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ALEXANDER LYMAN HOLLEY.

In the death of Alexander L. Holley, in Brooklyn, N. Y., January 29, the country loses one of its best known mechanical engineers and writers upon engineering subjects, and the world one of its foremost men of affairs.

Mr. Holley was born in Lakeville, Conn., January 20, 1832. His early taste for mechanics led him to spend some time as a boy working at the machinist's trade. In college he took the scientific course, graduating at Brown University, Providence, R. I., in 1853. From college he passed to the machine shop of Corliss & Nightingale, in Providence, now the Corliss Steam Engine Works, where he served in the double capacity of workman and student. Subsequently he spent some months as locomotive engineer on the Stonington and Providence Railroad, and then entered the New York Locomotive Works as draughtsman. About this time he began the contributions to technical journals which have since been so numerous and valuable. In 1856 he bought the *Railway Advocate* (founded by Zerah Colburn), and shortly after he went to Europe to study the working of the railway systems there. One of the fruits of these studies was the valuable report on American and European railways brought out by him in connection with Mr. Colburn. While abroad at this time Mr. Holley expressed in letters to the New York *Times* the notable prediction that screw propulsion was destined to supersede side wheels for ocean navigation. He returned on the first voyage of the Great Eastern to this country. In 1860 was published his book on "Railway Practice," which added materially to his standing in this department of engineering.

In the capacity of consulting engineer in the construction

ALEXANDER LYMAN HOLLEY.

of the famous Stevens Battery, he became greatly interested in ordnance and armor, and accordingly revisited England in 1862 to study the latest improvements in marine warfare. The immediate results of these studies was the "Treatise on Ordnance and Armor," which was promptly accepted on both sides of the ocean as a standard authority. A collateral and more important result of this visit was an acquaintance with the then newly developed Bessemer process of steel making, the great importance of which Mr. Holley was quick to appreciate. With characteristic foresight he secured the control of the American patents of Mr. Bessemer, forming for their development the firm of Griswold, Winslow & Holley, whose experimental plant, at Troy, N. Y., was the pioneer establishment of the sort in America, the success of which was largely due to improvements introduced by Mr. Holley. This enterprise was followed in 1867 by the establishment of the Pennsylvania Steel Works, near Harrisburg, Pa., plans for which were furnished by Mr. Holley, who had for some time persona' charge of the works. Other works of this class built by Mr. Holley, or under his supervision as consulting engineer, were those of the North Chicago Rolling Mill Company, the Joliet (Ill.) Iron and Steel Company, The Bethlehem (Pa.) Iron Company, The Edgar Thomson Steel Company, near Pittsburg; the Lackawanna Iron and Coal Company, Scranton, Pa.; and the Vulcan Iron Company, St. Louis, Mo. The improvements in the Bessemer plant and processes introduced by Mr. Holley in these works were many and valuable. After the last named works were constructed Mr. Holley turned his attention to the open hearth process for steel making, and designed the plants for the Cambria Iron Company, the Springfield (Ill.) Iron Company, and the Spaug Steel and Iron Company, of Pittsburg, Pa. For the past two years Mr. Holley has devoted his time mainly to the interests of the Bessemer Association, studying the adaptation of the basic process to the Bessemer plant.

Notwithstanding these severe and laborious engagements, Mr. Holley made time to aid in many ways his fellow laborers in the several departments of engineering progress. He was a prominent and active member of the American Society of Civil Engineers, the Iron and Steel Institute of Great Britain, the American Institution of Mining Engineers, and the American Society of Mechanical Engineers, and had served as presiding officer of each of the American Associations. He also served for some time as a member of the United States Government Board for testing the strength of metals, as trustee of the Rensselaer Polytechnic Institution, at Troy, N. Y., and as lecturer at the School of Mines, Columbia College.

Personally Mr. Holley was of the finest temper and amiability of disposition, genial, witty, and kindly to the highest degree. For the excellent portrait herewith, and for many facts with regard to Mr. Holley's life and labors, we are indebted to the courtesy of the *American Machinist*.

SOME QUESTIONS OF COAST DEFENSE.

Every year, in their annual reports, our military and naval authorities dwell with more or less of emphasis upon the exposure of our coastwise cities to attack, in case of war, and our manifest lack of guns, forts, and ships for their defense. Every year the questions involved are more or less earnestly discussed in Congress and in the newspapers; and every year goes by without seeing any positive movement toward providing a remedy for the undesirable state of things which all parties pretend to deplore.

The difficulty would seem to lie not in any lack of popular interest, in or out of Washington, but in a positive and general lack of agreement as to what ought to be done. The naval authorities naturally urge the building of more and better ships, and the construction of powerful guns for their armament. Given the ships and guns, backed by proper shore batteries and torpedoes for the inner lines of defense, and, they say substantially, the security of our popular and wealthy seaports will be assured. The military authorities as naturally call for the strengthening and more efficient arming of the forts about our harbors, floating batteries and torpedo systems being regarded as entirely subsidiary. The torpedo service is disposed to consider forts and ships in the light of means for more securely and effectually operating torpedoes, which, after all, should be the main reliance. But neither arm of the service appears able to convince Congress or the people that any device or combination of devices now developed is quite sufficient to meet all the requirements of this case.

The conditions of coast defense for this country are peculiar in comparison with those obtaining in Europe. The breadth of sea between us and any other first-class nation is so great that no permanent invasion of our shores need be feared. And as we have no colonies to defend, no allies to champion, no foreign commerce to protect, we have no need of a navy for aggressive uses. Could we use a navy economically in coast defense?

The curvature of our Atlantic coast, which chiefly needs defending, is such that a hostile fleet rendezvoused at the Bermudas, would be within three or four days' striking distance from either of our Atlantic seaports, from Portland to St. Augustine. And the longest time that would elapse between the discovery of the destination of a threatening fleet would be too short to allow of any concentration of naval forces to withstand the attack. To defend our entire coast by ships would, therefore, require, at each and all of ten or more ports, ships and guns enough to repel the largest fleet that could be brought against such port. Obviously a purely naval defense of such an enormous stretch of coasts would be neither practicable nor economical.

It would be possible to erect and arm at points commanding the entrances to our harbors ironclad forts amply capable of repelling any fleet that might try to enter is beyond question. In conjunction with channel torpedoes it would not be a hard thing to keep the most powerful of war vessels from forcing the harbor. But the sealing up of a harbor's entrances would not in all cases be coincident with the protection of the port and the city within.

For instance, a modern ironclad armed with the most powerful of existing guns could greatly injure, perhaps entirely destroy, New York city and Brooklyn without coming near enough to a shore battery, however placed, to be in serious danger from guns of equal power to those of the ironclad. There are guns that will throw shot and shell from eight to twelve miles. But the same guns would not penetrate the armor of an ironclad (allowing that they could hit it) at anything like that range.

Those of our coast cities that lie from ten to twelve or more miles from the sea may be protected by properly placed land fortifications, properly armed and armored. But New York and Brooklyn are not so situated. Forts and torpedo systems for the channels to the harbor might successfully guard these cities against capture; but they would be powerless to save them from grievous harm at the hands of a determined enemy.

The question of defense for New York resolves itself, accordingly, to this: How can we keep an ironclad or a fleet