

ELECTRICITY IN GAS WORKS.

MODERN COAL-HANDLING INSTALLATIONS.

BY DR. ALFRED GRADENWITZ

IN view of the keen competition between gas and electricity, it seems strange at first sight that there should be a possibility of co-operation between the two. Still the way for such a result has been prepared during the last decade and the electro-motor, by the useful services rendered to the gas industry, has become a link uniting these once opposite branches of industry.

As regards the manifold uses the electro-motor is put to in gas works, we wish at first to draw attention to the enormous crane plants erected, e. g., in connection with the Tegel Gas Works of the city of Berlin.

Fig. 1 represents the electrically-driven coal grab installed near the harbor of that works and which comprises two traveling double cranes on each of

Gas Works (Fig. 3). The capacity of the two bridges arranged beside one another corresponds to the full output of the grab installation represented in Fig. 1. These bridges are in turn moved on intermittently by the trolleys passing over them, thus insuring a uniform coaling of the silo; they can, moreover, be moved on by hand.

The coal taken out of ship holds by the grab cranes

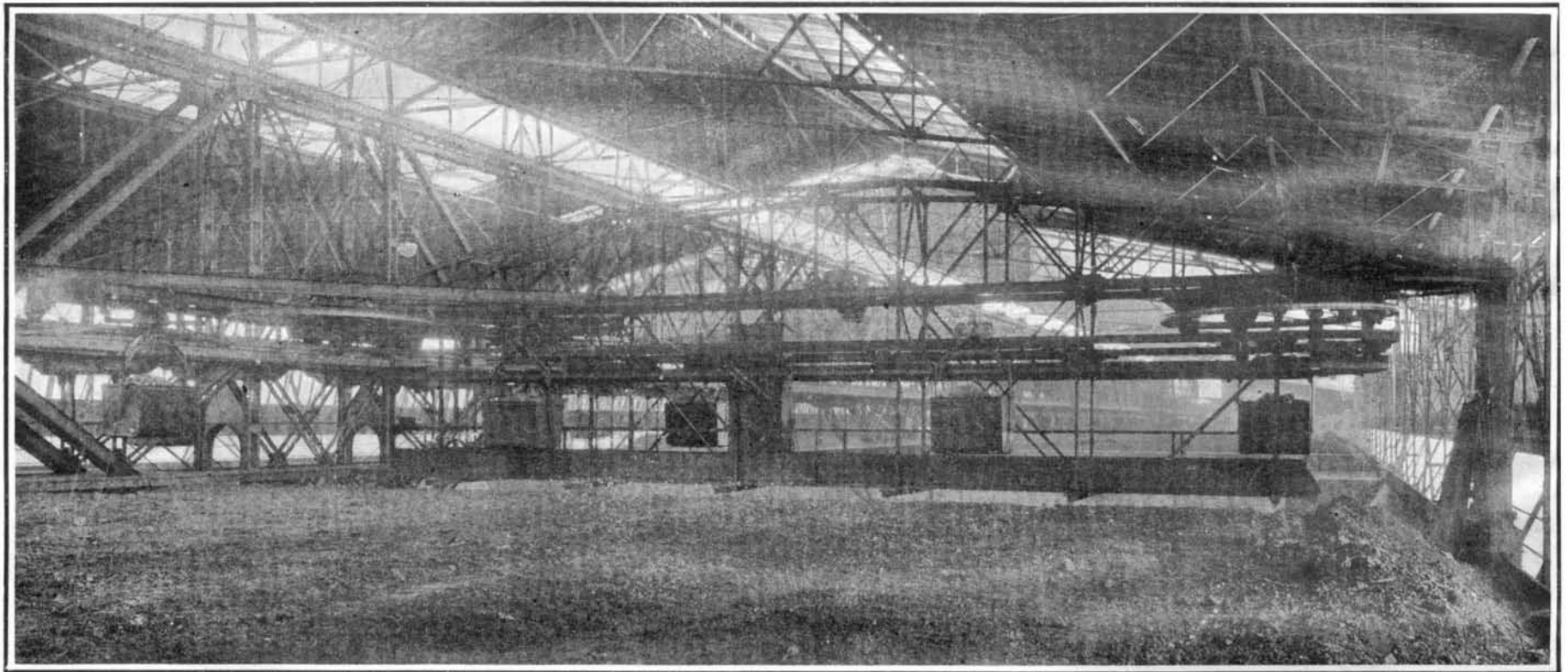


FIG. 3.—STORAGE OF COAL BY MEANS OF PUMPING BRIDGES AT TEGEL GAS WORKS. THEIR CAPACITY EQUALS THE TOTAL OUTPUT OF THE GRAB INSTALLATION SHOWN IN FIG. 1.

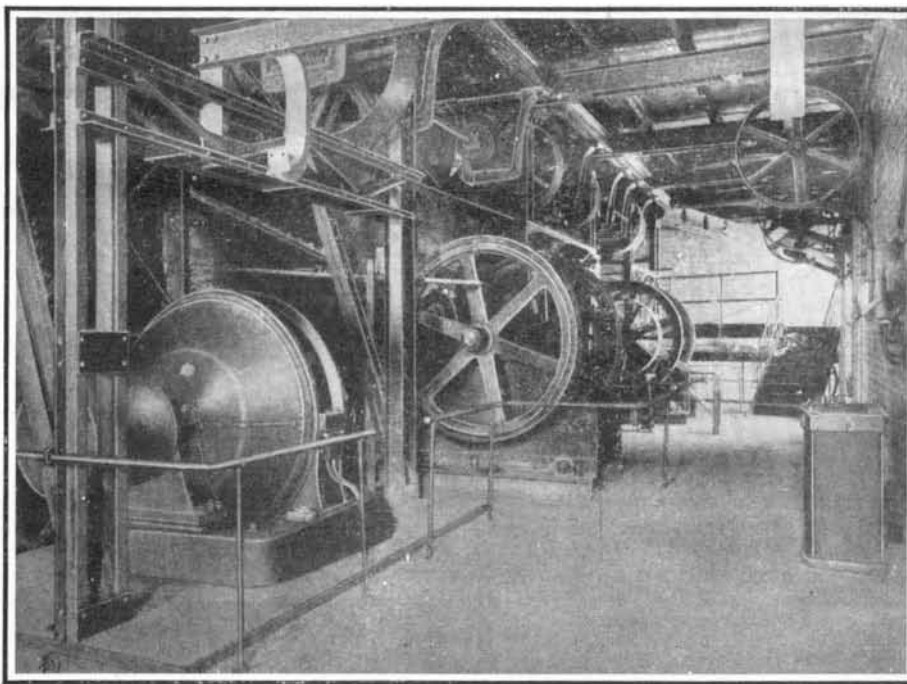


FIG. 4.—COAL-DRESSING PLANT AT TEGEL GAS WORKS COMPRISING FOUR JAW CRUSHERS EACH OF 30 TONS HOURLY CAPACITY.

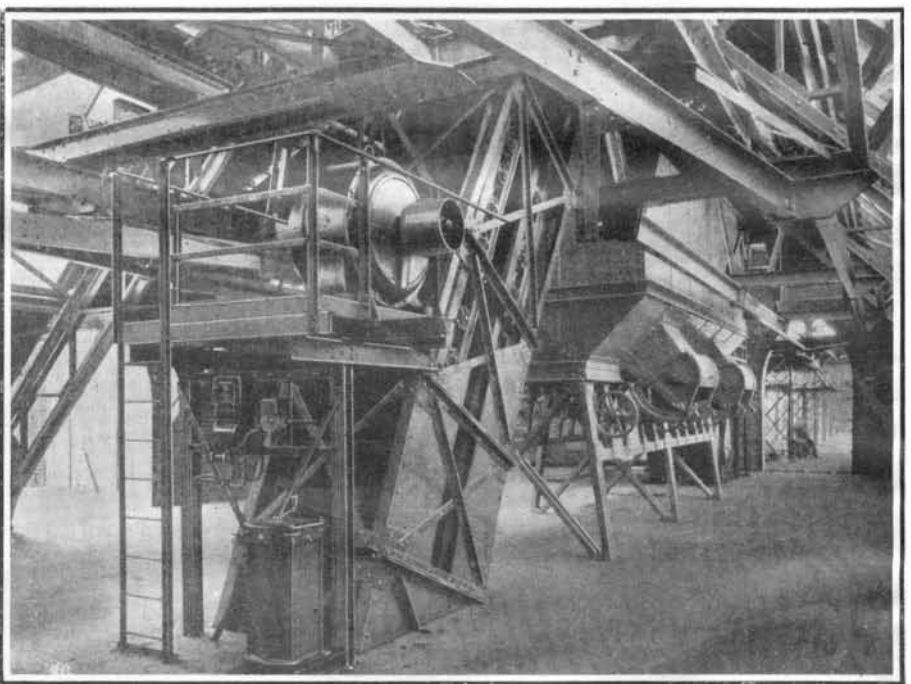


FIG. 5.—TWO ELEVATORS OF SAME PLANT FOR CRUSHED COAL OF 150 TONS HOURLY CAPACITY.

ELECTRICITY IN GAS WORKS.

When the powerful development of electricity had induced gas engineers to design their works on more modern lines and on greater scales, they found the old method of coal and coke loading by the shovel and wheel-barrow utterly insufficient, the more so as the cost of manual labor was on a steady increase. They, therefore, turned their attention to the electro-motor, which obviously was the only suitable prime mover for performing the most various operations, thus resorting to the services of an agent so far considered as unavailable.

How extensive a scope the electro-motor has acquired in gas works may be gaged from the fact that the A. E. G., which was the first continental electric company to take up this idea, during the last ten years has equipped about one hundred and fifty gas works with electric power, comprising motors of a total output of about 40,000 horse-power.

which are mounted two jib cranes free to rotate through a small angle. On each of the four jibs is traveling a crab fitted with a grab-lifting bar; on each double crane are installed twelve motors, giving a total of twenty-four, every two of which (with an output of 50 horse-power) serve jointly to operate the lifting gear. The capacity of this plant is $4 \times 40 = 160$ ton-hours.

In a similar manner the coal supply from the railway wagons is effected by wagon-tilting plants such as those of the Danziger Strasse (Berlin) Gas Works, represented in Fig. 2. This plant unloads eight wagons of ten tons, six wagons of fifteen tons, or four wagons of twenty tons each per hour, and is driven by an inclosed motor of 18 effective horse-power.

Another important point is the storage of coal by means of dumping bridges entirely automatic in working, such as those of the coal silo at the Tegel

is stored by means of the trolleys and the dumping bridges referred to in the coal silo in order then to be removed by the aid of other trolleys, which convey it to the coal-dressing plant where the coal, having been crushed to the proper size, is supplied to the retort.

Fig. 4 represents the coal-dressing plant at the basement of the Tegel Gas Works, comprising four jaw crushers, each of 30 tons hourly capacity. Two inclosed motors, of 60 horse-power each, are used to operate that part of the plant. Fig. 5 represents the first story of the same coal-dressing plant, comprising two elevators for crushed coal, of 150 tons hourly capacity. This is driven by two motors of 30 horse-power each. From the retorts, the coke is discharged in a similar manner.

Of further special interest are the charging and the discharging machines used in connection with

horizontal retorts, which, as represented in Fig. 6, can be combined into a single machine. The operation of the latter is carried out in such a way that the discharging and charging of each retort takes only two minutes; the electric equipment comprises three motors of 15 horse-power total capacity, which are used for traveling, discharging, and charging, respectively. Having been brought to the furnace, the loading and unloading machine at first throws out of

the retort the heated coke, in order afterward—by the aid of a special arrangement—to throw a new charge of coal into its interior. The man operating this interesting machine has only to take care of insuring a proper horizontal and vertical adjustment.

It would be quite impossible within the limits of this article to discuss all the different uses of electro-motors in modern gas works, comprising the opera-

tion of capstans, locomotives, different kinds of coke chutes, scratcher conveyers, Bradley works, elevators, door-lifting gears for chamber furnaces and coke-quenching towers, ventilating fans for withdrawing gases from the retorts or chambers, blowers for coke gas production, shaking sieves, and many other appliances. In fact, the working of an effective gas plant would be quite impossible without the co-operation of electricity.

A CURIOUS KIND OF RAILWAY CAR.

A SHOOTING CAR FOR A NATIVE CHIEF IN INDIA.

BY F. C. COLEMAN.

THE photographs reproduced herewith illustrate a novel type of railway locomotive and coach combined, constituting a shooting car, which has been built by Messrs. McEwan, Pratt & Co., Limited, of Wickford, U. S. A., for the use of His Highness the Rao of Cutch. The engines consist of a four-cylinder gasoline motor, having 4-inch by 5-inch cylinders, designed to develop about 27 brake horse-power at a speed of 900 revolutions per minute.

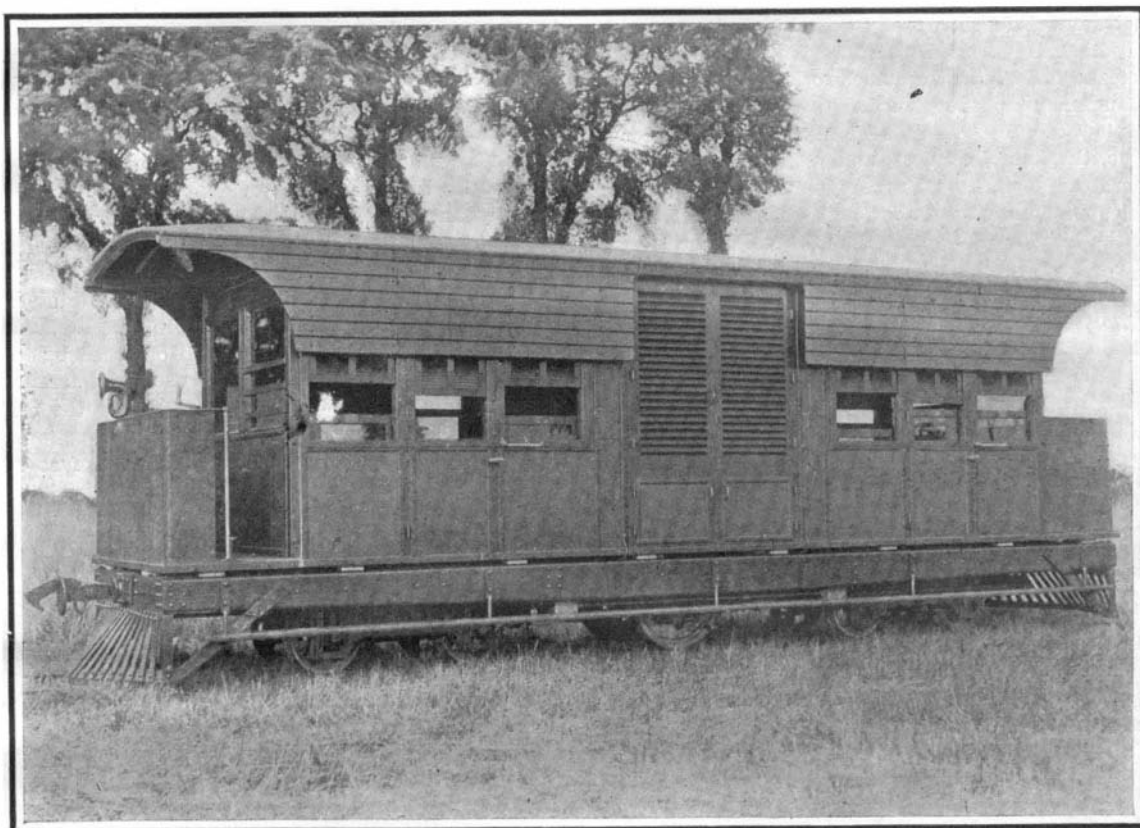
Three speeds in either direction are provided for, the gearing to the driving axle being such as to give speeds to the car, respectively per hour, of 10, 20, and 30 miles. There is a single pair of driving wheels, 2 feet 6 inches in diameter, placed under the center of the engine room, and the ends of the car are supported by means of four-wheeled bogies, each having wheels 1 foot 8 inches in diameter, and a wheelbase of 3 feet 6 inches, the total wheelbase of the car being 18 feet. The total length over frames is 26 feet, and over the central couplers 28 feet 10 inches. The body of the car is divided into three compartments with two end platforms for the driver for use in traveling in either direction. The central section comprises the engine room directly over the driving wheels, and an upper compartment for the carriage of game, guns, and stores. On either side of this section are two passenger compartments, richly equipped and upholstered with horsehair covered with buffalo leather. The whole exterior is finished in accordance with the best carriage practice.

This car is built for the 2-foot 6-inch gage, and is designed to carry one-third of the total weight on the driving wheels. It is constructed to negotiate curves of 300 feet radius and gradients of 1 in 50, and to attain the speeds already mentioned when carrying a load consisting of eight passengers, the driver and 4 hundredweight of luggage.

The gradient upon which the car was actually tested was 1 in 19, which was climbed at about 8 miles per hour.

It will be noticed that the car is fitted with cow-catchers and central couplers of standard Indian pattern.

The vehicle has been built according to the designs



VIEW SHOWING DOORS AND SUNSHADES CLOSED.

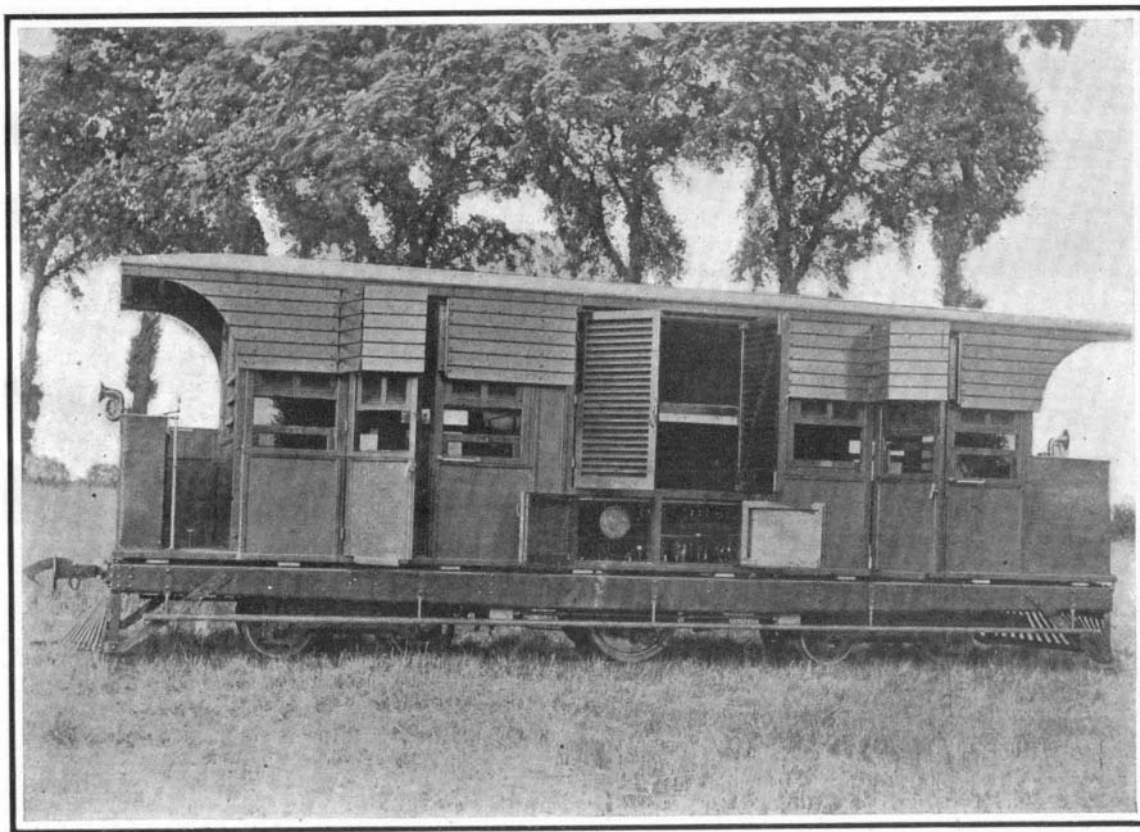
and requirements of Messrs. E. R. Calthrop & Partners, consulting engineers, of London.

A new method for producing high tension discharges was discussed by Prof. Ernest Wilson and W. H. Wilson, before the British Association for the Advancement of Science. According to this method, energy is taken from an alternating or continuous current source and stored in a magnetic field by an inductance; it is then permitted to surge into a condenser, which forms with the inductance a low

frequency oscillatory circuit. When the energy is accumulated in the condenser the latter is mechanically bridged across the primary winding of an induction coil, with which it forms a high frequency oscillatory circuit. The energy is then transmitted by the secondary winding of the induction-coil to the work circuit, and can be of an oscillatory or uni-directional character, according to the purpose in view. The apparatus is light, efficient, and cheap, and is especially suitable for radio-telegraphy, X-ray, and other work in which high-tension electricity is employed.



END-ON VIEW OF SHOOTING CAR WITH DOORS AND SUNSHADES CLOSED.



BROADSIDE VIEW OF SHOOTING CAR WITH DOORS AND SUNSHADES OPEN.

A RAILWAY SHOOTING CAR FOR INDIA.

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FIG. 1.—ELECTRICALLY-DRIVEN COAL GRAB INSTALLED NEAR THE HARBOR OF THE TEGEL GAS WORKS OF THE CITY OF BERLIN.

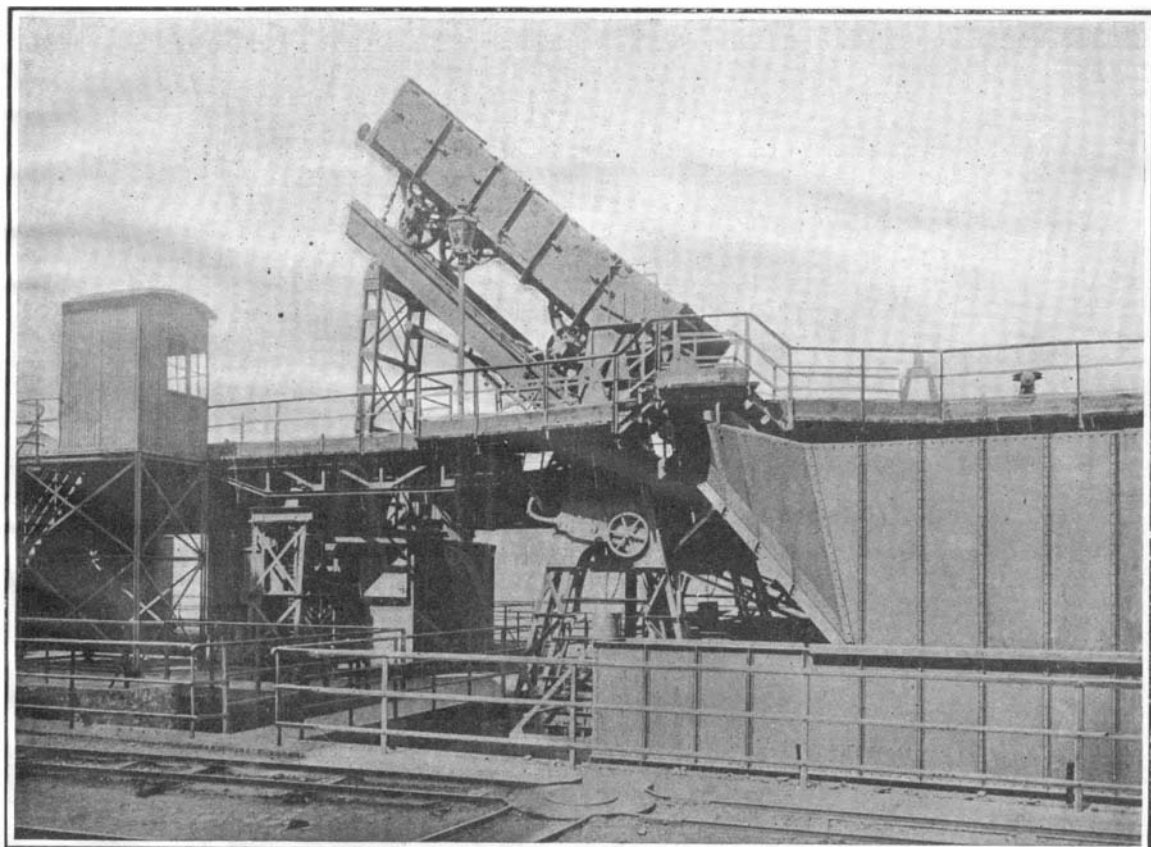


FIG. 2.—RAILWAY WAGON TILTING PLANT FOR UNLOADING COAL SUPPLY AT DANZIGER STREET GAS WORKS, BERLIN.

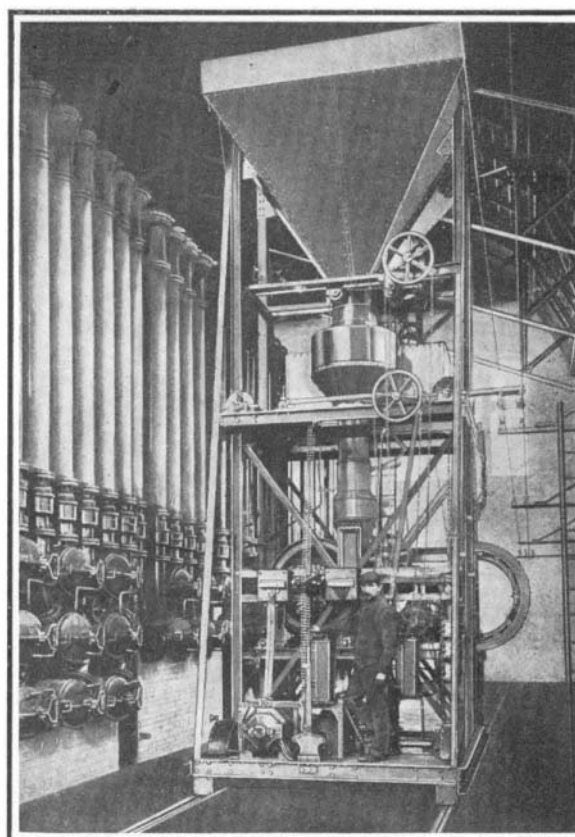


FIG. 3.—CHARGING AND DISCHARGING MACHINES USED IN CONNECTION WITH HORIZONTAL RETORTS.

ELECTRICITY IN GAS WORKS.—[SEE PAGE 424.]