

CUTTING METALS WITH OXYGEN.

BY JACQUES BOYER.

The process of cutting metals by a stream of oxygen, patented by the German Oxhydic Company, has been employed with success in numerous establishments for several years. The operation is performed by means of a blowpipe with two nozzles, of which the first delivers an ignited jet of mixed oxygen and hydrogen, and the second a stream of pure oxygen. The pressure is regulated by a gage attached to the oxygen tank. The oxyhydrogen flame and the stream of oxygen strike the same part of the metal, which after being heated by the flame is rapidly cut, or rather burned, through by the oxygen, the temperature being raised to 1,300 or 1,400 deg. F. by the combustion of the metal. The cut is as smooth as a sheared cut and requires little or no finishing. The chemical composition and physical properties of the material are not affected beyond a distance of 1/100 inch from the cut. The precision of the cut varies from 1/25 inch in plates less than 2 inches thick to 1/6 inch in the thickest objects, and the width of the cut varies from 1/2 to 1/5 of the thickness. Armor plates can be cut in one-twentieth of the time required for mechanical cutting, and the sharply localized heating probably causes less strain than punching and shearing develop. If oxygen costs two cents and hydrogen two-thirds of a cent per cubic foot, the cost of cutting an iron plate 4/5 inch thick is about 7 1/4 cents per running foot—about half the cost of mechanical cutting.

Special machines are constructed for cutting various objects. The pipe-cutting machine is made in a number of sizes for pipes up to 4 feet in diameter. The nozzles are attached to a frame which is easily adjusted to the proper position on the pipe, and are guided by a small wheel that runs around the pipe. Another machine is designed for cutting flanges and lateral openings in pipes for branch connections. Then there is a machine which cuts oval, round, and square man-holes in large pipes and boilers. In the plate-cutting machine used in very

thick plates the nozzles are moved in a straight line by a long screw and a hand wheel. Finally, there is a "universal" machine which can be arranged to make curved and polygonal cuts of any pattern in addition to the simpler cuts effected by the other machines. A special form of this universal machine is exceedingly useful in taking apart machinery and steel buildings. It operates by cutting off the heads of the rivets, which are then easily driven out.

The range of usefulness of the oxhydic process is very extensive. The process is regularly employed in many rolling mills, boiler shops, and machine shops, and it is used in steel foundries for the removal of runners and sinkheads on castings. It is also employed largely in cutting plates for the hulls and armor of vessels, in demolishing iron vessels and buildings, and in cutting up scrap.

The advantages of the process are well illustrated by the following examples, taken from actual practice. In the dust catcher of a blast furnace, made of 1/2-inch plates, seven openings for branch pipes, each 8 feet in diameter, and four holes over 2 feet in diameter, were cut by two men in 6 hours at a total cost, for labor, gas, etc., of \$15.50. It would have taken two men at least two days to cut one of the large holes with hammer and chisel.

A brace plate for a locomotive base was cut out of a steel plate 3/5 inch thick in one hour. The aggregate length of cutting was 22 feet.

A sinkhead 3 inches thick and 16 inches long was removed from a steel casting in 4 minutes with 40 cents' worth of gas. A sinkhead 1 1/2 inches thick and 10 inches long was cut from the flange of a valve

methods usually employed. An old cruiser, containing 14-inch armor and guns 3 feet in external diameter, was reduced to scrap ready for the furnace in 2 1/2 months. The old method would have required 18 months.

In cutting up scrap precision is not required, and consequently very rapid progress can be made. Four tons of scrap can be cut up in a day by apparatus controlled by one man. With the oxhydic process the work can be done at any place, thus saving transportation charges, and far more cheaply than by the old methods. The process has already been adopted, for cutting scrap, by nearly three hundred railroad machine shops, ship yards, and other establishments.

The oxyhydrogen nozzle of the oxhydic apparatus is cooled by water and other heat absorbed so effectively,

that flame striking back is immediately cooled below the point of ignition, and consequently extinguished, so that all danger of explosion is eliminated. The cooling device also serves the purpose of mixing the gases intimately.

Post Card Instruction.

Consul Frank S. Hannah, in the following report from Magdeburg, tells of the new educational use of pictorial post cards in Germany:

At the recent meeting of the German Geographical Society the idea was advanced for the first time to employ picture postal cards as means of instruction in the schools. The post card industry has made enormous progress in the last few years, and in the last few months cards have been brought into the market illustrative of natural history, political history, and for use in instruction in the German language, which have met with the hearty approval of professors and teachers of reputation.

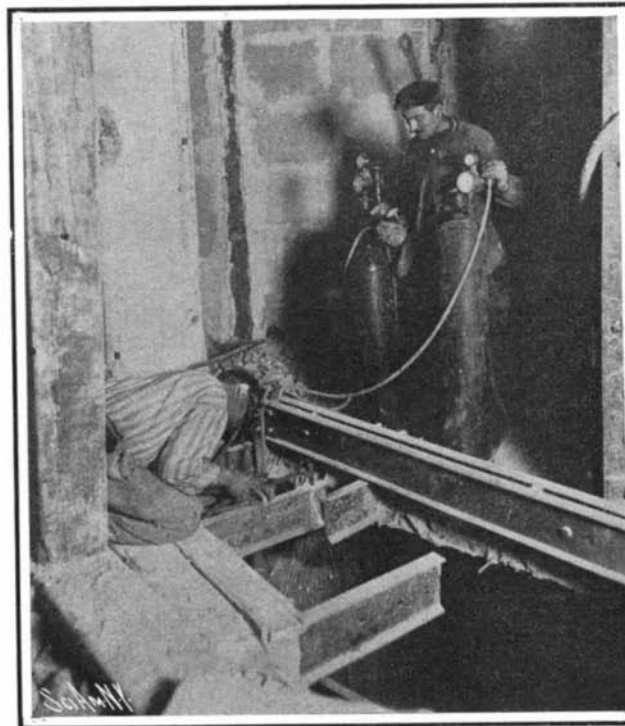
The school museum at Breslau has undertaken to form a collection of these cards, and for this purpose has requested the various publishers to forward them samples of their output, that it may be determined to what extent they may be used for purposes of instruction. Further, two teachers in Leipzig have established a central bureau for mer-

torious post cards of all sorts intended for purposes of instruction, collection, and travel. They have also developed and offer for sale two practical systems for the display and filing of the cards. These gentlemen select and arrange the cards most carefully according to pedagogical principles. Such prominent educators as Harms, Tischendorf, Rudolf Schmidt, and others have indorsed the plan of using illustrated cards as an aid in instruction, and even official bodies, such as the Provincial Schulkollegium in Potsdam, anticipate favorable results from them.

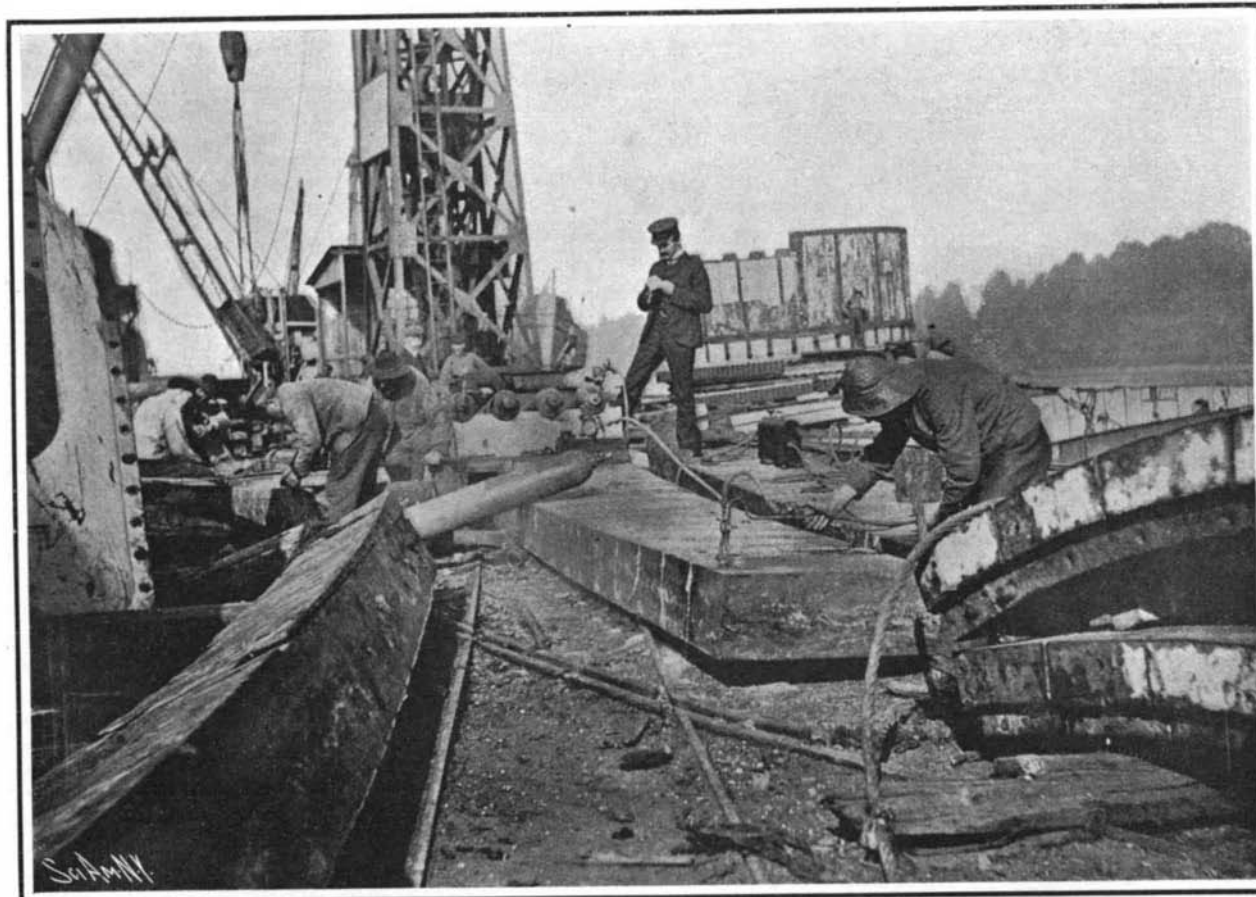
Solfatara, a semi-extinct volcano near Pozzuoli, has opened a new crater 250 feet from the ancient one. It is emitting a voluminous column of sulphurous gases. The activity of Solfatara always is supposed to coincide with the inactivity of Vesuvius.



The Metal-Cutting Equipment.



Cutting a Steel Beam.



Even Thick Armor Plates Can Be Cut with the Gas-Flame.

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case in 3 minutes. Three runners about 2 inches thick and with an aggregate length of 30 inches were cut neatly from the flanges of another valve case in 11 minutes at a cost of 57 cents. The removal of runners and sinkheads with planing and shaping machines is a very difficult, tedious, and expensive operation; and after it is completed it is necessary to send the castings back from the machine shop to the foundry to be annealed. The oxhydic process is applied in the foundry to castings hot from the mold, which are annealed before they go to the machine shop for finishing.

The dome of a blast furnace was removed by cutting it into four parts with the oxhydic apparatus. The actual cutting was done in 70 minutes, and the furnace, with its new dome, resumed operations two days sooner than would have been possible with the