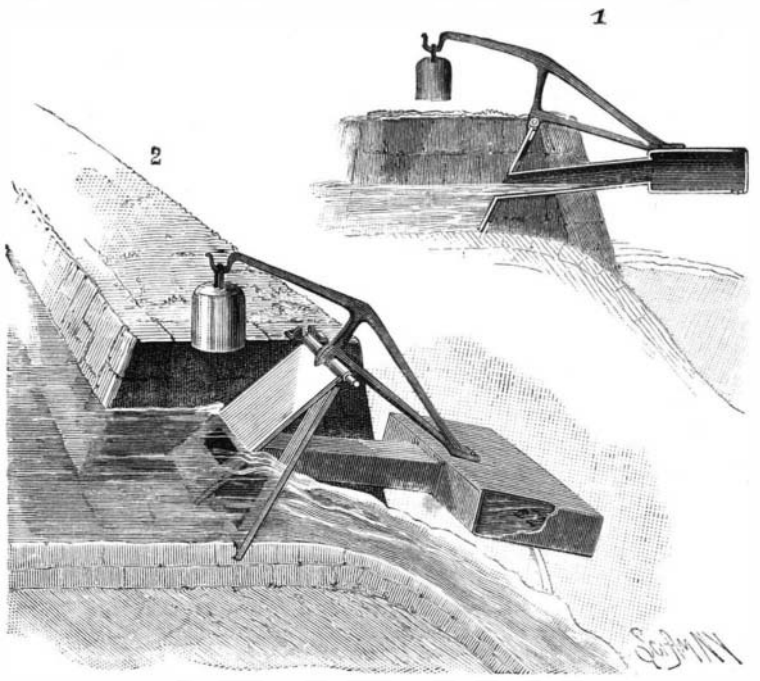
AN IMPROVED AUTOMATIC WATER GATE.

A waste gate which works automatically to control the overflow of wasteways or sluiceways of canals is shown in the accompanying illustration. The gate is designed to normally stay closed, opening automatically only when the water has risen to a certain predetermined height, when, by permitting the surplus water to escape through a suitable raceway, any damage likely to be caused by the water overflowing the banks is prevented. The improvement has been patented by Mr. George W. Norton, of Mohawk, Arizona Territory. Fig. 1 is a vertical section of the improvement, as applied in practice, the gate being closed, while Fig. 2 is a view in perspective, showing the gate opened by the rise of the water. In the wasteway is fitted an open gate frame, the top of the frame at the sides having bearings in which is journaled a cross-shaft to which is rigidly attached a swinging gate, and a counterpoise whose balance is changed by the rise and fall of the water. The counterpoise is secured at one end to a tank connected by a pipe to an opening in the gate, and on its other end is suspended a weight, whereby the gate will be held closed when the water is at a normal height, the tank at such times being empty. But with the rise of the water the tank fills, as shown in Fig. 2, and it then overbalances the weight and swings downward, thus opening the gate. The gate will remain open until the water falls below the opening leading to the tank, a small aperture in the bottom of the latter soon discharging it of its weight of water after the inflow has ceased, when the weight on the other end of the counterbalance pulls it down and closes the gate.



NORTON'S AUTOMATIC WATER GATE.

DR. WERNER VON SIEMENS.

It is with the deepest regret that the announcement has been received of the death of Dr. Werner von Siemens, which took place on December 6, 1892. A brief sketch of his life was given in the SCIENTIFIC AMERICAN of December 17, and we now add the following details:

It was in 1839, at Magdeburg, at the age of 23, that he began his scientific investigations. His first experience was unfortunate, for an explosion, caused by a preparation of phosphorus and chlorate of potash, burst the drum of his right ear. As he had met with a similar accident to his other ear some time before, he was for a time stone deaf. His studies were fated to be again interrupted, for in the autumn of 1840 he was sentenced to five years' imprisonment for acting as second in a duel.

"Stone walls do not a prison make" was more than exemplified in his case, for being allowed to continue his experiments, he successfully plated a silver spoon with gold. The silver spoon was connected to one pole of a Daniell cell, a *louis d'or* to the other. It was a great disappointment to him when, after a month's imprisonment, he was pardoned, and begged that he might be allowed to use his cell to complete some experiments.

A patent was granted him in Prussia, in 1841, for electro-gilding and silvering. In 1842 he and his brother, William Siemens, took out a patent for a differential regulator.

In 1844 he was appointed to the artillery workshops in Berlin, where he turned his attention earnestly to telegraphy, and in 1845 patented his dial and printing telegraph instruments, which were based on the self-breaking principle of the Neef's hammer.

In 1848, at Kiel, he laid down the first electric submarine mines. They served to protect the town of Kiel, and saved it from being bombarded by the Danish fleet.

The Prussian government, in the autumn of 1848, deputed him to lay the first great underground telegraph line from Berlin to Frankfort-on-the-Main, and in the following year another from Berlin to Cologne, Aix-la-Chapelle, and Verviers. Werner von Siemens now left the army and government service and devoted himself henceforth to scientific pursuits and the management of a telegraph factory, which he and Mr. Halske established in 1847. The firm has since then acquired a world-wide reputation, and is indissolubly connected with the growth and progress of telegraphy. During the laying of the first underground lines Werner von Siemens had observed the then remarkable phenomenon of electrostatic induction, which exercised so retarding an influence in the working of those lines. He described the phenomena in a paper communicated to the Paris Academy of Sciences in the year 1850. The underground system of telegraphs had, however, to give place to the overground, on account of the technical difficulties mentioned. But the experience gained from these failures resulted in overcoming the difficulties, with the result that the lines were relaid underground about 1878.

From the period of 1845 an almost uninterrupted series of scientific and technical discoveries and inventions emanated from him and from the factory under his direction.

In 1845 he devised a machine for the measurement of small intervals of time, and the speed of electricity by means of electric sparks, and its application, in 1875, for measuring the speed of the electric current in overland lines.

The firm of Siemens & Halske, in 1851, erected the first automatic fire telegraphs in Berlin. The difficulty of communicating through long underground lines led him to the invention of automatic translation, which was afterward improved upon by Steinheil; and in 1852 he furnished the Warsaw-Petersburg line with automatic fast-speed writers. The messages were punched in a paper band by means of the well-known Siemens lever punching apparatus, and then automatically transmitted in a clockwork instrument.

In 1854 the discovery (contemporaneous with that of Frischen) of simultaneous transmission in opposite directions and multiplex transmission by means of electro-magnetic apparatus was made, and two years later the Siemens magneto-electric dial instrument, giving alternate currents, was constructed. From this apparatus originated the well known Siemens armature, and from the receiver was developed the Siemens polarized relay, with which the working of submarine and other lines could be effected with alternate currents; and in the same year, during the laying of the Cagliari Bona cable, the construction and first application of dynamometers, also the development of the theory of submerging cables in deep water, took place.

DR. ERNST WERNER VON SIEMENS.

In researches on the subject of electrostatic induction and the retardation of the current in insulated wires representing Leyden jars, Werner von Siemens developed mathematically Faraday's theory of molecular induction, and thereby paved the way in great measure for its general acceptance. The construction of the ozone apparatus, telegraph instruments with alternate currents, and translation and automatic discharge for cable lines, were devised in 1857. The Sardinia, Malta, and Corfu cable was in the same year worked with such instruments.

In 1859 came the construction of an electrical log; the discovery of the heating of the dielectric by induction; the introduction of a reproducible standard resistance measurer (Siemens unit); the construction of resistance bobbins and the testing of insulated wires by systematic methods were also effected by him; also researches on the influence of heat on the electrical resistance of metals, and the establishing of methods and formulæ for testing resistances, and for the determination of faults by means of resistance measurements instead of with current measurements as formerly used.

In 1866 the establishing of the theoretical principle of dynamo-electric machines, which led to the construction of dynamo-electric mine exploders and light apparatus. In 1874, a treatise on the theory of the laying and testing of submarine cables; and in May, 1875, researches on the influence of light on crystalline selenium; and in 1876 and 1877 on the change of conducting power of selenium by heat and light.

He had continued reading papers and addresses down to the present time, and had contributed of late years much to the theory of electro-magnetism.

Werner von Siemens' scientific knowledge and inventive genius, combined with the great mechanical ability of his partner, Mr. Halske, soon developed the telegraph works of Siemens & Halske, in Berlin, into a large establishment, from which Mr. Halske retired in 1867.

In 1865 Werner von Siemens introduced pneumatic dispatch tubes into Berlin; the system adopted there served as a model for that laid down in London by Siemens Bros., in 1871. The railway signaling and block system of Siemens & Halske, which has been adopted by many Continental railways, was the first to ensure a forced dependence between the electric and semaphore signals and the position of the points.

In 1879 Werner von Siemens constructed an electric railway in Berlin. The electric energy was transmitted to the moving carriage, or train of carriages, through the two rails upon which it moved, these being sufficiently insulated from each other by being placed upon well creosoted cross sleepers. This railway, which was much used during the Berlin Exhibition of 1879, was the direct progenitor of the Lichterfelde line, one rail serving as the conductor from the dynamo, the other as the return. This railway has continued with success from 1881 down to to-day.

The alcoholometer ranks as one of the most ingenious of Werner von Siemens' inventions. This apparatus registers with perfect accuracy the actual quantity of absolute alcohol contained in the spirit which is passed through it.

About 1,000 workmen were employed at the Berlin telegraph and cable works as early as 1879. Siemens & Halske were among the first to construct telegraph lines in Germany and other countries. In 1854 a branch firm was established at St. Petersburg, under the direction of Carl Siemens, who became a partner. A complete network of government telegraph lines for Russia was constructed and erected by this firm. In the year 1857 a branch of the firm was established in London, the well known Siemens Bros. of to-day. The development of Siemens & Halske's business since the introduction of electric light and traction is one of the most remarkable facts in industrial enterprise. They have carried out much of the electric light and traction work on the Continent, and the latest development is the opening of a large branch house in America, where it is expected they will compete with advantage with the American manufacturers.

For his scientific labors, Werner von Siemens had in the year 1860 the degree of Doctor (*honoris causa*) of the Berlin University conferred upon him, and in the year 1873 he was elected member of the Berlin Royal Academy of Sciences. The Patent of Nobility was bestowed upon him in 1888 by Frederick III. He was for a long time member of the Prussian Parliament and the vice-president of the Society for the Advancement of Industry in Berlin; he was also member of the Asiatic Society in Calcutta, and honorary secretary for Germany of the London Society of Telegraph Engineers (now the Institution of Electrical Engineers), and was honorary member of the Institution of Civil Engineers, London, etc.

Not the least important of his many labors was the