Acetylene Standard for Photometry.

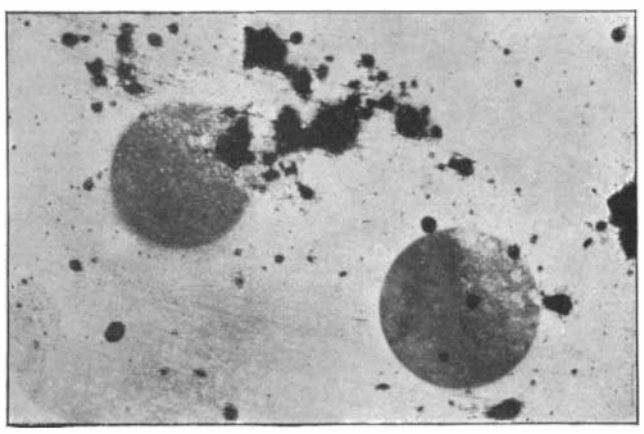
The practical advantages of flames as standards of light have led to their almost exclusive employment for this purpose at the present day. A gas of constant chemical composition, burning under defined conditions, must admittedly form a useful accessory standard. Acetylene, the importance of which has been shown in a masterly study of it by M. Berthelot, appears to be well adapted for the purpose. M. Moissan has found the means of readily preparing the gas in a pure state by the action of water on calcium carbide, which is easily manufactured in the electric furnace. If acetylene is consumed under slight pressure in a burner which gives a broad, shallow flame, the latter is quite steady, very bright, remarkably white, and, for a fairly large surface, of practically uniform luminosity. By placing in front of the flame a screen with an opening of fixed dimensions, which can be varied for particular cases, a source of light well fitted for ordinary photometrical observations is obtained.

These principles were enunciated last year at a meeting of the Société Francaise de Physique, and M. Charpentier (for whose valuable assistance my thanks are due) has constructed for me a standard lamp embodying them, and easily used. The acetylene, issuing from a small conical orifice, draws in the required air, and then passes through a narrow aperture into a tube in which mixing occurs. This tube ends in a steatite batswing burner, like those employed for illuminating gas. Either the whole or a clearly defined portion of the flame may be used. In the model employed, the flame is inclosed in a small chamber, one of the sides of which is provided with an iris diaphragm, enabling any desired number of candles to be secured. Another side is made to accommodate plates with previously calibrated apertures. The whole flame corresponds to more than 100 candles, under a pressure of 0·30 meter of water, and a consumption of 58 liters (2·049 cubic feet) per hour. The illuminating power of acetylene is therefore more than twenty times that of coal gas burnt in a Bengal burner, which gives 1 carcel (9 6 candles) per 105 liters (3·708 cubic feet), and at least six times that of coal gas consumed in a Welsbach burner, which gives one carcel per 30 liters (1·059 cubic feet). Moreover, spectrophotometry shows that for the whole length of the spectrum, from C to F, the light from acetylene differs little from that of platinum in a state of fusion. The latter is employed as the absolute unit, and it is so related to the candle that this is defined as one-twentieth of that unit. Photography, which offers the best means of studying rays of small wave length, shows that in the flame of acetylene there is an actinic intensity, which should prove of most valuable service.—M. Violle in Comptes Rendus.

RADIOGRAPHY.

In the March number of the Red and Blue, of the University of Pennsylvania, is given an account of Roentgen photography and some experiments made at the university in the same direction by Dr. Arthur W. Goodspeed, assistant professor of physics. These experiments were successful repetitions of the experiments of Roentgen and others, together with original work; but the item of greatest interest was contained in the last clause of the article referred to, which we produce, together with cut of the first shadow picture, for which we are indebted to the magazine above mentioned.

In the year 1890, Mr. Jennings, of Philadelphia, had associated himself with Dr. Goodspeed in experiments on spark photography. One evening, the 22d of February, 1890, at the close of work, with the table still littered by plate holders and apparatus, Dr. Goodspeed brought out the Crookes tubes for Mr. Jennings' amusement. Next day that gentleman wrote that he had had a curious failure among his plates—a negative spotted by two disks; but since no one could explain the phenomenon, comparatively uninteresting as it was, the plate was thrown aside and forgotten. Six years later after the discovery of the Roentgen rays, it was recalled to mind and recovered. A duplicate was prepared under exactly the same circumstances; both plates exhibited the same indications of genuineness—the sharp line at one edge of the disk, the dull line of shadow at the farther edge. These photographs the Red and Blue has the honor of presenting for the first time. It was in a lecture on the evening of University Day that Dr. Goodspeed told the story, and concluded thus: "We can claim no merit for the discovery—for no discovery was made. All we ask is that you remember, gentlemen, that six years ago, day for day, the first picture in the world by cathodic ray was taken in the Physical Laboratory of the University of Pennsylvania."



THE FIRST SHADOW PICTURE IN THE WORLD.
Taken by accident at the University of Pennsylvania, February 22, 1890.

DR. CHANTEMESSE, of Paris, has it is said discovered an anti-typhoid serum, with which he has experimented on three patients. After the first hypodermic injection they passed through the ordinary stages of the disease and became convalescent.

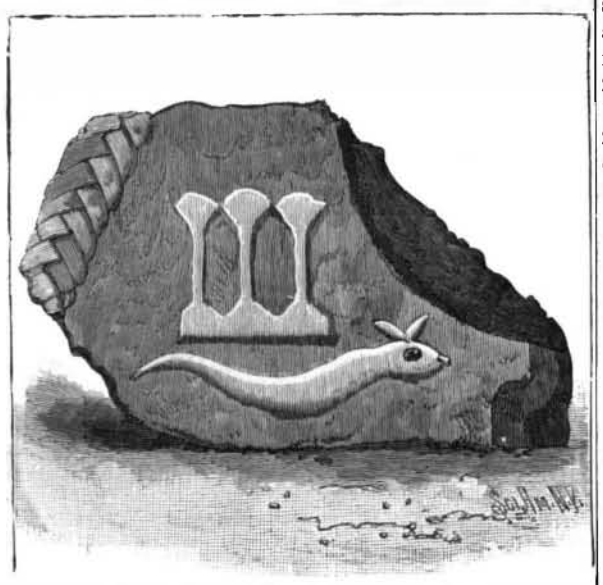
AN INTERESTING ARCHÆOLOGICAL DISCOVERY.

We have received the following letter from Mr. George E. Raum, late of San Francisco:

Cairo, Egypt, February. 29, 1896.

To the Editor of the SCIENTIFIC AMERICAN:

Dear Sir: I inclose a rough sketch of a portion of the rock crown of the Sphinx found by me. This portion of the stone crown or diadem of the Sphinx was found at the bottom of the temple, between its forepaws, on February 26, 1896. Originally this stone crown was in all probability ten feet broad and as high



CAP OR DIADEM OF THE SPHINX.

again, with a stone stem seven feet long, which fitted into the perpendicular hole in its head, to hold it on. We now know how the Sphinx originally looked.

Yours truly, GEORGE E. RAUM.

This discovery of Col. Raum is of great interest, though the statement of the find has been received with incredulity in some quarters. The arguments of the gentlemen who are inclined to disbelieve in the authenticity of the stone found are not convincing, being principally based on the fact that the temple has been excavated by several modern explorers—Caviglia, Mariette, and M. Maspero. Again, others state that "it is not usual to hear of holes 'drilled' by the ancients in their monuments," but the Egyptians worked hard stones with bronze saws set with corundum or diamonds, and for tubular drilling they had tools like our modern diamond rock drills (see Engineering, xxxvii, page 282). Another point which has been made is that there are three lotus columns on the cap. This is more reasonable criticism and may possibly be satisfactorily explained. The fallibility of Egyptologists is well known, but until some really convincing proof is brought forward, it is probably safe to believe that the marked stone found by Mr. Raum is the cap or diadem of the Sphinx.

The Egyptian Sphinx was usually an emblematic figure representative of a king, and may be considered, when with the head of a man and the body of a lion, as the union of intellect and physical force. The Great Sphinx lies about 1,800 feet southeast of the Great Pyramid of Gizeh. It is a recumbent androsphinx, or man-headed lion, hewn out of a natural eminence in the solid rock. Owing to certain defects in the rock, these faults were remedied by a partial stone casing, the legs being likewise added. The addition of these pieces militates against the argument that the cap so recently found could not have belonged to the Sphinx, as it did not form a part of the solid rock. An excellent idea of this hoary monument of antiquity may be obtained from the engraving in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 864. The Sphinx has been variously measured. The figures given by Mr. E. L. Wilson are length, 155 feet; height from the base, 63 feet. Between the paws is a temple (?) which speedily fills up with sand after being excavated. It is considered that the Sphinx is older than the Great Pyramid. Various interpretations have been given to this boldly sculptured figure which rises out of the waste of sands. Cambyses mutilated the face of the Sphinx, and it may have been at this time that it lost its cap.

The brow of the Sphinx is nearly 14 feet broad; so the cap, which is 4 feet 6 inches long at the bottom, probably only formed the tip of the cap, as stated by Mr. Raum. Col. Raum obtained permission to excavate in and around the Pyramids and Sphinx from the Egyptian government. He came upon the cap at a depth of fourteen or fifteen feet below the surface in the temple (?) between the forepaws. The stone is painted red in the decorations, as was in order, as the countenance of the Sphinx was originally of a reddish hue. The cap is irregular in shape, measuring 2 feet 2 inches at the top and 4 feet 6 inches at the bottom; on the left side, from top to bottom, it measures 2 feet 8 inches. The left side has a conventional decoration. In the center are three lotus columns and a fish, on the right side is a portion of the sun's disk. The wonderful discoveries conducted by Mr. L. De Morgan, at Dahshur, Egypt, are described in the current issue of the SUPPLEMENT. The tomb of Queen Khnemit was unearthed by the discoverer and a beautiful golden crown and other ornaments of elaborate workmanship were found.

Fire from Steam Pipes.

The burning of the Warren (R. I.) cotton mill having been attributed to the carbonizing of the wooden lagging on the cylinder of the large quadruple expansion engine, again brings up the possibility of wooden coverings to steam pipes taking fire without the presence of a spark to start the combustion, and some recent investigations by the Boston Manufacturers' Mutual Fire Insurance Company are of considerable interest. In a report of these investigations, appearing in the Providence Journal, several instances are given where wood coverings, although separated from steam pipes by several thicknesses of hair felt and other coverings, became badly charred and in several instances actually took fire.

Mr. Edward Atkinson, president of the company, says that it is sometimes held that this finely carbonized wood will not ignite from any cause except actual contact by spark or flame from an outside source. In proof that charcoal in a porous condition will ignite from the sudden influx of fresh air, he cited an example in his own experience.

Having had occasion to test heat-retarding substances on his own behalf, he once obtained some sections of prepared wood pulp in slabs of 1½ inches in thickness and of a very porous quality, which are made use of in the construction of refrigerators. His purpose was to determine whether or not such slabs could be used to prevent the escape of heat from a lamp oven. He therefore raised the heat of the inner oven, which is a tight inner iron box one inch distant on all sides from an outer case made of vulcanized and very solid wood pulp, to a little under 400 degrees. In the center of that inner oven, isolated from any metallic contact with the wall, was placed one of these slabs and there left subject to heat at less than 400 degrees for about one hour. He then removed the front of the outer oven and opened the door of the inner oven, letting a very quick and large supply of fresh air into the chamber, in which the oxygen had probably been in part exhausted by subjection to the hour's heat. The slab of wood pulp had turned from pure white to dense black, having been converted into very porous charcoal. In less than a minute after the fresh air was let in it took fire and burned to ashes. He repeated the experiment with the same result. Four hundred degrees Fahrenheit will be developed by a pressure of steam of 238 pounds per square inch, but the same carbonization ensues by lapse of time even at boiling heat, or 212 degrees, as has been proved.—The Engineering Record.

Life of a Cannon.

La Nature contains a short note in which the horse power of a cannon is calculated. An Italian cannon of 100 tons with a charge of 550 lb. of powder and a shot weighing about 2,000 lb., will give an initial velocity of 523 meters per second; the length of time during which the powder acts is less than one-hundredth of a second, from which it follows that the horse power developed is about 17,000,000. The writer adds that after about 100 shots the cannon is put out of service and its total active life is, therefore, only one second! In large modern cannon the horse power runs as high as 24,000,000. If the writer had carried out these calculations still farther, he would have found that, after all, this 24,000,000 horse power does not represent a large amount of energy, as it would be just sufficient to run 31 incandescent lamps for only one day.

PROFS. AYRTON and Medley find that incandescent lamps appear to increase in effectiveness during the first 80 or 100 hours of use, after which the light slowly fails.