## Correspondence.

### Can a Celestial Body Fall to the Center of Its Attraction?

*To the Editor of the Scientific American:*

Newton demonstrated that from gravity a moving orb will assume an orbit corresponding to one of the four conic sections, with the controlling body at the focus of the curve. Now, from this law, is it possible for a celestial body to fall to the body around which it revolves, *i. e.*, to leave the perimeter of its orbit and pass to the focus thereof? It has been said, even by men of science, that were the earth stopped in its orbit it would fall to the sun. If Newton be correct, the earth, thus stopped, would not fall to the sun, but would make a perihelion passage around that body and assume a new orbit, for, from the moment it started toward the sun, it would move and continue in a curve of a section of the cone. A binary system of stars is an example where suns have fallen toward each other, but, keeping to their mathematical curves, have made mutual perihelion passages without ever coming dangerously near each other.

If Newton's theory is correct, Mayer's theory of solar maintenance (from meteoric impact) is untenable.

E. B. WHITMORE.

Rochester, N. Y.

### A Plan to Heat the Cold Wall.

*To the Editor of the Scientific American:*

Instead of damming the Straits of Belle Isle to keep out the cold water, as so ably suggested by Mr. John C. Goodridge in your paper of October 31, I propose that we place waterwheels and friction contrivances in the Straits, so as to heat the water as it comes through during the winter season. Stop the wheels in summer.

By these simple expedients the water will be made to warm itself, and a southerly moving, genial, warm stream will be produced, to soften and temper the climate of the adjacent countries during the winter; while the refreshing coolness of the cold wall may still be enjoyed in summer. Furthermore, this plan obviates all risk of changing the climate of Europe or Great Britain.

I hereby file this my caveat of priority upon the general idea of making streams of water heat themselves in winter by friction, without the use of coal—applicable to all great rivers, such as the Hudson, Ohio, Mississippi, Missouri, and others in this and other countries, which are now frozen solid, and commerce suspended in winter. Incalculable benefits to the world must ensue when my discovery is adopted.

O. B. SERVER.

### The Word "Atlantic."

*To the Editor of the Scientific American:*

Referring to Dr. Le Plongeon's note, in your edition of the 7th instant, I have to deny that my former note contains any error—even a "tiny wee" one. When I used the expression "sea beyond Mount Atlas," I did not offer it as a translation of the Greek words, but merely as explanatory. Dr. Le Plongeon, in attempting to correct a supposed error of mine, has "put the cart before the horse" in his translation of the Greek words as the "open sea Atlantic," since the meaning is just the reverse, viz., the "Atlantic open sea," or, to substitute an equivalent English adjective for the Greek one, the "Atlasian open sea."

In answer to Dr. Le Plongeon's query as to where the Greeks obtained the word *'ατλαντικος, -κη, -κον*, I would say that they formed this adjective from *Ἄτλας* (gen. *Ἄτλαντος*). As I before intimated, the ocean was so-called because it lay beyond Mount Atlas. As regards the etymology of Atlas, I would say that the best Greek scholars derive the word from *α* (euphonic) and *τλας*, participle of *τλῆναι*, 'to bear,' 'to endure,' which is from the Aryan root *tal*, 'to bear,' 'to lift,' 'to sustain,' whence also Sanskrit *tul*, 'to lift,' Latin *tollere*, 'to lift,' 'to bear,' Gothic *thulan*, 'to endure,' Anglo-Saxon *tholian* and English *thole*, 'to endure.' (Cf. also the derivative *Atlantes*, used in architecture as a name for male figures employed in place of columns to support an entablature.) The meaning of the word is evidently the 'bearer' or 'sustainer.' How the mountain came to receive the name of the god is a question of mythology which does not concern us.

So much for the Greek; now for the Nahuatl: Dr. Le Plongeon derives the word *atlan* from *atl*, 'water,' and *tlan*, 'near,' 'between;' but the real meaning is, rather, 'water country.' *Titlan* is, in Aztec, a locative suffix meaning 'land,' 'place,' 'country,' and, in its abbreviated forms, *-tlan* and *-lan*, is found in many place names; for example, Mazatlan, 'deer country,' Quauhtemallan (whence Guatemala), 'wood-pile place,' Huaxtlan, 'land of acacias,' Tzapotlan, 'land of the sapote,' Mixtlan, 'land of clouds,' etc.

G. W. R.

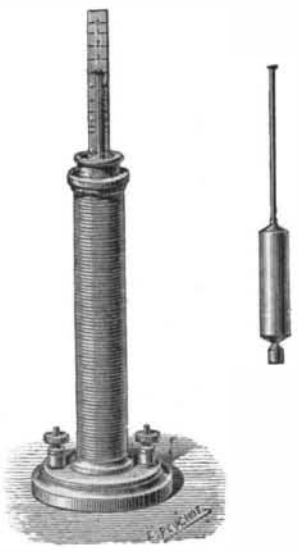
### A NEW APPARATUS FOR MEASURING ELECTRIC CURRENTS.

BY MR. F. DE LALANDE.

These new amperemeters and voltameters are made without permanent magnets, thus removing common cause of error. The principle on which they operate is based on the action of a solenoid on a bunch of soft iron wires placed movably within it, and maintained by an opposing force.

To obtain this result in a practical way, the apparatus is formed of a bunch of soft iron wires placed within a float, and put in a test tube filled with water, and surrounded by a bobbin through which the current to be measured passes. The initial position of the float, regulated by the constant level of the liquid, being always the same, it is evident that it will have a positive fixed equilibrium, sinking to a certain depth, which is varied by the strength of the current which passes through the bobbin, but is always the same for the same electromotive force. The upper end of the rod of the float forms the index, which moves over a vertical graduated scale. The float rod passes through and is guided by a metallic eye in the liquid, thus preventing friction by contact with the sides of the tube.

By varying the dimensions of the bobbin and of the bunch of soft iron wires or of the float rod, a movement of any desired length can be obtained for a given current. In the models, which have been very carefully made by Mr. Carpenter, a displacement of ten centimeters (4 inches) corresponds to a current of from 10 to 25 amperes, or an electromotive force of 100 volts.



The bobbins of the amperemeters are formed of only one or two layers of very coarse wire; they may have a resistance of only one one-hundredth to two one-hundredths of an ohm; the apparatus can, then, be introduced without inconvenience in almost any electric circuit. The bobbin of the voltameter is of fine wire, and has a resistance of about 1,700 ohms.

The apparatus is very sensitive, and is not visibly affected by changes of temperature, by the presence of metallic masses, or even by powerful magnets.

### Experiments with the Lime Cartridge.

M. Mathet in *L'Echo des Mines et de la Metallurgie*, has recently described some experiments which have been made at the Blanzy mines, with a view to determine the bursting power of lime cartridges before employing them on a large scale, the cable testing machine supplied by Falcot, Meyret & Co., of Lyons, being used to measure the pressure. The cartridge was cylindrical in form and of the following dimensions: Diameter, 65 millimeters; length, 86 millimeters; surface of base, 33·16 square centimeters; total surface, 241·76 square centimeters; volume, 285 cubic centimeters; weight, 550 grammes. The cartridge was inclosed in a lead casing 3 millimeters thick, which it fitted exactly, a space of a few millimeters only being left for the admission of water. The whole was then introduced into a cast iron cylinder, provided with two openings, one of a large size serving for the introduction of the cartridge, the other being to enable the whole of the vessel to be filled with some incompressible liquid; this latter opening was hermetically closed by a plug. The larger opening was fitted with a cast iron cylinder in which a piston moved, and this piston was in connection with the testing machine. The cartridge being placed in position, water was injected, and the outer vessel filled with mercury. After one and a half minutes, the balance registered a pressure of 2,000 to 2,500 kilogrammes; after this first period of pressure there were a few moments of repose, after which the pressure again gradually increased, the results of a large number of experiments showing final pressures varying from 3,160 to 6,600 kilogrammes; but these figures are considerably lower than the real pressure exerted by the cartridge, as a leakage of mercury could not be avoided. The cartridges used in the experiments were manufactured at Montceau.

### A Natural Gas Forge.

The *Petroleum Age* thus describes a recent trial at Kendall, Pa., of Dr. Benninghoff's patent process of smelting iron, steel, and glass with natural gas. Iron and steel were quickly raised to a white heat in a well controlled flame, which came from mixing natural gas with air, and the metals were easily and thoroughly welded.

The invention seems likely to revolutionize the smelting of iron, steel, and glass in the United States. The forge is built of brick, about 33 inches square at the base and 30 inches in height. The firepot is located at the central point, and near the top of the forge. Inch air pipes coming from the fan or blower are connected to three-quarter inch gas pipes just outside and on opposite sides of the forge. At the T the gas and air are mixed, and then pass into the forge through the same pipe. The two pipes from opposite sides are in a horizontal line with one another, and have their open ends in the forge directly opposite and sixteen inches apart. When they are lighted, the two flames strike against each other. An air pipe in a vertical position from the bottom of the forge has its open end about eighteen inches below the horizontal line between the pipes containing gas and air. The intense heat is obtained near the intersection point of the air current and the mixed ones of air and gas.

The top of the forge is nearly closed, with the exception of an aperture large enough to admit the piece of iron or steel to be welded. When the two gas jets are first lighted, the flame rises to a height proportionate to the flow of gas. But when the air is forced into the air pipes and mingles with the gas, the flame changes from a yellow to a lambent blue color, as it settles into the firebox in the forge. Why the jet of flame sinks instead of rises is something as yet unexplained by those who have brought about the valuable results. Dr. Benninghoff describes his invention as a process in which gas is mixed with air under pressure, so as to make it in the highest degree combustible. He also says, the oxygen in the air being the important factor of combustion, all that is necessary is to supply a sufficient amount of air to get the required amount of oxygen to perfectly consume the gas. Gas burning in an ordinary jet for the purpose of light gives that light because it is not all consumed. Where combustion is perfect, there is no blaze or flame to be seen. In order that the air supply may not interfere with the heat supply, the gas is mingled with the air before it is introduced into the firebox. In arranging a forge it may also be necessary to add extra air blasts to the fire for the purpose of locating the heating place, and for supplying oxygen in case there be any non-oxygenized gas present.

### Hand Grenades.

It seems to us that some one might do his fellow-citizens a good turn by telling the truth about the fire extinguishing hand grenades which are sold now in such enormous quantities. There are so many varieties of them that we will not attempt to say what they are all filled with, but, so far as we have been able to ascertain, not one gives out, when thrown into a fire, any of those efficacious gases which they are popularly supposed to contain, and we have yet to hear of any which possess more virtue than inheres in a bottle of salt and water, or of alum solution; while the disadvantages of their employment are considerable. It is not many weeks since smoke was discovered, early one morning, proceeding from between the floor boards in our own office, and a rush was made for the hand grenades by the few persons who happened to be in the building. A washstand with two faucets stood within ten feet of the smoking floor-boards, just outside the door of the room, and pails and pans were not far off; but instead of availing themselves of this obvious means of attacking the faint threads of smoke which were alone visible, the amateur firemen threw their grenades apparently at random over the room and the adjoining closet, completely ruining with dark chemical stains every object of value upon which the liquid contained in them was spattered, but of course producing no effect upon the fire beneath the flooring.

Finally a four inch hose was dragged into the room from a standpipe near by, and, after cutting a hole through the floor, a stream was turned in large enough to drown a lively conflagration, completing the destruction which the perfectly useless hand grenades had begun, and, like them, accomplishing nothing which two quarts of water, applied with a little common sense, would not have done equally well, without incidentally spoiling a considerable part of the contents of the office, as well as of that under it. If the grenades contained nothing but water in a convenient shape, there would be no great objection to them; but the mystery of the ingredients which fill them gives them a false value in the eyes of the ignorant, who forget all about using the water pails close at hand in their anxiety to invoke the mighty genii of the blue bottles, and thus throw away the precious opportunity which, in fires, never comes but once, and lasts only a few seconds.—*The Amer. Architect.*