## Correspondence.

### High Pressure from Calcium Carbide.

To the Editor of the SCIENTIFIC AMERICAN:

In making a series of experiments for an acetylene apparatus, I have been astounded at the terrific pressure I could obtain practically instantaneously with the calcium carbide. My apparatus was a four-foot piece of steel pipe tested to 600 pounds to the square inch. It is capped on the bottom. The top cap is drilled for a stuffing box with gland nuts; a turned steel shaft runs through the stuffing box, on the end of which a carbide basket is hung made of ordinary wire. The pipe is filled to about six or eight inches from the bottom with water. A release cock for the air, and a pipe for screwing on a steam gage are tapped in the stuffing box. The gage reads to 400 pounds. On lowering the shaft touching the carbide to the water and forcing the air out, a second quick plunge forces the gage around to 400 pounds in three seconds.

It may and should be that this instantaneous raising of high pressure can be applied to some mechanical and commercial use, such as pressing cotton, baling hay or even as an explosive. The idea is offered to those of your readers, who can make a mechanical and commercial use of it. GEO. HUSTON.

Sandon, B. C., October 14, 1902.

### Do Mussels Move?

To the Editor of the SCIENTIFIC AMERICAN:

Some time ago I read an article on the pearl button trade of the Mississippi and Arkansas Rivers, and in it found the following paragraph: "Authorities differ upon the question of whether mussels move or not, except as the water makes them or they fasten onto some moving object that touches them, but the fact that sand and mud deposits kill them seems to establish their inability to move without assistance." I was reared on the Tennessee River, and lived for a number of years near the Colorado, in Texas, and have had ample opportunity to make observations on the characteristics of the mussel. I can state emphatically that mussels do move. I have watched them for an hour at a time. They elevate themselves with the open part of the shell down; a mussel six inches long and three and one-half or four inches wide will make in moving, two parallel lines about one and one-half inches wide. Their method of locomotion is to protrude sufficiently out of the shell and operate on the same principle as a snake, moving very slowly. If the water is disturbed in the slightest manner they will close their shell at once and fall over. I do not suppose they can hear, but of course they have sensation. The fact that mussels are covered up by sand deposits and destroyed is no argument against their locomotion. The mussel is a very slow mover, and the debris of a river moves rapidly during a rise, and of course the mussel is unable to reach a place of safety. In the West I have seen hundreds of fish drowned in the sudden rise of a stream caused by a waterspout. It is not strange, then, that the slow-moving mussel should be killed by the same cause. E. H. OLIVER.

Gary, Fla., October 6, 1902.

### Smelting With Oil.

BY C. W. ARTHUR.

Under the auspices of the Oil Blast Furnace Company, a crude-oil-burning smelter recently erected in Los Angeles was given its first run on October 1.

The test was made on a quarter of a ton of copper ore that had been taken from a mine in San Bernardino County, Cal.

Several hundred pounds of iron slag were first run through the furnace for preliminary heating purposes, after which came the test, fully 60 pounds or about 13 per cent of pure metal being the result. The smelter is a very crude affair, with a capacity for ten tons per day, it being the intention to construct a first-class apparatus as soon as all necessary arrangements are perfected.

A Connersville blower, an improvement upon the old Root process, was employed upon the air blast by which the crude petroleum was sprayed in the furnace. It worked at the rate of three and one-half cubic feet per revolution, although its utility in that respect is somewhat regulated by the size of the furnace, and it is capable of operating at different speeds. Its power in the test was derived from a miniature engine which was designed by F. P. Pettingill (who also designed the smelter), which, while operated by gasoline, was built upon principles identical with those using steam.

The air becomes heated to a degree equivalent to 400 deg. Fahr. before reaching the furnace, thus obviating any objectionable features that might exist by reason of transmission of air in a cold state.

Much is claimed for the new process, especially upon the basis of cost. It is said that a saving of from one-fifth to one-quarter can be made upon the item of coke alone, and that ores of an exceedingly silicious character can be handled, provided a reasonable percentage of other rock is also treated.

### Electrical Notes.

In studying the heating effects upon the poles of a spark-gap, as affected by the variance of the inductance of the circuit, Mr. B. Eginitis uses Tesla coils without a core, and poles of fine wire. The brightness of the aureole varies at first inversely as the heating effect for all metals examined. At high inductance, both the temperature and brightness increase with increasing inductance—at least, in iron and steel. A closer study of the effects by determining the temperatures of the poles was made with the aid of a thermoelectric couple. The metals examined include aluminium, copper and silver. The heating first increases rapidly with increasing inductances, and then breaks into a succession of maxima and minima. The presence of metallic vapor is not a primary factor in the heating effect, as is shown by the fact that at small inductances the brightness of the spectrum decreases with increasing inductances, whereas the heating increases very rapidly.

At a colliery in the Dortmund district of Prussia it was required to dismount a horizontal arm of the pump rods; but this was found impossible, owing to the rusting of the bolts and cotters, while the part in question could not be cut through by hammer and chisel on account of the small space at disposal. It was, therefore, determined to effect the separation by means of the electric arc. The energy employed was obtained from a continuous-current dynamo generating 320 amperes at 110 volts, which served for lighting, the negative pole being put in connection with the pump rod and the positive with a carbon of 20 millimeters diameter, held in a well-insulated gas pipe. The latter was fitted with a rest, so that the carbon might be guided by hand, and, for preventing danger from fire, a bucket filled with sand was placed under the spot where the melting was to be effected, while a small hand-pump was also held in readiness. For protecting the men's eyes from the bright light red and green glasses were provided, to be held in the hand. The work was carried through with a current of 320 amperes at 60 to 70 volts, the carbon point being held from 40 to 50 millimeters away from the point to be melted in such a manner that a vertical slot of 20 to 30 millimeters was formed, and then gradually deepened. The guiding of the carbon, which became more difficult as the depth increased, had to be effected in the upward direction, so that the molten iron might fall in drops. The work was performed by six men, who relieved one another every hour or half-hour, in about twelve hours altogether, including a few interruptions. No inconvenience was experienced by the men during the operation; but afterward all of them felt more or less severe pains in the face and hands, while those who did not always use the glasses also suffered in their eyes. The pains, however, lasted only a short time.

Aerial telegraphy is soon to be used extensively in France, if the projects of the recently-formed Paris company are to be carried out. The company, which uses the Popp-Branly system, is shortly to install a central station in Paris of a novel character, and subscribers all over the city will receive the news of the day by wireless telegraphy. The main station will be in connection with the telegraph, telephone, and with the aerial posts outside the city, so that it will be in a position to keep the subscribers posted as to all occurrences of importance, stock quotations, results of races, etc. A certain number of trial posts have already been installed and the system is found to work well. It only remains to apply it on a large scale, and for this the company has been waiting for an authorization from the Minister of Posts and Telegraphs. The company will apply a number of ingenious schemes to supply the subscribers with news. To obtain the results of the races, for instance, which are generally held near Paris, a wireless telegraphy mast will be permanently installed in each race track. An automobile will be fitted out with all the necessary instruments and will constitute thus a movable post. On the occasion of the races it will proceed to the track and connect with the mast, and will thus be able to send all the details of the events to the main station, which in turn transmits them to the subscribers. An extensive system is to be organized on the coast of France. The government has already authorized the company to establish two posts at Havre and Barfleur which will be the beginning of a system which will unite the coasts of France and Algeria. Such a system would be of great value. In the first place, collisions at sea would be rendered almost impossible. Provided with aerial telegraphy outfits, ships could not only signal to the coast at a distance of 150 miles, but also with the ships in the same waters. In case of disaster help can be demanded from the shore or from neighboring vessels. For the national defense the application of such a system is at once apparent. At 150 miles from the coast a simple torpedo boat could announce the approach of the enemy's fleet, and the posts would send the news all along the coast and to the interior.

### Engineering Notes.

Reports have been submitted to President E. H. Harriman, of the Southern Pacific Railroad, for the construction of a tunnel nearly seven miles long through the Sierra Nevada Mountains, at a cost of about $14,000,000. Such a tunnel would cut down the summit grade about 1,500 feet, and would enable the company to dispense with all but three of the forty-two miles of mountain snowsheds.

Instead of blowing down coal in mines by means of dynamite, an Englishman intends to make use of a hydraulic cartridge, which is said to obviate the wasteful shattering of the fuel. The cartridge is 20 inches in length. Orifices along its sides admit of the application of a pressure of some 3 tons per square inch. The total pressure is about 60 tons. When inserted in a hole the cartridge is coupled up with a small hand pump. It is said that in a few minutes after the apparatus has been at work, the coal breaks up and falls in great blocks. About 1½ pints of water are used in the operation. One colliery proprietor who has adopted the invention for use in three mines computes that each cartridge saves $75 per week.

"I remember," said a bridge contractor some time ago while on the subject of workmen's dare-deviltries, "when working at the big bridge across the Niagara, when the two cantilever arms had approached within fifty feet of each other, a keen rivalry as to who should be the first to cross sprang up among the men. A long plank connected the two arms, leaving about two and a half feet of support at each end. Strict orders were issued that no one should attempt to cross the plank upon penalty of instant dismissal. At the noon hour I suddenly heard a great shout from the men, who were all starting up. Raising my eyes I saw a man step on the end of that plank, stop a minute, and look down into the whirlpool below. I knew he was going to cross, and I shouted to him, but he was too high up to hear. Deliberately he walked out until he reached the middle of the plank. It sagged far down with his weight until I could see light between the two short supporting ends and the cantilevers on which they rested. He saw the end in front of him do this, hesitated, and looked back to see how the other end was. I thought he was going to turn. He stopped, grasped both edges of the plank with his hands, and, throwing his feet up, stood on his head, kicking his legs in the air, cracking his heels together, and yelling to the terrified onlookers. This he did for about a minute—it seemed to me like forty. Then he let his feet drop down, stood up, waved his hat, and trotted along the plank to the other side, slid down one of the braces hand over hand, and regained the ground. We discharged him, of course, but what did he care? He got all the glory, his fellows envied him, and he could command work anywhere."—Cassier's Magazine.

John Smeaton in 1752 was the first man who ever styled himself a civil engineer, and in the one hundred and fifty years the business has ever been growing more and more of an exact profession, till now it is of equal importance with any of the learned professions, and demands as high a quality of intellect. The business of mining engineering has not as yet reached so high a standard, but is destined to surpass it. The old rule of thumb is being rapidly discarded, and the advance is noticeably greater in the last twenty years than in the preceding one hundred and thirty years. Like the miner, who has had to grope his way painfully upward, the mining engineer has had to be creative in his functions, and cause a demand before furnishing the correlative supply. The scope of the mining engineer is becoming a tremendous one in variety and requirements. He is becoming the master and interpreter of protean forces, and in his functions combines the powers of many branches of practical science. Indeed, all the modern arts and sciences, so far as they apply to mechanics, come under the domain of the mining engineer, for nearly everything to make up modern mechanical progress comes in somewhere as a part of the great mining and metallurgical industry, whether it be the whole railroad system of ore transportation, the pneumatic method in converters, the best efforts of the electrician, the most complex and far-reaching process of the chemist, the keenest effort of the geologist, the profoundest demonstrations of the mathematician. Thus the educational equipment of the mining engineer is becoming necessarily as much more complex than it was as are the appliances at his command in contrast with the simple devices of a generation ago. And if the demands for capacity and knowledge seem great, it is to be borne in mind that the rewards are proportional and commensurate. No youthful profession on earth pays higher salaries to-day than are paid mining engineers, and the world of great mining enterprises stands ready to pay a man the value he himself sets upon his services, provided he can demonstrate his worth as a matter of economy—economy in this regard meaning the judicious expenditure of money.—Mining and Scientific Press.