THE DREDGER "MARQUESS."

The "Marquess," a bucket dredger with a single ladder, has been recently constructed by A. F. Smolders at Rotterdam for the Cardiff Railway Company. The entire hull is of mild steel. The length of the deck is 136 feet, 3 inches; the width, 24 feet, 7½ inches; and the depth, 10 feet. The bucket ladder is 88½ feet in length. It is strengthened by crossbraces, and fitted with cast steel rollers mounted upon steel axles. The buckets have a capacity of 19 cubic feet, and are of Siemens-Martin steel. The upper tumbler of the dredger is quadrangular and is a single steel casting, while the lower one is cast in two halves. The edges of the tumblers are protected against wear by pieces of hard steel. The height of the upper tumbler above the load water line is 28 feet. The discharge chutes, which are of Martin steel, are provided with friction bearings and are set at 30 deg. from the vertical, one on each two sides of the dredger. The buckets can be made to empty into one chute or the other by means of a valve. The stationary chutes are provided in the center with a slide that recedes from or approaches the bucket chain, so as to reduce the waste to a minimum. They have, in addition, two movable extensions that may be raised or lowered by means of windlasses. All these parts are actuated from the deck. The motive power is transmitted by two camel's hair belts running over pulleys keyed to the crank and transmission shafts. The transmission is so arranged that the buckets pass over the upper tumbler at the rate of 16 a minute. The transmission by belt has the advantage that if the buckets meet with an obstacle, such as a rock say, or a tree-trunk, the belt slides. Consequently, a possible breakage of the chain is prevented.

The engine is of the compound type, fitted with a surface condenser and a reverse. The diameter of the high-pressure cylinder is 19 inches, and that of the low-pressure one, 26⅜ inches, while the stroke of each is 19¾ inches.

The boiler is of the type usually employed on sea vessels. It is of Siemens-Martin mild steel with two furnaces. The diameter of the body is 8 feet, 10½ inches; and the length, 10½ feet. The diameter of the furnace is 2 feet, 9½ inches. There are 112 3-inch tubes in the boiler. The heating surface is 860 square feet. The effective pressure is 105 pounds.

The dredge is provided with five steam windlasses. One of these does duty for the ladder, two others for the two lateral chains, a fourth for the bow chain, and the fifth for the three stern chains.

In addition, there are two hand windlasses for manipulating the discharge chutes. The dredger is lighted entirely by electricity. The current is furnished by a continuous-current dynamo and is capable of supplying a total of 1,600 candle-power.

There are cabins for the captain, mate, the engineer, the fireman, and the crew.

The dredger operates to a depth of 45 feet beneath the surface of the water. At the time of the experiments made in the Cardiff channel, it dredged and discharged 4,536 tons of material into lighters in 319 minutes. The average work was therefore 853 tons an hour. The minimum was 732 tons per hour, and the maximum 1,030. The contract called for 650 tons per hour for work in compact clay, gravel, and sand, and for 325 tons for work in marl. The same chain and buckets naturally had to work in both cases. The requirements of the contract were therefore largely exceeded.

THE BERTHIER ACTINO-ELECTRIC TRANSFORMER.

BY EMILE GUARINI.

Although it is as yet remote, a day will come when we shall be obliged to direct our whole attention to the utilization of natural forces, or at least of such as we do not at present consider the utilization practical.

Although it is true that water courses and water falls have received numerous applications—yet far less numerous than they might have received—in the majority of countries there are, on the contrary, other natural forces, such as the wind, which can be made use of everywhere, and the tides, which are very pronounced in certain countries, and the applications of which may be relied upon with confidence. There is one, even, which has as yet been utilized scarcely at all, and that is the sun, at least in countries in which it shines more or less frequently; and perhaps this same sun will, in the years to come, be made to give us nearly all the heat necessary to keep us warm in winter, and a large proportion of the power needed to run the machinery of the world, which is ever increasing in size and quantity. Something, moreover, has already been done in this direction, especially at Los Angeles, where a reflector of about thirty-three feet in diameter has been utilized for concentrating the calorific and luminous rays upon a steam generator that supplies a 15-horse-power motor.

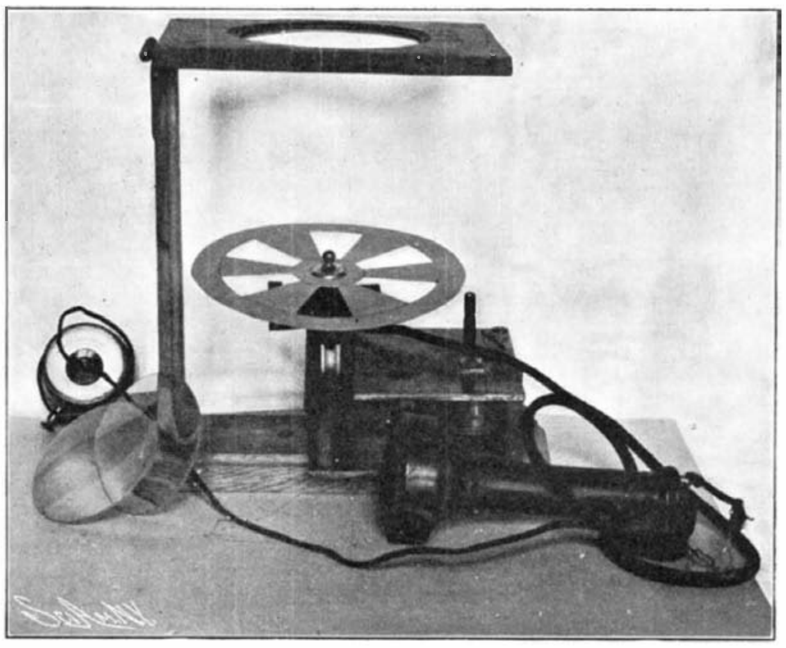


Fig. 1.—Arrangement for Producing an Alternating Current.

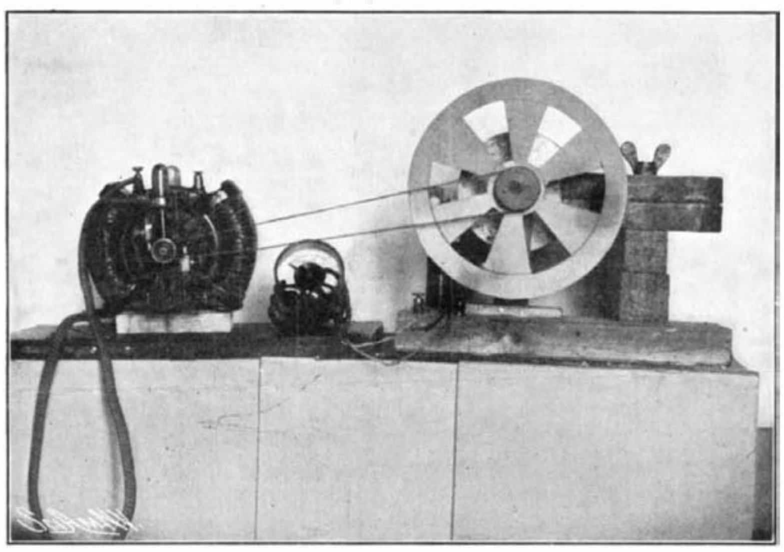


Fig. 2.—Arrangement for Producing a Direct Current.

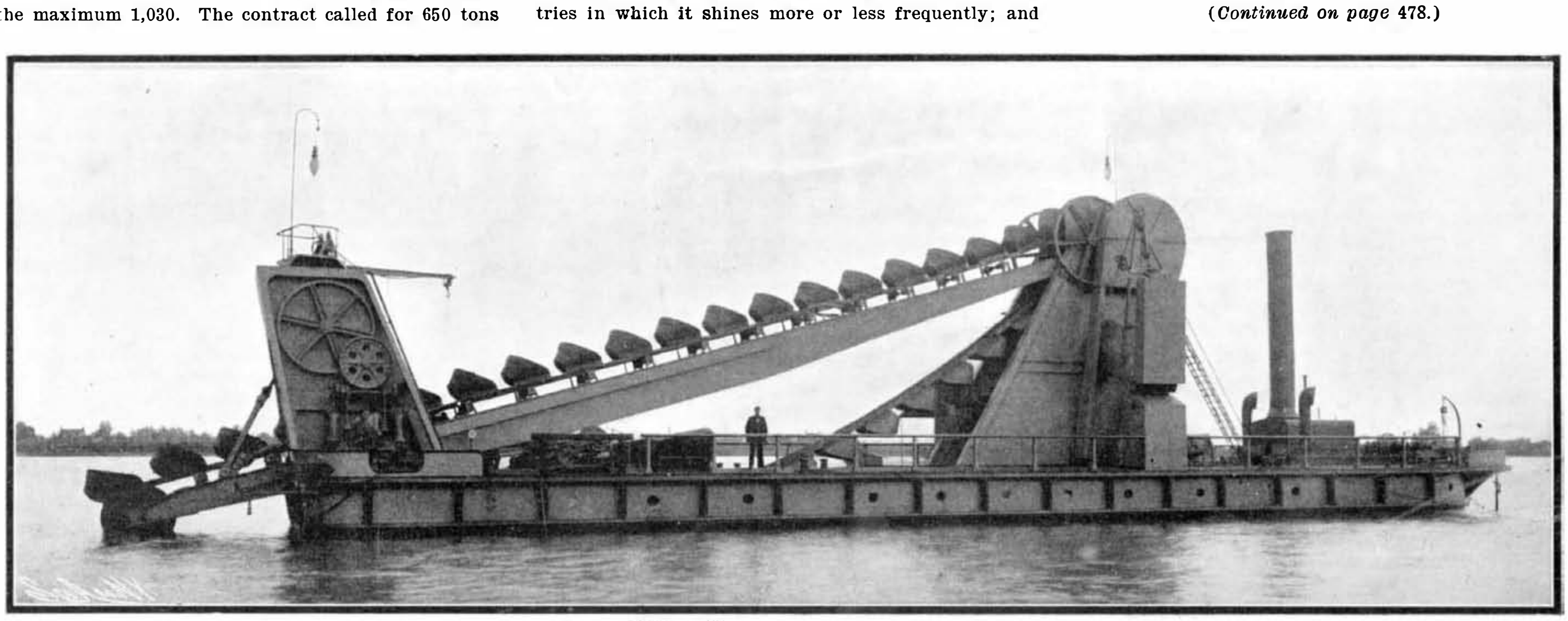
APPARATUS FOR PRODUCING ELECTRICITY FROM LIGHT.

M. Berthier, on the other hand, desirous of demonstrating to us once again the ease with which one of the numerous forms of energy may be changed into another, has entered upon an entirely different path, in aiming at the transformation of light into electric energy; and, with such an idea in view, has devised an actino-electric transformer, an apparatus capable of utilizing the property that selenium possesses of producing an electro-motive force under the influence of light. Such a result may be reached in two different ways: (1) By constructing an apparatus based upon the use of selenium submitted to more or less rapid variations in light, and, consequently, by utilizing the modifications in resistance; and (2) by constructing an apparatus in which the light shall act in a constant manner for the production of a constant electro-motive force capable of being utilized. The second of these methods is not new. Prof. W. E. Adams long ago showed that a ray of light, falling upon a bar of selenium, develops therein an electro-motive force that gives rise to a current, and that the bar by this fact becomes temporarily converted into a small battery. I do not know why this property has not, up to the present, received practical applications, since it seems to me that nothing could be more easy than to form industrial actino-electric elements of the nature of thermo-electric batteries. The bars, connected in multiple, might serve for increasing the intensity of the current, and connected in series, for increasing the tension of the current.

The first of the methods mentioned above is new, and M. Berthier has devised a most interesting apparatus for the carrying out of it.

The inventor gives his apparatus two forms. By means of the first, he obtains an alternating current, and, of the second, a continuous one. The first form is represented in Fig. 1. A disk, provided with apertures and revolved by means of a clock-work movement, serves as a shutter and produces in the luminous pencil, concentrated by a convergent lens, a rapid series of interruptions. The pencil of light itself is directed upon a selenium bottom formed of quite a large number of thin strips of this metalloid and submitted to the action of the magnetic field of two powerful magnets or of two electro-magnets. The battery is placed at the point where the field possesses its maximum strength. The selenium battery is put in circuit with two coils secured to the extremity of the magnets. These latter therefore serve as cores. These coils are provided with another winding, which constitutes the induced circuit. It is connected with a telephone or any other apparatus in which, in a normal state, no sound is heard. There is therefore no current in the

(*Continued on page* 478.)



HUGE ENGLISH DREDGER "MARQUESS," CAPABLE OF EXCAVATING 1,030 TONS OF MATERIAL PER HOUR.

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