WAGON JACK.

The wagon jack herewith illustrated has been recently patented by Mr. Andrew J. Burke, of Elm Grove, Illinois. The lever, *a*, is pivoted to standards, secured to a base, and provided with apertures for the pintle to permit adjusting the lever higher or lower. That end of the lever which supports the axle is slightly hollowed out. A lever, *c*, is pivoted on the lever, *a*, at the end near the standards, and is pressed upward by a spiral spring, *d*, surrounding a pin projecting upward from the free end of the lever, *a*, and passing through a hole in the end of the lever, *c*, the head of the pin being above this lever. Guide pins on the lever, *a*, pass through holes in the other lever. Two levers, *g*, pivoted to the sides of the standards are united at the free ends by a cross pin, *e*, above the lever, *c*. The apertures in the standards permit pivoting the levers, *g*, at any desired height. A spring, *h*, has one end mounted on the pintle of the levers, *g*, as shown by the dotted lines, *f*; the other end

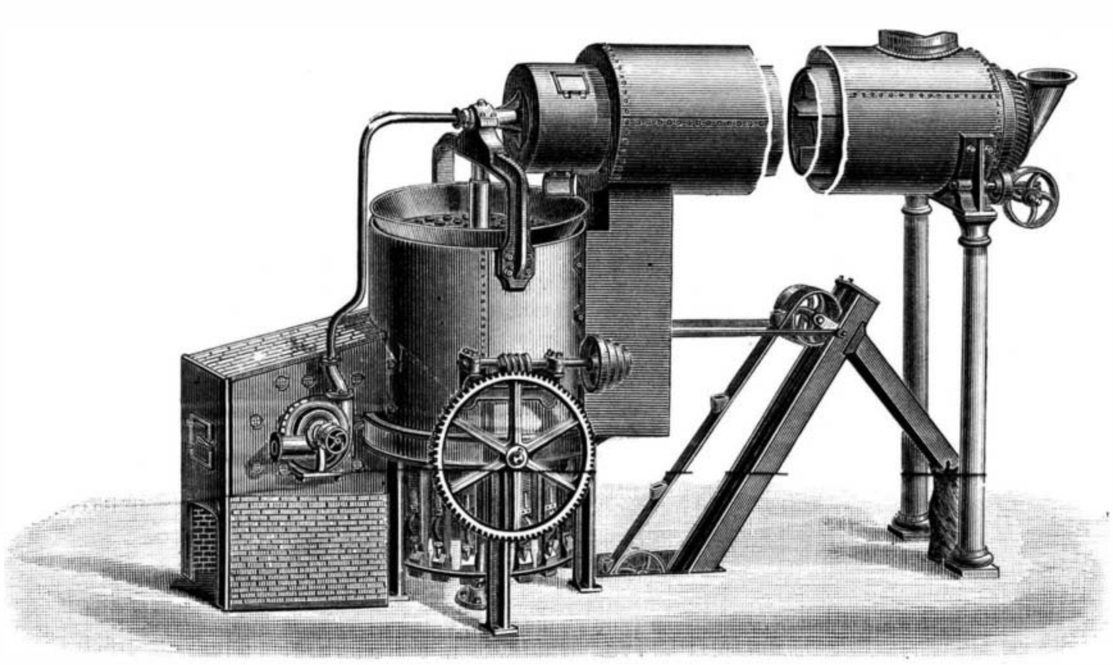
BURKE'S WAGON JACK.

bears against the bottom edge of the lever, *a*. Between its ends the spring passes over a bolt, *f*, uniting the levers, *g*. To use the jack the hollowed end of the lever, *a*, is placed under the axle and the other end pressed downward. After the cross pin, *e*, has passed the pin, *d*, the free end of the lever, *c*, is pressed toward the lever, *a*. The spring, *h*, presses the levers, *g*, downward. The lever, *c*, is pressed by its spring against the cross pin, *e*, and is held against the pin, *d*, the head of which prevents the lever, *c*, from pressing the cross pin above the upper end of the pin, *d*. The levers, *g*, thus hold one end of the lever, *a*, lowered, the other end and the axle on it being raised.

IMPROVED RUELLE FURNACE FOR REVIVIFYING BONE BLACK.

The revivification of bone black, after it has been used, is a very important operation in every sugar manufactory. Among the numerous systems of furnaces that have been proposed for performing it, very few have given the results that were expected of them. The Ruelle furnace, represented in the annexed cut, is not a novelty, and, if we now advert to this well known apparatus, it is because it has been the object of some relatively recent improvements, which it has seemed to us would be of interest to make known.

As well known, this furnace consists of a certain number of vertical retorts, designed for baking the black, and the upper extremity of which debouches into a hopper, into which the black to be revivified is thrown, while their lower extremity debouches into cooling tubes. The whole is inclosed within a cylindrical casing of fire bricks covered with plate iron. The first improvement added to the apparatus is the automatic method of emptying the tubes. With this object in view, the apparatus is so constructed that it may be revolved around a central axis by means of an endless screw and gear wheels. Each cooling tube is provided at its lower part with a distributing box of cast iron, and between this and the tube there is arranged a sheet iron valve, provided with a steel spring, which opens or shuts in passing into a bifurcation, and permits the black to enter the box. The distributing box is provided with a counterpoised door that is opened and closed by the same method as the valve just mentioned, so that on the second revolution of the furnace the black that is contained in the box falls over an inclined plane into a bag, or into a car.



FURNACE FOR REVIVIFYING BONE BLACK.

Formerly the black to be revivified was, before being introduced into the retorts, dried upon a cast iron table, which was heated by waste heat from the fire-place. For the last year and a half this table has been replaced by a mechanical drier. This is the second improvement which we have to call attention to.

This drier consists of two concentric sheet iron cylinders, the external one of which is fixed, while the internal one is given a rotary motion through an endless screw and a helicoidal wheel. This latter cylinder is provided internally with four spiral paddles that each forms a quarter circumference on the length of the cylinder, so as to constantly stir up the black and cause it to move forward progressively toward the furnace hopper. A furnace designed to revivify from 100 to 110 hectoliters of black every twenty-four hours contains 54 retorts, and burns but 5 hectoliters of coal. With the system of emptying the tubes just described we are always sure of revivifying the same quantity of black—the latter remaining the same length of time in all the retorts. Moreover, as the latter receive the same degree of heat, we are certain that the black will always be baked uniformly. The mechanical drier is not only advantageous because it is heated by waste gases, but also because it prevents the black from being crushed or wasted. In this furnace the internal cylinder is 6 meters in length by 0·85 in diameter at the entrance and 1 at the outlet. The external one is only 6 meters in length, and its diameter but is 1·3 meters.

We may also mention, in conclusion, that the apparatus is provided with a small blower for driving hot air into the movable cylinder. The bad odors from the black are thus forced out of doors.—*Annales Industrielles.*

Novel Mode of Dredging.

At a recent meeting in this city of the American Society of Civil Engineers, a paper by Mr. L. J. Le Conte, C.E., was read, describing the dredging operations at Oakland Harbor, Cal. The work described was the excavation of a tidal basin, and the deposit of the excavated material on the adjoining salt marshes. The machine used was a pump dredge, with a cutting apparatus consisting of a horizontal wheel with ordinary plows upon its lower face. The rotation of this wheel makes the excavation. Over this cutter, and partly surrounding it, is a hood, which allows water to enter only from beneath. Over the top of this hood a 20 inch pipe leads up to the large centrifugal pump of 6 feet in diameter. From this a line of wrought iron pipe, supported partly on pontoons and partly on the marsh, extends several hundred feet upon the tract to be reclaimed. The material, after leaving the cutter, is taken up by the water, passes through the pump and through the pipe to its place of deposit, without at any time during the transportation coming to a state of rest. The engines are two 16 x 20 inch engines, used exclusively for driving the centrifugal pump, and two 12 x 12 inch engines for driving the cutting apparatus, swinging the gear, etc. The steam is supplied by two 100 horse power boilers, generally carrying from 90 o 95 pounds of steam. The amount of material transported with the water runs at times as high as 40 per cent by volume; but experience has shown that in the material excavated at this point, which is a blue clay mud, it is not advisable to carry more than 15 per cent, particularly in order to secure a uniform distribution at the place of deposit. The total quantity moved by one dredge in eight months was 250,000 cubic yards. The best work in one month was somewhat over 60,000 cubic yards in 230 engine hours; the average distance of transportation being 1,100 feet. The greatest distance transported was during October, when 45,000 yards were deposited in 190 engine hours, through 1,600 to 2,000 feet of 20 inch pipe. The average daily expense account was stated as approximately $102.00, but this did not include the cost of the nine or ten men on shore, employed to secure a proper disposition of the material, particularly as the fill approaches completion. Nor did it include the cost of retaining embankments where required. The result of the work was stated to be, with this one pump dredge, an average of 30,000 cubic yards, measured in the cut at a maximum cost of 10 cents per cubic yard; and in one particular month of 23 days' work, 60,000 cubic yards were deposited on shore at a distance of 1,600 to 2,000 feet from the dredge, at a cost of 5 cents per cubic yard. The complete distribution of the material at the place of deposit has been very satisfactory, the result being a cluster of cones whose slopes are very flat; not more than 1½ per cent, and frequently so slight as to appear almost level.

IMPROVED AIR COMPRESSOR.

To successfully use atomized liquids in the treatment of diseases of the upper air passages, it is necessary that the current be continuous. The well known double bulb atom-

IMPROVED AIR COMPRESSOR.

izing hand ball, made of rubber, has the great disadvantage that both hands of the operator are employed, and the continued effort is very tiresome. The accompanying engraving represents an apparatus which is easily worked, compact in form, and light in weight. The pump cylinder is 2½ inches in diameter by 3 inches stroke, is mounted on an arched stand, and contains a piston furnished with a valve opening upward. The piston is connected to the foot pedal by a forked connecting rod, and is moved by a slight and easy motion of the foot. The upper end of the pump cylinder is closed, with the exception of an aperture, which is covered by a valve opening upward into a cylindrical air reservoir secured to the upper end of the pump. A flexible rubber hose is attached to a stop cock near the top of the reservoir. Immediately on top is a spring gauge indicating the air pressure from one to twenty pounds. By a little exertion on the part of the operator, the pressure can be kept at any point, and, when filled to ten or twelve pounds, there is air enough to give a spray, with a good atomizer, for ten minutes, or long enough to make application to three or four patients in succession without pumping.

The same plan furnishes a simple and efficient device for maintaining a continuous supply of air for blow pipe use. As much of the oxygen of the air is taken up by the lungs, exhaled air is deficient in heating qualities. This defect is overcome by the use of the compressor, which not only saves a great amount of hard work, but delivers a stronger and steadier blast than is possible to maintain with the mouth. With ordinary care it will last for years, the only attention required being a drop of oil occasionally on the leather packing ring.

The apparatus is manufactured by Mr. J. Elliott Shaw, 154 South Fourth Street, Philadelphia, Pa.

A Liniment for Rheumatism.

The *Therapeutic Review* says: Methyl salicylate (oil of wintergreen) mixed with an equal quantity of olive oil or linimentum saponis, applied externally to inflamed joints affected by acute rheumatism, affords instant relief, and, having a pleasant odor, its use is very agreeable."

Sir William Siemens.

We much regret to have to announce the sudden death of Sir William Siemens, which occurred on the evening of Monday, the 19th of November, in consequence of an injury to the heart, brought about by a fall a fortnight previously. Walking home from a scientific meeting on the afternoon of Monday, the 5th, he tripped and fell while crossing Hamilton Place. Though for a day or two no apparent harm resulted, it was soon found that the heart had been—it was hoped slightly—injured, or, at all events, that the shock, acting on a previously existing morbid condition, had had injurious effects. Still there seemed no reason to fear that rest would not repair the mischief, till on Monday, quite suddenly, the end came.

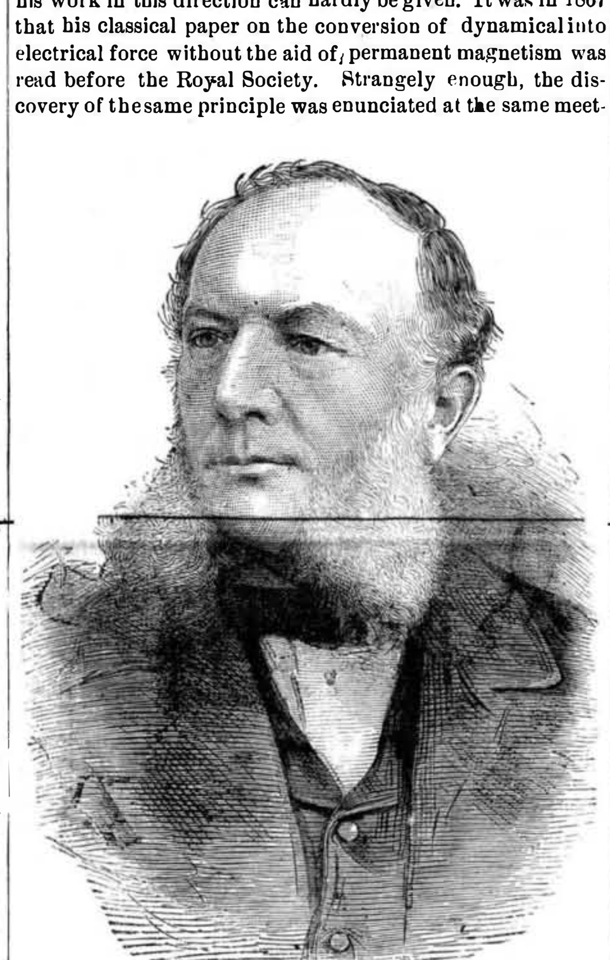
By his death English science has suffered a severe loss, and a loss which will not readily be made good. At a time when the tendency of science is more and more to specialize itself, and scientific men are often compelled to study one particular branch of a subject alone, it is very rare to find a mind like that of Sir William Siemens, who devoted himself to many distinct branches of science, and yet excelled in them all. Not only has he done much for the advancement of pure science, but it may be said without contradiction that he has, beyond all his contemporaries, promoted the practical application of scientific discoveries to industrial purposes. He was an ardent scientific discoverer, a large and successful manufacturer in at least two distinct branches of industry, an engineer of high rank in the profession, and besides this he was a shrewd and clear-headed man of business.

Charles William Siemens was born at Leuthe, in Hanover, on the 4th of April, 1823. He was educated at the Gymnasium at Lübeck, afterward at the Polytechnic School at Magdeburg, and finally at the University of Göttingen. Here he studied under Wohler and Himly. In 1842 he became a pupil in the engine works of Count Stolberg, and here he laid the foundation of his engineering knowledge—knowledge he afterwards turned to such good practical account. The fact that he was one of a family of inventors makes it rather difficult to say what was the precise personal share he had in the many inventions for which the world is indebted to the four gifted brothers—Werner, William, Carl, and Frederick. They all worked so harmoniously together—the idea suggested by one being taken up and elaborated by another—that it is hardly possible to attribute to each his own proper credit for their joint labor. The task, too, is rendered all the harder by the fact that each brother was always ready to attribute a successful invention to any of the family rather than to himself. It may, however, be said that in electrical discovery the two brothers William and Werner were principally associated, while the regenerative furnace is due not only to William, but also to Frederick. It was to introduce to the English public a joint invention of his own and his brother Werner in electrogilding that William Siemens first came to England. This was in 1843. Speaking two years ago to the Birmingham and Midland Institute, Dr. Siemens, as he was then, gave an interesting and somewhat touching account of the difficulties which not unnaturally beset the young foreign inventor, so ignorant of the language of the country that his first visit was to an "undertaker," under the impression that he was a suitable person to take up and bring out his invention. Thanks to the kindly discrimination of Mr. Elkington, who was able to perceive that certain processes described in some of his own patents could only be carried into effect by the improvements of the Siemenses, he was able to dispose of his invention so far successfully that he was induced in the following year to come back again on a similar errand. This time it was his "chronometric governor," an apparatus which, though not very successful commercially, introduced him into the engineering world, and was really the cause of his settling in this country. The chief use of this apparatus, intended originally for steam engines, has been found in its application to regulate the movement of the great transit instrument at Greenwich.

His studies in the dynamical theory of heat led him to pay special attention to methods of recovering the heat generally allowed to run to waste in various engineering and manufacturing processes. The first application of these researches was in the regenerative steam engine which he set up in 1847 in the factory of Mr. Hicks, at Bolton. In this superheated steam was employed, but its use was attended with certain difficulties which have prevented the commercial introduction of the invention. The Society of Arts may have the credit of being the first public body in England which recognized the value of the principle by awarding Mr. Siemens a gold medal in the year 1850 for his regenerative condenser. The direction in which he was then working was stated in a paper he read before the Institution of Civil Engineers in 1853 on the conversion of heat into mechanical effect. This paper gained him the Telford Premium and medal of the Institution. In 1857 Siemens, in connection with his younger brother and then pupil, Frederick, turned his attention to regenerative furnaces for metallurgical purposes. The regenerative gas furnace, as it is certainly the greatest invention due to the Siemenses, so is the one in which William Siemens is believed to have had the largest share. The first successful application of these furnaces was in 1861. The principle of the regenerative furnace is tolerably well known; it may suffice to say here that its main feature consists in an arrangement by which the waste heat of the products of combustion is utilized by being imparted to the air and to the gaseous fuel by which combustion is supported. This is effected by causing the products to pass through chambers in which the heat is taken up by masses of brickwork, and afterward passing the incoming currents of air and gas among the heated brickwork. The earlier applications of this principle to steel and glass making have been followed by its extension to many other industrial purposes in which great heat is required, the powers of the furnace being only limited in practice by the nature of the materials of which it can be constructed.

The application of the furnace to the making of iron and steel naturally led the attention of its inventor to other improvements in the same manufacture. In 1862 he endeavored to reduce to practice the result of Reaumur's experiments in making steel by fusing malleable iron with cast steel. After some years' experimenting the Siemens process of steel making was perfected, and a little later still the Siemens-Martin process. In the latter, scrap iron is melted in a bath of pig iron on the hearth of the furnace; in the former, ore is reduced. The production of steel in this country under Sir William Siemens' processes was over 340,000 tons in 1881.

But if the inventions of this regenerative furnace and of improved processes for steel making are those which are most likely to keep alive in future years the memory of their inventor, it is just now with the electric light that the name of Siemens is most closely associated in the popular mind. The precise date at which he may be said to have commenced his work in this direction can hardly be given. It was in 1867 that his classical paper on the conversion of dynamical into electrical force without the aid of permanent magnetism was read before the Royal Society. Strangely enough, the discovery of the same principle was enunciated at the same meeting of the Society by Sir Charles Wheatstone, while there is yet a third claimant in the person of Mr. Cromwell Varley, who had previously applied for a patent in which the idea was embodied. It, therefore, can never be quite certain who was the first discoverer of the principle on which modern dynamo machines are constructed. As regards the Siemens discovery, the originator of the idea was Dr. Werner Siemens, who, on being shown an electrical motor constructed without permanent magnets, immediately saw that a generator without permanent magnets was equally possible. The details, however, of the construction of the Siemens machine, and the various improvements by which it has been brought to its present form or rather forms (for there are, of course, several varieties) are due alike to the younger and the elder brother. And the same may be said of the various inventions connected with telegraphy and the electric light which emanated from the great firm of Siemens Brothers. Some of these were entirely worked out by one, some by the other brother, more were the joint production of both, but no attempt was made to separate them or to discriminate. How great were the inventive resources of Sir William is well shown by the saying common in his workshops, that as soon as any particular problem had been given up by everybody as a bad job, it had only to be taken to Dr. Siemens for him to suggest half a dozen ways of solving it, two of which would be complicated and impracticable, two difficult, and two perfectly satisfactory.



DR. C. W. SIEMENS. F.R.S.

As regards telegraphy, the most important work executed by the firm was the laying of the Direct United States Cable in 1874, for which work that remarkable vessel the Faraday was built after the designs of Sir William Siemens. A good instance at once of the versatility of Sir William's talents and of his engineering skill is given by the arrangement of the screw propellers in this ship. Their shafts (the Faraday is a twin screw) are set at a slight angle, diverging not outward, as has often been proposed, but inward, toward each other. The effect of this is that the thrust of each propeller, when used singly for steering purposes, acts at a much more effective angle, and the result is that the vessel can turn in her own length, when the engines are worked in opposite directions. The Faraday is most completely fitted up with every possible appliance for cable laying, grappling, and recovering lost cables, but the above small detail is only referred to here as illustrating the way in which Sir W. Siemens dealt with a purely engineering question, which might have been considered quite beside the ordinary direction of his work. To record fitly what he and his firm have done for the advancement, not only of electric lighting, but of the various practical uses of electricity, would involve the enumeration of an infinity of technical details, each comparatively unimportant, but each fitting into its own place and serving to produce a complete whole. To enter fully into the amount of electric lighting work effected by them would invite comparisons which at the present moment are above all things to be avoided. It may, however, be said that if a careful examination were made of the working installations of the electric light, it would be found that a very considerable portion of the real work done had been done by the firm of Siemens Brothers. At the Paris Exhibition they were *facile principes;* at Munich, at Vienna, at the Crystal Palace, they were alike conspicuous.

The process of "anastatic printing," a process only superseded by recent advances in photographic processes, was due to William and Werner Siemens. It was described by Faraday in 1845. Faraday, too, it may be noted, had for the subject of his last lecture at the Royal Institution the advantages of the Siemens furnace. Improvements in calico printing, the invention of a double cylinder air pump and of a water meter, are also among the earlier work of William Siemens. Among more recent inventions may be noted his bathometer, for measuring the depth of the sea without a sounding line, his electrical furnace, his electrical thermometer and pyrometer, his rotatory furnace for the production of iron and steel by the direct process, his deep sea electrical thermometer, and his regenerative gas burner.

Sir William Siemens was elected a Fellow of the Royal Society in 1862, and in 1869-70 he served as one of the Council. He became a member of the Institution of Civil Engineers in 1854, and has been on its Council for some years. He was the first president of the Society of Telegraph Engineers, and served a second time in that capacity. He has been President of the Institution of Mechanical Engineers, of the Iron and Steel Institute, and of the British Association. He was Chairman of Council of the Society of Arts.

The honors he has received for his inventions and discoveries are very numerous. This brief record may serve to show how valuable was the life that has just passed away, how great the loss of what a few more years of strenuous work might have yielded. Those who knew him may mourn the kindly heart, the generous, noble nature, so tolerant of imperfect knowledge, so impatient only at charlatanism and dishonesty; the nation at large has lost a faithful servant, chief among those who live only to better the life of their fellow men by subduing the forces of nature to their use. Looking back along the line of England's scientific worthies, there are few who have served the people better than this, her adopted son, few, if any, whose life's record will show so long a list of useful labors.—*London Times.*

Dr. John L. Le Conte.

The death of Dr. John L. LeConte at his home in Philadelphia on Thursday, November 22, at the age of fifty-eight, removes one who has long been the leader, *facile princeps*, of American entomologists. With his death the younger men are completely separated from the former generation of workers in this field, and they will lose a friend and teacher to whom they constantly looked. Dr. Le Conte was as highly honored abroad as at home, and has been an active investigator for nearly forty years. His death occurred during the session of the National Academy, of which he was a member, but was not known in New Haven until its close.

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