coast and Geodetic Survey, he intrusted the computations for determining transatlantic longitudes from telegraphic observations on cable lines to his colleague, who then had charge of this work until 1876.

As a lecturer, Prof. Lovering was well known. He gave nine courses, each of twelve lectures, on astronomy or physics, before the Lowell Institute of Boston. Five of these courses were repeated on the days following those of their original delivery, to another audience, according to the original practice of that institution. He delivered shorter courses of lectures at the Smithsonian Institution in Washington, D. C., at the Peabody Institute in Baltimore, Md., and at the Charitable Mechanics' Institution of Boston, and one or more lectures in many towns and cities of New England.

He was an indefatigable contributor of scientific articles to contemporary literature, and his papers, more than one hundred in number, may be found in the files of the "Proceedings of the American Academy of Arts and Sciences," the "Proceedings of the American Association for the Advancement of Science," the *American Journal of Science*, the *Journal* of the Franklin Institute, the *American Almanac*, the *North American Review*, the *Old and New*, and the *Popular Science Monthly*. His most important researches are included in several papers on the aurora, terrestrial magnetism, and the determination of transatlantic longitudes, which appeared in Volumes II. and IX. of the "Memoirs of the American Academy of Arts and Sciences;" also Volume X. consists of his results on "Aurora Borealis" (Boston, 1873). Besides the foregoing he edited a new edition of John Farrar's "Electricity and Magnetism" (1842).

The degree of LL.D. was conferred on him by Harvard University in 1879, and in 1873 he was chosen a member of the National Academy of Sciences. In 1839 he was elected to the American Academy of Arts and Sciences, of which he was corresponding secretary from 1869 to 1873, its vice-president from 1873 to 1880, and president thereafter until 1888. He joined the American Association for the Advancement of Science at its Cambridge meeting in 1849, and from 1854 till 1873 he was its permanent secretary, during which time he edited fifteen volumes of its proceedings. This abundant service to the greatest of our American scientific associations was then rewarded by his elevation to its presidency, and at the Hartford meeting, in 1874, he delivered his retiring address, in which he reviewed the development of the physical sciences. He was also a member of the American Philosophical Society and of the Buffalo Historical Society.

His long life was mostly spent in Cambridge, but during 1868–9 he was given leave of absence by the university for a year, and he spent the great portion of that time in Europe with Prof. William W. Goodwin, the well known occupant of the Eliot chair of Greek

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literature at Harvard. Prof. Lovering was an active member of the Cambridge Thursday Club, and one of the trustees of the Peabody Museum of Archæology and Ethnology.

Soon after his retirement from the active duties of his university work, his colleagues, classmates, and many friends sought in some way to express their appreciation of his distinguished services. At first it was proposed to give him some valuable token of this esteem, but this plan gave way to one of his own suggesting, in the proposition to sit for a portrait to be hung in Memorial Hall. The incident was commemorated in an elaborate banquet held at the Hotel Vendome on January 15, 1889, at which President Charles W. Eliot, Rev. Phillips Brooks, Thomas W. Higginson, Charles Devens, Augustus Lowell, and other distinguished men were speakers. A few weeks later the Harvard Club, of New York, entertained him in a similar manner. Since then he lived at his home on Kirtland Street in retirement, although maintaining to the last his keen interest in the affairs of his alma mater.

His wife and four children still survive him. The funeral services were held in Appleton Chapel, in Cambridge, on January 20, and the day following his remains were interred in Mount Auburn Cemetery.

It has been well said that: "In his death Harvard has met a serious loss, as has the scientific world, which benefited so much by his investigations. Behind him, however, he has left the results so well organized that the students of the present day can press forward to a consummation of the results which their teacher and exemplar did an incalculable amount to bring about and for the perfection of which he had given the vitality of his mind and body." M. B.

THE highest railroad bridge in the United States is the Kinzua viaduct on the Erie road—305 feet high.

New York to Chicago in Eighteen Hours.

A mail train to run from New York to Chicago in about 18 hours, over the New York Central & Hudson River and the Lake Shore & Michigan Southern, has been discussed in the newspapers during the past week, though nothing seems to have been decided upon, and the post office authorities at Washington on one side and the officers of the New York Central on the other seem to be each inclined to throw upon the other the responsibility of having first suggested the idea. Such a train is doubtless practicable, and the only question, as Vice-President Webb says, is whether the government is willing to pay the necessary cost. The speed would be practically the same as that made by the Empire State Express, and that train has made a very creditable record thus far. A summary of the train sheets for the 58 days from October 26 to December 31 shows that it arrived in Buffalo on time on 40 days and not over five minutes late on 7 other days. There were 5 days on which delays of over half an hour occurred, slight mishaps to freight trains having occasioned these in each case. On December 25, 28 minutes lost time was made up between Albany and Buffalo, and considerable losses have been made up on other days. The schedule of this train is 8 h. 40 m. for 439½ miles, equal to 50·75 miles an hour, including the four stops. The distance through to Chicago is 965 miles (calling the Lake Shore via the Sandusky and Air Line divisions 525½), and the Empire State's route would make the schedule through 19 hours, equal to 18 hours apparent time, and 30 minutes longer than the time mentioned by the newspapers.

As regards track and grades, the Lake Shore is doubtless as good as the New York Central for fast trains, and in freedom from curves even better; but it has not three extra tracks on which to run the other trains, and some of the way it has not even one; that is, it is a single track road. But there are two separate roads most of the way where there is not a double track, so that the conditions can be made quite favorable everywhere. It is, of course, incumbent upon a manager to make them as favorable as possible in such a case, even for a mail train, for to kill six mail clerks, as at Kipton last April, is as bad either ethically or in a business sense as to slaughter the same number of passengers. The use of the absolute block system, on both double and single track, at least for this train, and the equipment of all facing points on double track and of all switches on single track with distant signals, should, therefore, be regarded as imperative prerequisites to making this further attempt to beat the world.

But after safety comes the question of cost; and though the government may conclude to pay a very liberal price, the question with the road is whether the real cost can be determined at all. To make very high speed with regularity, other trains, especially freight trains, must be run so as to clear the fast train by a large margin—more than 10 minutes in many cases—and the losses, direct and indirect, by the delays caused in this way are not easy to calculate. A train of this kind would be of value to people sending letters through between New York and the Missouri River and places west of there, but it is still a somewhat questionable improvement for business between New York and Chicago proper, as letters must be mailed in New York about three o'clock and cannot be delivered in Chicago until about 11 or 12 the next morning. To really cover the 965 miles "between two business days" would require a decided advance on the "Empire State" schedule.—*Railroad Gazette.*

Process for the Manufacture of Metallic Nickel.

Mons. J. Garnier, Paris, France, has recently patented a new process for the manufacture of metallic nickel. It consists in purifying the crude nickel resulting from the reducing fusion of nickel oxide or roasted nickel mattes by charging the crude nickel with the addition of coke and lime, magnesia or baryta, together with fluorspar or sea salt, in a water-jacketed furnace having a basic lining or a lining of chrome iron ore, the bed of fusion being so prepared that the bases enter into the slag formed in the proportion of 75 per cent to 25 per cent of silica and fluorspar or silica and sea salt, the product obtained consisting only of nickel and the metals of the bed of fusion, viz., iron, and sometimes copper, from which the sulphur, arsenic, silicon, and phosphorus have been eliminated. The product thus formed may be energetically oxidized and deoxidizing agents added to get rid of the iron, so as to obtain pure nickel or nickel alloyed with copper, or it may be employed in the manufacture of alloys of nickel and iron.

"I HAVE lots of fun in a quiet way," said an ex-telegraph operator to an *Electrical Review* representative. "I was dining at the Murray Hill Hotel the other night, and while waiting to be served I began to tick on a plate with my knife. In a few minutes I got an answer in the same way from the other side of the room. Conversation was maintained for some time, and finally names were exchanged. I stood up and, looking across the room, saw an old side partner of mine whom I had not met for years."