modern battleship. The ship was launched last spring, and is rapidly approaching completion. The spirited photograph of the "Katori" shows this vessel as she was taking the water at her recent launch. The big chains which reach forward from the bow are cables, which are dropped at the moment of launching, and serve by their friction as they are dragged over the ground to check the ship's speed. The ship was named by Princess Arisugawa of Japan, who pulled a cord attached to the small balloon at the bow of the ship and released several pigeons, a characteristic Japanese ceremony.

By-Product Coke.

About 30,000,000 tons of coal are carbonized in beehive ovens every year, 20,000,000 tons being carbonized into coke for blast furnace use and the balance for sundry other manufacturing purposes. In this connection we would like to impress upon your mind the fact that there goes off as waste products from this 30,000,000 tons from 80 cents to $1 per ton. Consequently you can see the advantage of saving these waste products because it is not American-like to see so much waste go into the air. Our friends, the financiers, are usually after the mighty dollar, and they don't like to have it get into the air where they can't get it.

By-product ovens have been in use throughout Germany and other parts of the Continent, and largely in England during the past 25 years. There are no beehive ovens in operation in Germany at the present time.

The introduction into this country was comparatively slow at the first, but the field has greatly increased during the past three or four years. There have been built, or are in course of construction at the present time in the United States and Canada, about 3,950 by-product ovens, about 2,605 of these being of the Otto-Hoffman and United-Otto systems, carbonizing approximately 15,000 tons of coal per day, and about 1,345 Semet-Solvay, carbonizing approximately 8,000 tons of coal per day, amounting in a year to a total carbonization of approximately 8,400,000 tons. It will be seen that, although the number of by-product coke ovens apparently does not approach the number of beehive ovens installed, on account of the difference in the size of the charge and the shorter coking time, the coke made in by-product coke ovens will be much nearer the total coke tonnage of beehive ovens than would at first be supposed.—Mines and Minerals for July.

How the Ox Bow Tunnel was Cooled.

The boring of the Ox Bow tunnel in Idaho is one of the great engineering feats of the age. The Payette River at this point makes a loop, and by putting a tunnel through 1,200 feet, the river bed is left dry for two and a quarter miles. It is the intention to mine the river bed for gold. Experts have estimated its value at from $6,000,000 to $42,000,000 dollars. Ordinarily, the putting through of this tunnel would be a simple matter, but at 300 feet from the upper end and 250 feet from the lower, hot water was struck. The heat at first was from 95 deg. to 105 deg., increasing as the work progressed to 132 deg. at the hottest point. Different fans and blowers were experimented with to cool the air in the tunnel, but without success until William Flick, the superintendent of the work, thought of spraying the walls of the tunnel with water pumped from the river. Very simple pumping apparatus and common garden sprays were used with complete success. The tunnel is 28 feet wide and 9 feet high, and the flow of hot water amounted to 75 miner's inches. The cold water so cooled the hot water that it was caught in sumps and pumped out with common pumps.

THE FUTURE UNIVERSITY OF CALIFORNIA.

BY ENOS BROWN.

Five years ago the most noted of European and American architects engaged in a competition to provide the University of California with plans and suggestions for buildings and their arrangement in reference to the site. The competition was held in Antwerp, and the response to the invitation was general. Of the number exhibited, about ten were commended for future consideration, and from these the one designed by M. Benard, of Paris, was selected as the most meritorious. The successful architect subsequently visited the university, and, in conference with the regents, his design, with some necessary modifications, was adopted and definitely settled upon as the one to which all new erections for university purposes should be subordinated.

The architect of the university, John Galen Howard, has recently completed a plaster cast of the site, with the location and detail of the buildings now being erected and of those it is contemplated building as the necessary funds are provided.

The site of the University of California is incomparable. By a gentle ascent it rises from the shores of the bay, from which it is distant about two miles. The entrance is 100 feet above sea level, but, within the grounds, the slope is more abrupt, climbing the low coast range until at the crest, upon which the observatory will stand, a height of 597 feet is attained.

CAST OF BUILDINGS OF THE UNIVERSITY OF CALIFORNIA.

The profile is undulating and the view wide. The small buildings immediately below the observatory are dormitories, and to the right of the picture are the amphitheater and, in order, the department for chemistry, physics, mathematics, clock tower, languages, library, California hall, zoology, agricultural, botany, history, library extension, physiology, and hall for alumni. The large building to the right is the athletic field and accompanying gymnasiums. To the left of the central roadway, from the top, is the dining hall, geology, mining, electrical, mechanical, and civil engineering buildings, museum, fine arts, pathology, physiology, anatomy departments, with mansion for the university president. Even on the minute scale at which the cast has been made, the architectural type and general appearance of the buildings have been faithfully shown. The structure in the central basin is the great auditorium for gatherings of faculty and students. The dome of this structure will dominate the entire group.

Considerable progress has already been made in the erection of new buildings based upon the general plan. The concrete amphitheater is completed and the president's mansion, California hall, and mining building are in a state of advancement, while funds have been provided for the new library. The older structures, that now serve a necessary purpose, will be dispensed with as soon as possible. In time the plan will be complete; and no institution of learning in the world will be so magnificently housed. It is not as yet estimated what the cost will be, but many millions will be required. The munificence of individuals with the generosity of the State are confidently looked upon to supply the necessary funds.

A Novel Smelting Process.

A novel smelting process patented by the Köln-Müsener Mining Company in Kreuzthal is receiving much attention in German engineering circles. This process is intended to be used mainly in the operation of blast furnaces, its object being to open with extraordinary rapidity any closed blasting molds or obstructed tapping holes. It further serves to dismount rapidly any kind of iron construction. It may be mentioned that about fifty mining works have already secured licenses under the patents.

The risk and heavy loss involved in blast-furnace operation whenever the tapping hole does not open normally, and the hard and oftentimes useless work of many hours in chiseling through the hardened mass with steel rods, are known to every metallurgist. There is the risk of the rising liquid pig iron reaching the water-cooled cinder molds and the tuyeres, which may result in fatal explosions and bursting. All these difficulties and risks are entirely done away with by the Köln-Müsener process, which is carried out in a few minutes, and frequently in less than one minute.

The process consists in heating the mass to be melted in one of its points by any means, to the combustion temperature of its combustible components, after which oxygen is thrown against it under high pressure. The local combustion heat in the concentrated oxygen current is so enormously high that the neighboring parts will at once become liquefied.

To preheat the material an oxy-hydrogen flame is used to advantage in most cases, while electrical arcs, for instance, can also be used for this purpose. In the latter case it will be possible to pierce cold armor plates of 200 millimeters (8 inches) diameter in about 10 seconds. The current from two accumulator cells that furnish 120 amperes at 2.3 volts will be quite sufficient. The fact that this process renders it possible to remove the iron before the copper from assembled iron and copper plates without any prejudice to the copper, will be found interesting and important for many purposes. This will prove of importance also for blast-furnace operation, it being possible to melt into the extensions of copper or bronze blasting molds or cinder molds without any risk to the copper.

The process will further prove rather valuable whenever dismounting work is to be performed at short notice, the operation being reduced to a few minutes' work, while the cost as compared to the efficiency is quite negligible. It is true that the construction of special types of apparatus is required to enable the process to be carried out safely.

The Academy of Sciences of California has just fitted out and dispatched an expedition to the Galapagos Islands. The expedition has sailed in the schooner yacht "Academy" for Enseñada, Mexico, and after taking out clearance papers there, will visit the following Mexican islands: San Benito, Natividad, Cerros, San Benedicto, and Socorro. After leaving Socorro, the expedition will proceed to Cocos Island, and thence to the Galapagos Archipelago. The chief work of the expedition will be at the Galapagos, where a year will be spent in studying the natural history and collecting specimens for the museum of the Academy of Sciences.