ERNST WERNER SIEMENS.

In the fields of steam engineering, of metallurgy of iron and steel, and of electricity, no name occupies so prominent a place at once in all three as that of the Siemens brothers, Werner, Carl, William, and Frederick. A review of the life of Sir William, with his portrait, has already been published by us.* In most of the Siemens inventions he had some part. Dr. Werner Siemens has won his principal fame as an electrician. He was born at Lenthe, near Hanover, December 13, 1816. He entered the Prussian army in 1838. His mind was early occupied with studies in electricity, the problem of electro-gilding engaging his attention. In his experiments on the new art, as it was then, he was joined by his brother William, six years his junior. His first patent on the subject was taken out in 1841. A year later George Elkington had executed successful plating in Birmingham. This was the beginning of the great electro-plating industry. The Siemens invention was introduced into England in 1843. Still working with his brother, he was a joint inventor of the process of astatic printing. It was described in one of Faraday's lectures in 1845, and represents the beginning of the reproduction of prints and drawings. It was mechanical and chemical, the resinous matter of the ink of a printed page being destroyed by caustic baryta or strontia, and the letters being then transferred to a zinc plate by pressure. Photographic processes have now superseded this method.

In 1844 he assumed the charge of the government artillery works at Berlin, but continued to devote himself to electricity. In 1847 he laid the first sub-aqueous telegraph line, insulated with gutta percha, across the Rhine at Cologne, a distance of one-half mile. A year later he experimented at Kiel with submarine mines exploded by electricity through his cable. In 1849 he left the army and founded the great telegraph construction house of Siemens & Halske, in Berlin.

To the year 1856, a period when the mechanical generation of electricity, founded on Faraday's researches, was in its infancy, the old Siemens H armature is referred. This antedates the Pacinotti ring four years. It is not easy to ascertain to which brother it is due, or if to both. The prolific nature of both makes it difficult to accurately define their individual work. Sir William took out about one hundred patents of his own, while forty or fifty inventions stand to the credit of the brothers jointly.

In 1858, Werner Siemens, with Herr Halske, his partner in Germany, and with his brother William, founded the English house of Siemens & Halske, at Charlton, West Woolwich, a branch of the Berlin establishment, and principally in Sir William's charge.

Eleven years after the invention of the armature, Werner sent a very remarkable paper to his brother, in London. On the 14th of February, 1867, Sir William read it before the Royal Society. Its subject was "On the Conversion of Dynamic into Electrical Force without the Aid of Permanent Magnets." A paper on an identical subject was read by Sir Charles Wheatstone on the same evening. In these papers, for the first time, the principles of the dynamo-electric machines were laid down—the self-contained, self-exciting dynamo was then disclosed simultaneously by both scientists. It forms one of the remarkable coincidences of invention.

DR. WERNER SIEMENS.

The discovery is claimed, as independent inventors, by Varley and Hjorth.

The subject of electrical railroads engaged his attention for many years. He proposed to establish them in Berlin, but the city authorities interfered and stopped it. He exhibited one at the German Industrial Exhibition in 1879, and eventually built a short line in the suburbs of Berlin, the Lichterfelde road, which was opened in 1881. At the Paris Exposition of Electricity, in the same year, he ran a line carrying many thousand people successfully and without accident. The Portrush line, in Ireland, is worked largely on the same plans, and was built under the supervision of his brother.

Among his inventions may also be named the method for determining the position of faults in submarine cables—something essential to the economical success of long submarine cables.

The business and engineering enterprise and achievements of the firm of Siemens & Halske in telegraph construction is worthy of notice. They are the only rivals of the Telegraph Construction and Maintenance Company, of East Greenwich, England. The Indo-European overland telegraph line was built by them, through almost unexplored countries, across Russia and Persia to India. It was built under the agreement that no payment should be made to the firm until a dividend of 12½ per cent had been earned on the paid-up capital.

Years were consumed in the work, which has proved a commercial success. The connection of the firm with it terminated in 1882. The story of the difficulties encountered and overcome in this work reads like a novel. They laid the direct U. S. cable, the Brazil line, the North China line, and the ocean is everywhere underlaid by their cables, placed in position by their special cable-laying ship, the Faraday.

The Siemens armature, already spoken of, was the old grooved or H armature. The more recent one, the drum armature, resembling in its theory the Gramme or Pacinotti ring, is to-day used in probably a third of existing dynamos. A great proportion of motors also embody it in their construction. The Weston dynamo, as made by the United States Electric Lighting Company, contains it. The Siemens electrical lamp also stands very high in order of merit.

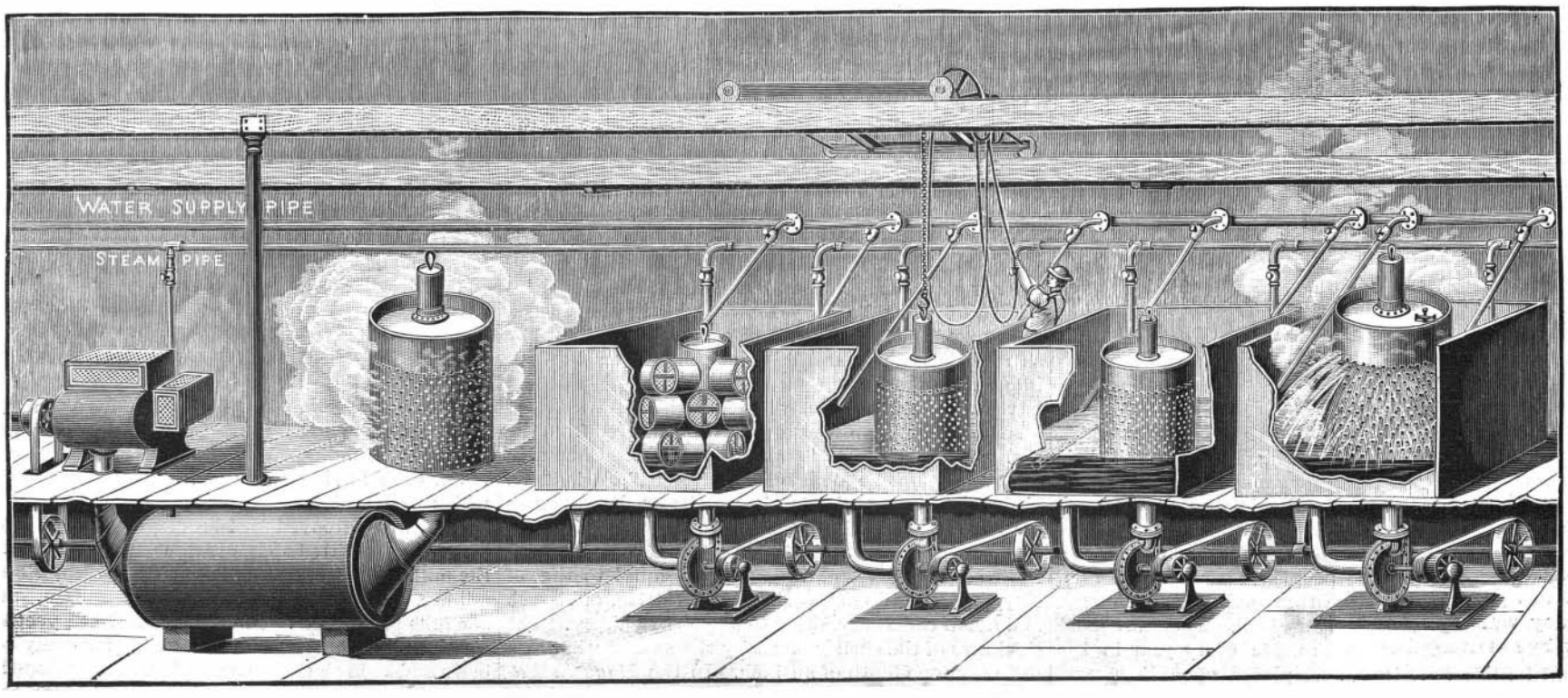
Thus Ernst Werner Siemens stands as one of the pioneers of electricity in almost all its applications—electric plating, telegraphy, submarine cables, mechanical generation of electricity, and electric lighting. In much of his work he cannot be separated from his brother.

* See SCIENTIFIC AMERICAN SUPPLEMENT, No. 353, and SCIENTIFIC AMERICAN, vol. xlix., p. 388.

MECHANICAL DYEING.

That modern industry ceaselessly aims to make itself independent of hand labor is a fact well known, and many useful apparatus and contrivances have been already devised for effecting this object in the different branches of the tinctorial trades. The dyeing of loose wool and cotton also have had their share of attention at the hands of inventors, without, however, bringing forward any very striking changes over the old methods until within the last few years. The process under consideration may be considered as a thoroughly modern method. It relies, of course, on the well known and necessary principle of effecting a circulation of the dyeing or mordanting liquids; but, unlike the older systems, the material is left standing while the liquids are kept in motion. It is to the mechanical arrangements, therefore, that our attention must be first given, and then to the amount and quality of the work performed.

As will be seen from the illustration, the dyeing apparatus consists of a cistern in which the dyeing or mordanting operations are performed. The material



IMPROVED MECHANICAL DYEING PROCESS.

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