Correspondence.

Impracticability of Cement Tiles.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of the 10th instant of the SCIENTIFIC AMERICAN is an inquiry for cement tile, by John R. Spears. He seems to have overlooked the fact that the farm drainage tile is porous, water going through its sides the same as through the earth. Cement tile might be used for glazed tile, for watertight or sewage purposes. Yours truly,

Wayne, Neb., February 12, 1906. C. E. BARTLETT.

A Centigrade Photometer.

To the Editor of the SCIENTIFIC AMERICAN:

I was much interested in the article by Mr. Butzing, "A Unit for Light Measurements and a Centigrade Photometer," in SCIENTIFIC AMERICAN of January 27, p. 91. His suggestions are very good. I would suggest to use a selenium cell in connection with a galvanometer, to indicate the intensity of light on a graduated scale, the same as we read the steam pressure on a steam gage. This photometer might be either permanent, intermittent, self-recording, or not. To save current it might be so made that it could be turned on or off at will. Of course, this photometer would hardly be as accurate as the ones now in use, but for ordinary purposes it would certainly be sufficient, and above all it would be handy. But I would suggest that zero should be absolute darkness, so as to avoid the nuisance of above and below zero. But make it Centigrade by all means.

Is there any chemical that would make paper permanently a fairly good conductor of electricity, so that electricity would pass through it? If paper would not do, I could use cloth. REV. JAMES WALCHER.

Tintah, Minn., January 29, 1906.

[Acetate of lead, sodium chloride, or carbonate, and many other salts dissolved in water and absorbed in paper, will render the paper a fairly good conductor of electricity. If, however, the paper must be dry, these will not answer. Plumbago incorporated in or surfaced upon the paper would perhaps answer the purpose. The question conveys nothing of the use intended, and we are at a loss for an answer.—ED.]

Refractory Lining for Gas-Engine Cylinders.

To the Editor of the SCIENTIFIC AMERICAN:

I have read with a good deal of interest Mr. Howell's interesting article on "A Rational Method of Cooling Gas-Engine Cylinders." It might be interesting to him to know that Mr. C. C. Bramwell, of Hyde Park, Mass., tried this system of piston and cylinder construction on an air-cooled motor for automobile work on ordinary lines early in 1901. That part of the cylinder, where the packing rings were, was made of steel and was unjacketed; the upper part, where the explosion and expansion took place, was of copper.

He found that as far as lubrication, etc., went the motor gave him no trouble, but that it was necessary to water-jacket the head in order to prevent pre-ignition.

It seems to be a generally accepted belief that all the good that a water jacket does is to prevent preignition and make possible the successful lubrication of the cylinder. I have reason to believe, however, that when an engine becomes overheated quite an amount of the loss of power may be caused by the expanding of the incoming charge due to its contact with the cylinder walls and the residual exhaust gases of the last explosion, thus preventing a full charge being taken into the cylinder. It can easily be seen that, if this is so, the higher the speed of the engine the less the loss from this cause would be. The same result could, of course, be secured by opening the inlet valve late in the stroke.

Of course, the first thought that comes to one's mind on hearing this argument for the first time is the matter of the Diesel engine. Now, as a matter of fact, the Diesel engine has not nearly as high a maximum temperature as the ordinary Otto cycle engine, and since an excess of air is always used in this engine it is evident that less heat units are developed from the combustion of the fuel and therefore there is proportionately less heat carried off by the water jacket or other cooling device; hence it is only reasonable to suppose that the mean temperature of the cylinder walls is lower, and therefore we would not be as likely to suffer from this result of overheating as with the ordinary Otto cycle. Furthermore, as in this Diesel cycle an excess of air is always used, this effect of expanding the incoming charge would probably do no harm anyway.

Mr. Howell, however, speaks about compounding. If this were done it would probably be advisable to use all the fuel that the oxygen of the air would unite with and perhaps to begin the admission of the fuel during the last of the compression stroke, thereby departing from the Diesel cycle in these two particulars. This would be necessary in order to get the highest possible terminal pressure so as to get the greatest advantage from compounding. I feel, however, that Mr. Howell's estimate of the possible terminal pressure is somewhat high and that the advantage of compounding is somewhat doubtful. HAROLD H. BROWN.

Boston, January 25, 1906.

Time Signals from Electric Lights.

To the Editor of the SCIENTIFIC AMERICAN:

In modern life it is quite desirable that the people have a simple, inexpensive, and ready method of setting their clocks and watches to the correct time, at least once a day. In many cities and towns in the United States the correct time is distributed daily, by means of government time signals, telegraphed throughout the land at twelve o'clock noon. The Western Union Building, New York, and the Prudential Building, Buffalo, are provided with time balls. The ball drops at precisely twelve o'clock. Comparatively few of the inhabitants of those cities can make use of such signals. These can be seen only from certain positions and directions, and at short distances. Moreover, they can scarcely be seen, at any considerable distance, during rain and snow storms.

It recently occurred to the writer that time signals might be transmitted to nearly all the inhabitants of cities and towns which have central electric lighting stations. The proposed method, in its simplest form, may be described as it might be used in a town which has only one electric arc lighting circuit. At precisely nine o'clock each evening the attendant at the central electric lighting station would open the switch for a moment. All the arc lights on the circuit would blink at the instant of opening the switch. The speed of the electric current is about sixteen thousand miles a second, and the time required by the arc in blinking, or dying down to a red glow, is perhaps only about a quarter of a second after the opening of the switch.

In cities and towns where many electric arc lighting circuits radiate from one central station, the attendant at the electric lighting station might open the switch of circuit No. 1 at nine o'clock in the evening, the switch of circuit No. 2 at fifteen seconds past nine, and so on, until he had momentarily opened the switches of all the circuits radiating from his electric-lighting station. A printed card, in each house, might tell the inmates at exactly what time each arc-lighting circuit would momentarily be opened, and its lights in consequence caused to blink. Instead of printed cards, the local newspapers might contain this information once for all.

Time signals might also be transmitted in a similar manner on incandescent lighting circuits connected with central electric-lighting stations. Where the houses are fitted with incandescent lamps, on circuits connected with central stations, the convenience of incandescent electric lights as time signals would be even greater than that obtainable by arc lights.

In large stores and factories, it might even be advisable for the attendant at the dynamo to transmit a time signal throughout the establishment, at a certain hour each evening. All the employes would thus be enabled to secure the correct time while engaged in their regular vocations. The method might be used in order to distribute time signals on railway trains and ships. All the incandescent lamps might be caused to blink at a certain hour. Hence all the passengers might receive the correct time. The attendant at either a central station or a local plant might secure the correct time for transmission in one of several ways:

1. He might carry a well-regulated watch which could be compared with the government daily telegraphic time signal. 2. A telephonic time signal might be sent to him from some establishment in which a good regulator is already installed, and which is compared daily with the government telegraphic time signal. 3. An electric bell might be placed near the switches, and might be in a circuit connected with an establishment which contains a good regulator. A person in such an establishment might transmit a time signal to the attendant at the central station, shortly before nine o'clock each night. 4. A clock, synchronized hourly by one of the telegraph companies, might be set up near the switches, in the central electric lighting station.

If possible it would be well to have all the switches momentarily opened at nine o'clock, or other suitable time. But this would require an attendant at each switch; hence it would be impracticable. Perhaps inventors can devise a form of compound switch, supplementary to the ordinary switches, whereby one attendant might cause all the electric lights in all the circuits connected with one station to blink simultaneously.

The residents of a city using such time signals as I have herein proposed, would not only be enabled to secure the correct time daily, but also they would be enabled to regulate their clocks and watches with a high degree of accuracy and precision. The user of a watch, on leaving the city for a time, would be enabled to place more reliance upon his time-keeper.

In conclusion, it may be pointed out that one or more arc lamps can be seen from nearly every house in a city, even during heavy rain and snow storms. Hence, nearly all the inhabitants might receive the correct time each evening, without leaving their houses; and, where electric lamps are used in the house, the inmates need not even look out of the window in order to receive the time signal. Moreover, the system, in its simple form, need not cause the outlay of a single dollar. JAMES ASHER.

253 Hickory Street, Buffalo, N. Y., February 12, 1906.

LIGHT POWER BOATS AT THE SPORTSMEN'S SHOW.

The most noteworthy development at the 1906 Sportsmen's Show, now being held in Madison Square Garden, is the application of the gasoline motor to all kinds of light craft for the purpose of propulsion. So far-reaching is this, that it extends even to St. Lawrence skiffs and to canoes. A portable apparatus that may be attached to any small boat in a few minutes, and which will be found illustrated on page 189, forms a further novel method of applying a motor to a light boat.

Among the various light launches exhibited, those built of steel are rather prominent on account of several unquestionable advantages—lightness, water-tightness, and the fact that they are non-sinkable—to be had from this form of construction. Two forms of small 16-foot launches of this type are shown on page 193. One of these is constructed of steel strips fastened together and to the framework by concealed galvanized steel rivets. As these rivets are not exposed to the weather, it is claimed that they can by no possibility rust and cause the boat to spring leaks. Another form is the smooth-skinned, pressed-steel boat, which is made of plates of steel pressed to the proper shape in powerful drop presses. The Michigan Steel Boat Company's craft is an example of the former, and the Mullins Company's boats of the latter construction.

The Michigan boat, as can readily be seen, is a very neat clinker-built launch 16 feet in length. It is fitted with an extremely simple, 1½-horse-power, two-cycle engine. This engine has a water-jacketed exhaust pipe, and a long spark-shifting lever with switch for cutting the current. This switch may readily be opened by pressing a button with the thumb as the hand grasps the lever. If the lever is moved to the other side of the center, and the switch released after the motor has been allowed to slow down, it will instantly reverse. An insulated, spring-pressed, brass block at the base of the lever presses against a fiber cam on the crank-shaft, and when it rubs over a brass segment in the cam, the contact is made for the primary circuit, and sparks jump at the points of the spark plug in the top of the motor cylinder. The long, spark-shifting lever makes it possible to adjust the spark to a nicety, as a considerable movement of the top corresponds to a very slight advance or retardation of the time of contact. The crankshaft of the motor is made hollow, and the crank is lubricated by grease forced through from a grease cup at its forward end. Other grease cups lubricate the main bearings. The 2-horse-power motor has a 4¼-inch bore by 4½-inch stroke, and develops its power at about 500 R. P. M.

A considerable number of different types of boats are made by this concern. Among these are a small combination power, row, and sail boat; aluminium and steel canoes and ducking boats; a sectional steel boat made in two halves, one of which will fit inside the other; and a flat-bottom boat which may be folded and formed into a trunk.

In order to obtain a smooth-skinned steel boat, pressed steel plates, which have been galvanized and put through a special process that prevents scaling or cracking of the galvanized surface, are fitted snugly over the wooden framework of the hull. The joints of these plates are countersunk and riveted in a similar manner to the plates of an ocean steamer. They are afterward soldered and tested. The hull is consequently one piece of smooth steel, and is guaranteed against leakage at its joints. The keel is not bolted to the outside of the steel hull, but is inside the boat, being placed in a slot pressed into the steel shell for this purpose. It is thus protected, and adds great stiffness to the hull. The steel shell has a slight movement on the framework of the boat, and as the engine is mounted upon the framework, any vibration which the latter receives is not transmitted to the hull, and, consequently, does not tend to loosen its joints. The engine, which is placed in the center of the boat, has an exhaust pipe leading to a tube surrounding the propeller shaft and communicating with the water below the stern. The exhaust gases and cooling water pass through this tube into the water, thus doing away with all odor and noise. This under-water exhaust also has a tendency to keep the stern bearings lubricated.

In both these types of steel boats large air chambers are placed at the front and rear. These are sufficient to keep the boats afloat, even should they become filled with water. As they are built of steel, there is no danger of their destruction from fire. These qualities, together with their durability, make them ideal craft for pleasure or business purposes.