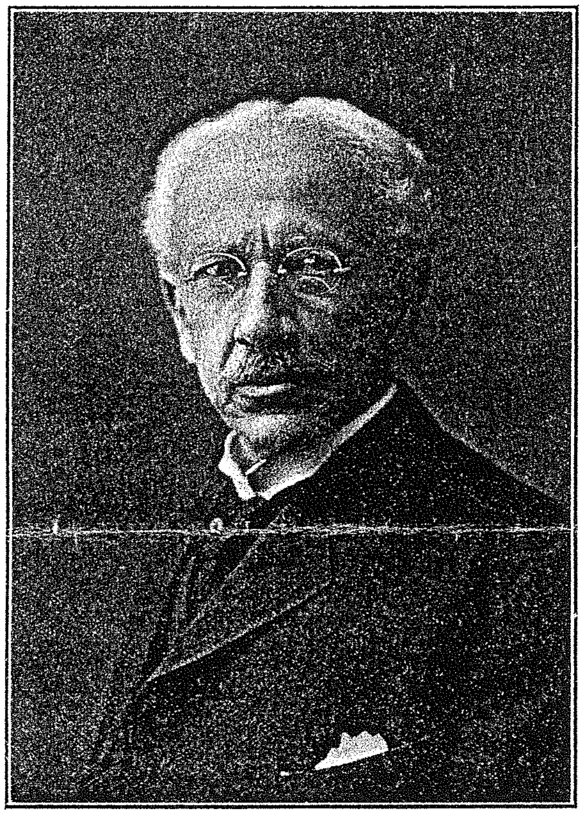
Oberlin Smith Dies

Ninth President of the A.S.M.E. Passes Away at Bridgeton, N. J., at the Age of Eighty-Six

OBERLIN SMITH, President of The American Society of Mechanical Engineers in 1890, passed away early in the morning of Monday, July 19, at his home, Lochwold, Bridgeton, N. J., following an attack of heart failure. He was the last of a notable group of fifteen engineers serving as presidents of the Society between the time of its founding in 1880 and the year 1897. Active up to three days before his death, the eminent inventor and successful manufacturer had passed his eighty-sixth birthday and had rounded out sixty-three years of devotion to a rather unique business career in the little city of Bridgeton.

Born in Cincinnati, Ohio, on March 22, 1840, Oberlin Smith was the son of George R. and Salome (Kemp) Smith, both of whom were of early Colonial English stock. The father was a very active anti-slavery worker and operated a link in that Pre-Civil War institution called the "underground railroad."



Oberlin Smith

When Oberlin Smith was very young the family moved from Cincinnati to Bridgeton, N. J. At Bridgeton the boy began his education in the public schools, and during vacations worked on farms and also learned carpentry. His education was continued at the West Jersey Academy, and his technical training began at the Philadelphia Polytechnic Institute. This latter was of a broad and practical nature. To use his own words in speaking of the period from 1856 to 1861, he "... learned drafting, patternmaking, gas and steam fitting, blacksmithing, architectural ironwork, machine work, die making, etc., with schooling mixed in." The "schooling" here referred to was largely home study undertaken on his own initiative.

In the early days of the Civil War Mr. Smith became particularly interested in the die working of metals and in the design of dies and presses for this purpose. This interest crystallized in 1863 when he established at Bridgeton a concern for the manufacture of improved dies and presses which he had invented. This business, which in 1877 was incorporated as the Ferracute Machine Company, has been a powerful factor in the commercial development of the die working of metals. Its influence has extended from the minting of Chinese money to the mass production of automotive products.

In the sixty-three years of Oberlin Smith's continuous service as mechanical engineer and president of this concern, he became widely known as an authority on presswork. During this time he designed and built more than five hundred types of presses, and obtained more than fifty patents. For the Atlantic Refining Company and other Standard Oil concerns he worked out in the early eighties can-making devices which were responsible in no small way for the development of the package oil trade with the Far East. In his classic paper Shop Management read before the Society in 1903, Frederick W. Taylor gave Mr. Smith credit for the mnemonic symbol system which is such a characteristic and important feature of Scientific Management.

While most of Mr. Smith's inventions related to presswork, there were several in entirely outside fields. Among them were such widely divergent lines as improved looms, dump carts, keyless locks, and egg boilers. In 1883 he achieved considerable publicity through the invention of a magneto-electric phonograph, and this same publicity prevented him from obtaining a patent upon it. Citizens of Bridgeton bear witness to Mr. Smith's having frequently driven through the streets of that town in a motor-propelled vehicle long before the days of automobiles.

Mr. Smith was a prolific writer and lecturer, his works in this direction covering science, fiction, and even theology. Two of his books on widely different subjects were Press Working of Metals, and Tho Material, Why Not Immortal? His active physical and mental characteristics were reflected in his favorite recreations, which included swimming, rowing, motoring, dancing, and golf, most of which he entered into with enthusiasm to the last of his life.

Some years ago he equipped his phonograph with a mechanism by which records could be changed automatically. In his last years, when his sight was failing, through this means he could sit in his favorite chair and by pressing buttons, with the location of which he had become thoroughly familiar, change the tune being played on an instrument in a nearby room.

His intellectual interests not only covered a very wide range, but he espoused many of them with the utmost vivacity. He was particularly given to astronomical discussions. Mrs. Smith tells of bringing such a debate which Mr. Smith was enjoying with a house guest to an end at one o'clock on a Sunday morning. To her surprise and amusement at six-thirty the next morning she heard the resumption of the heated discussion. Mr. Smith had gotten into bed with his guest and the two were hard at it once more!

It was natural that Oberlin Smith should have been one of the early and active members of The American Society of Mechanical Engineers. He joined the Society in 1881, within a year of its founding. He served as a Manager from 1883 to 1886, and in 1889 succeeded the late Henry R. Towne as the ninth President of the Society. In 1901 his prominence in the engineering field led to his appointment as New Jersey Commissioner to the Pan-American Exposition in Buffalo. He made several European tours for purposes of engineering observation. His acquaintanceship was very wide; among his intimate friends he numbered such well-known national characters as Thomas A. Edison and Henry Ford.

On Christmas Day, 1876, Mr. Smith married Miss Charlotte E. Hill at Bernardston, Mass. He is survived by a daughter, Winifred, Countess Raditchevitch, of Paris, a son, Percival Smith, who is vice-president of the Ferracute Machine Co., and by a brother Fred B. Smith, and a sister, Miss Emily Smith, both of whom live at Lochwold.

Mr. Smith belonged to numerous clubs and societies. In addition to the A.S.M.E., he was a member of the American Institute of Mining and Metallurgical Engineers, the American Institute of Electrical Engineers, the American Society of Civil Engineers, the American Iron and Steel Institute, the Franklin Institute, the American Association for the Advancement of Science, and the Engineers' Clubs of both New York and Philadelphia. He also belonged to the American Automobile Association, the Philadelphia Art Club, The Atlantic Union, the New York Lotus Club, the Luther Burbank Society, the National Academy of Political and Social Science, the National Geographic Society, and the Advisory

Council of the Simplified Spelling Board, and had served as vice-president of the Men's League for Woman Suffrage.

Members of our Society and other friends who had visited Lochwold will probably best remember both Mr. Smith and Mrs. Smith through the quality of their entertaining. This was a home in which gracious hospitality and the very best in American culture were held in high esteem. The Czechs have a saying, "Where there is a guest in the home, there is a God." This might well have been inscribed over the doorway at Lochwold.

The funeral of Oberlin Smith was held at Lochwold at 2:30 on Wednesday afternoon, July 21, the Rev. A. B. Collins of the First Presbyterian Church of Bridgeton, officiating. The American Society of Mechanical Engineers was represented by Fred J. Miller, Past-President, and Morris L. Cooke, Past-Manager, and three Bridgeton members of the Society, Messrs. Henry A. Janvier, Adam C. McCutcheon, and Wilbur R. Smith, who were appointed Honorary Vice-Presidents by President Abbott to represent him.

MORRIS LLEWELLYN COOKE.

Structural-Steel Welding

FOR THE last ten years or more there has been a growing effort to replace riveting by welding in its numerous applications. During the War an attempt was made to produce a rivetless ship, the plates being joined by welding. Of late the effort has been directed in another field, namely building construction. There are obvious advantages of welding as compared with riveting in the erection of steel frames of modern buildings, providing only that at least the same strength can be secured with the same factors of safety and reliability.

From this point of view tests made by A. M. Candy, welding engineer, and G. D. Fish, consulting structural engineer, Westinghouse Electric & Mfg. Co., are of more than usual interest. In this series of tests specimens were all welded with the various members located in the same position and manner as would be required if the various members were actually a part of a building structure. As a result all of the welds were executed from the same direction and were located in the same position as would be found in actual practice. All joints made with the single bead of metal were executed so as to make the bead approximately $^5/_{16}$ in. in thickness at the center and to extend out from the corner of the member so joined a distance of approximately $^5/_{16}$ in.

The amount of weld metal used to make the various joints is unquestionably in excess of that actually required to produce joints of 100 per cent strength, but this was intentionally incorporated in the design of the test specimens so that they could prove beyond the shadow of a doubt that structural members can be joined by arc welding, making joints which will not fail even up to rupturing loads on the members so joined. In carrying out further tests in the future, determinations will be made as to the minimum amount of weld metal which can be used for such joints and still retain the requisite strength at the joints. These tests are claimed to demonstrate, among others, the following facts:

1 The tests demonstrate that welded joints can be constructed in such manner as to develop fully the ultimate strength of the structural members connected.

2 A steel I-beam of given section and length will sustain a far greater load if fixed at its ends by a suitably designed welded joint than if supported by standard riveted connections consisting of top and bottom angles. A 9-in. standard I-beam framed between rigid upright columns 8 ft. apart by means of specially designed welded connections was able to sustain a load 25 per cent greater than a beam of the same size and length framed between columns by means of riveted top and bottom angles of $^1/_2$ in. in thickness.

3 A plate girder assembled by welding and consisting of nothing but sheared plates, has a far greater bending strength than a riveted plate-and-angle girder of the same weight, due to the better distribution of the steel in the cross-section. A 15-in. plate girder which was assembled by welding and simply supported on a 14-ft. span developed more than 50 per cent greater strength than a riveted plate-and-angle girder of the same depth and the same weight.

4 A double-angle tension member such as is used in trusses was connected at the ends by welding, and when tested to tension failure broke through the angles at a load 30 per cent greater than the load at which a hanger consisting of the same size angles with riveted end connections failed.

The joints that were demonstrated in these tests are being used in the five-story steel building 70 by 220 ft., 80 ft. high, now being fabricated and erected by the American Bridge Company for the Sharon Works of the Westinghouse Electric and Manufacturing Company. The typical beam and girder connections are fully continuous connections, thereby permitting large percentage c saving in the weight of the beams and girders to carry a given load. The same type of connection which develops continuity effectively also has the added advantage of stiffening the building against wind loads.

The advantages claimed for welded buildings as compared with the riveted one may be stated as follows:

1 That complete continuity of lines of beams can be obtained in welded construction, whereas, it is well known that this cannot be done in riveted construction.

2 That in a welded building it will be possible to make every joint develop full strength of the main members, whereas, in a riveted building many joints are weaker than the members due to the weakening effects of the rivet holes and the weakness of steel angles which have to be used for transmitting tension between two members at right angles to each other.

At the same time it may be well to recall the objections made with reference to all welded joints by both welding engineers and prospective and actual users of welded structures. Essentially, the main objection is the fact that not only does the personal equation enter with particular importance into all welded work, but thus far no way has been discovered to determine the degree of excellence of a welded joint after it has been made. Because of this there may be quite a margin between what *can* be done by welding and what actually will be done under commercial conditions, with such labor as may be obtainable if welding be applied on that vast scale which would be required in actual building procedure.

Another feature which cannot yet be considered fully established is the degree of reliability of welding made under what might be called adverse conditions; for example, on rusted steel members, in strong wind, and in rainy or sleety weather. However, in all new arts such objections are brought forward and as a rule they have been overcome with further developments. There is no question therefore that such tests as those developed above are of great value in opening new paths of progress, particularly in such a field as building construction which has shown less striking advancement in methods than many other fields of mechanical engineering.

In this connection the following editorial from *Machinery* (London, August 5, 1926) may be of interest as showing the attitude of the British engineering world:

"In spite of the fact that welding is steadily superseding riveting in general engineering work, it should not be thought that riveting is in danger of being entirely supplanted. Anyone who analyzes the subject in an impartial manner will discern that there is wide scope for both methods of jointing.

"Structural engineers, for example, have learned from years of experience the virtues and limitations of rivets and how to use them to make economic structures that will not jeopardize human life. Before they can rely on welding they must adopt standard methods of making welds by different processes. They must determine, and establish values for, the strengths of welded joints of different types. They must determine the grades of structural materials that can be welded satisfactorily and investigate the effects that welding will have on the parent material. Some reliable way should be established of controlling the mechanical and human elements in making a weld and of testing the finished work.

"This is only one example of the urgent need of more detailed and more reliable information on welding technique before the art of welding can be applied to what appears to be an almost unlimited field."