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Something New in Electric Furnaces

By E. F. Cone

AN electric furnace with a repelling arc is the latest addition to the important industry of melting or refining steel or non-ferrous metals by electricity. It is unique in many respects and is a highly interesting addition to this industry. It is really an electric torch. It has been developed by a Chicago electric furnace company and is already in use in melting brass and copper and in making aluminum steel. It is known as the von Schlegell repelling arc furnace and is the invention of the president of the company. A brief description follows:

Many electrical people have asked what we mean by the phrase "repelling arc," what are its advantages and why. It is a self-regulating, flaming arc torch which can be operated from 220-volt motor circuits and suspended into various kinds of chambers for high temperature with deoxidizing conditions maintained.

In answer to the question, "What is the repelling arc?" we offer a drawing which reveals the reason why we call it a torch suspended in a furnace body. By dotted lines we have indicated the electrodes in a relaxed position which the electrodes take when there is no current passing. The bottom ends touch each other. They are drawn together by adjustable weights, as indicated. As soon as current flows, the repulsion between electrodes and the flow forces the electrodes apart, thus drawing the arc.

The electrodes, it will be noted, are placed about the same as electrodes are placed in a flaming arc lamp and the arc is very similar to that given by a flaming arc lamp. It will be noted that the operation of this arc differs from that of other arcs in that the usual practice in drawing arcs is by longitudinal movement of the electrode, while in this case it is entirely accomplished by lateral movement and the repulsion between electrodes is the force which gives this lateral movement. This repulsion also drives the arcs down from the ends of the electrodes.

One of the most desirable things in electric arc furnaces is to overcome the fact that with the changes of temperature and melting of the material in the furnace, as well as the wear of electrodes, the influences affecting the current in the arc are constantly changing to make the arc unsteady.

Another important advantage is the fact that because the electrodes can be raised and lowered as a unit, or in a cluster, rather than individually, it is possible to use gas-tight electrode joints. This prevents any flame coming up around the electrodes, prevents the rapid wear on electrodes which occurs in

other types of furnaces, and obviates the necessity of water-cooled electrode holders.

The fact that all three electrodes are handled in a cluster, and that the arcs are inherently self-regulating, makes it possible to suspend the same cluster or torch alternately in either one of several furnace bodies. Thus there may be instances where the industrialist has two furnace bodies with the torch suspended into one, while the other is being charged and preheated with oil. This really makes possible the use of two furnaces with the cost of but one set of electrical equipment. One shell may be basic and the other acid, or the two shells may be used for melting different metals.

On the von Schlegell furnaces no adjustment is made of the electrodes during heats. The torch is merely lowered during the process as the material melts down. Other applications of this torch for industrial pur-

deficiency of the lean periods to be made up by the surplus of the fat ones.

A Rumanian engineer, Mr. A. Beldimano, sends an interesting suggestion for the solution of this problem, based on his experience in the oilfields of his own country. He points out that, as is well known to geologists and practical oil-engineers, clay strata, even when only a few feet thick, are absolutely gas-tight and water-tight, as is shown by the fact that natural gas has been kept compressed under them, at a pressure perhaps of 100 atmospheres, for thousands of years, until man began to piece them by sinking wells. He therefore proposes to drill deep artesian wells at the highest point of an anticline where a water stratum is to be found beneath a fairly thick clay stratum, and to drive his energy in the form of compressed air into the well, when the air will replace the water in the pores of the sand of the water-stratum. In this way he would

obtain a cheap and absolutely air-tight container of any desired capacity. In connection with this plan he points out that in Germany old disused collieries have already been used as reservoirs for storing air under pressure, being rendered air-tight by a lining of clay. The compressed air in the reservoir could be conveyed by pipe lines to any desired point and used in motors for the production of mechanical power, or an electrical power station might be established at or near the reservoir and the power transmitted electrically.

The second part of his scheme contemplates the production of large quantities of compressed air at a pressure of say, 10 atmospheres from the energy of the waves of the sea, continues *The Times Engineering Supplement*. For this purpose he would anchor pontoons in the sea at a suitable distance from the shore, and would install in them air-

compressors with a simple mechanism operated by the varying tension on the mooring line as the pontoons are moved up and down by the waves. The compressed air thus obtained would be conveyed by pipe lines to the artesian containers on land. Mr. Belimano points out that this method of harnessing the waves would require no pier or masonry work on shore, and that the pontoons containing only the simplest engines, which would need no attention, except for an occasional inspection a few times a year, could be constructed in any shipbuilding yard and need only be moored in a special way by anchors, like lightships. As the size of the power plant would depend on the number of pontoons in operation, it would be possible to begin with a comparatively small installation, and subsequently enlarge it, according to requirements. Both these schemes seem most ingenious on their face, but their practical value remains to be proved in actual test.

General view of the electric furnace with the repelling arc, and a sectional view and details of this new form of electric furnace

poses would be in heating furnaces for forging; melting the alloys and heating large ladles preparatory for adding charges; for work on non-conductive materials, particularly such classes of metallurgical work where it is desired to hold an intense heat within a body of ore or sand, similar to the manufacture of manganese, glass, etc.

Artesian Reservoirs for Intermittent Supplies of Energy

THERE are many sources of power in Nature—the sun's radiation, wind, the tides and waves of the sea—which could be turned to the use and convenience of man were it not for the difficulty that they are intermittent or irregular, whereas practical applications in general demand a more or less constant supply. This difficulty would be overcome if a cheap method of storage could be found, such as would enable the