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THE PARIS ELECTRICAL EXHIBITION.

Since our notice of the opening (on August 11) of the International Exhibition at Paris, most of the delinquent exhibits have been put in place, and the success of the undertaking has been assured. Upward of 1,800 exhibitors have contributed to this pioneer display of the applications of electricity to scientific, industrial, and domestic affairs; and it is noticed as a significant indication of the rapidity of modern progress that the exhibition of a single scientific industry, and that a comparatively new one, should require more space than sufficed for an entire international exhibition of the arts and sciences a quarter of a century ago. The Palais de l'Industrie, with its 45,000 square meters of space, was ample for the World's Fair of 1855. It is now crowded with electrical exhibits, and many pavilions of wood and iron have been erected around it for the additional space required.

The form of the great hall of the palace is rectangular, the open central space being about 250 meters long and 100 meters broad. The walls are of masonry. The arched roof is carried by lofty iron pillars, about 8 meters apart, with galleries on every side, under which are receding spaces, about 30 meters deep. In one of these under spaces are the boilers, engines, and dynamo machines. The French syndicate which supplies the power serves 200 magneto-electric machines of various systems, including those of Gramme, Siemens, Weston, Edison, etc. Several of these machines are illustrated in the accompanying engravings.

Fig. 1 shows the new Gramme machine, which is substantially the same as the older machines, descriptions of which have already appeared in this paper. The later machines have, however, a new expansive boss or hub for holding the ring, and are provided with improved journals and lubricators.

Fig. 2 shows a new form of Gramme machine especially adapted to sending currents through long conductors or great resistances. In the machine the magnets are placed in a cast iron octagonal frame, which protects them and other parts from injury, and renders the machine very compact, facilitates shipping, placing, etc. This machine has four magnets and four collectors for taking off the current. It weighs 1,030 pounds, and will send a current 2½ miles. The Gramme Company make another machine of the same class that will transmit 12 to 16 horse power 5 miles. It is found by experience that proportionately greater effects are realized when two machines are coupled on the same shaft.

These machines are especially adapted to the Gramme lamp, the inventor of which does not believe in extensive subdivision of the current, but prefers a small number of arc lights. He has succeeded well.

[*Continued on page* 162.]

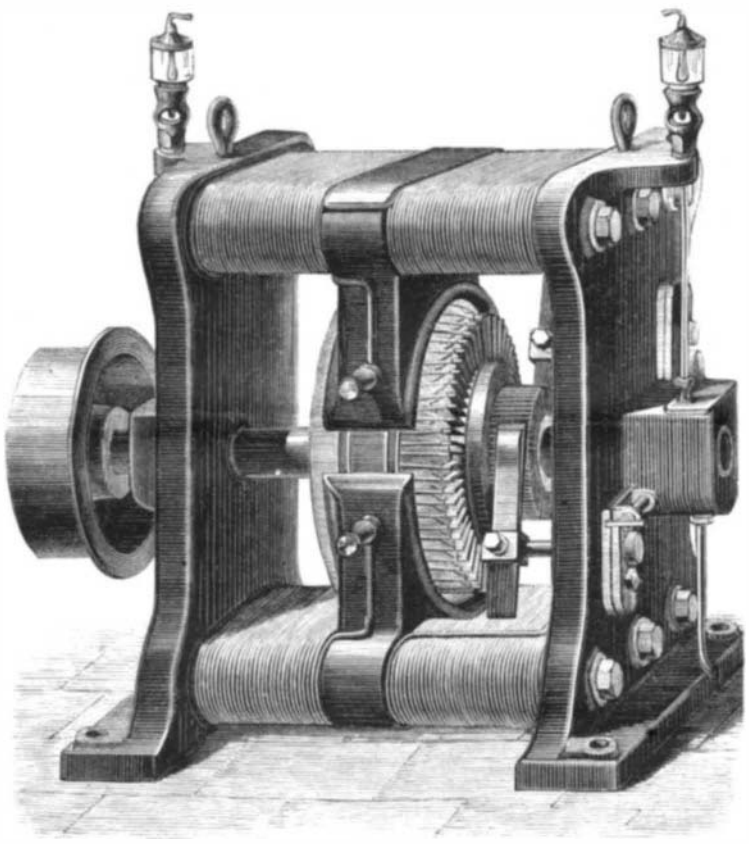


Fig. 1.—IMPROVED GRAMME DYNAMO-ELECTRIC MACHINE.

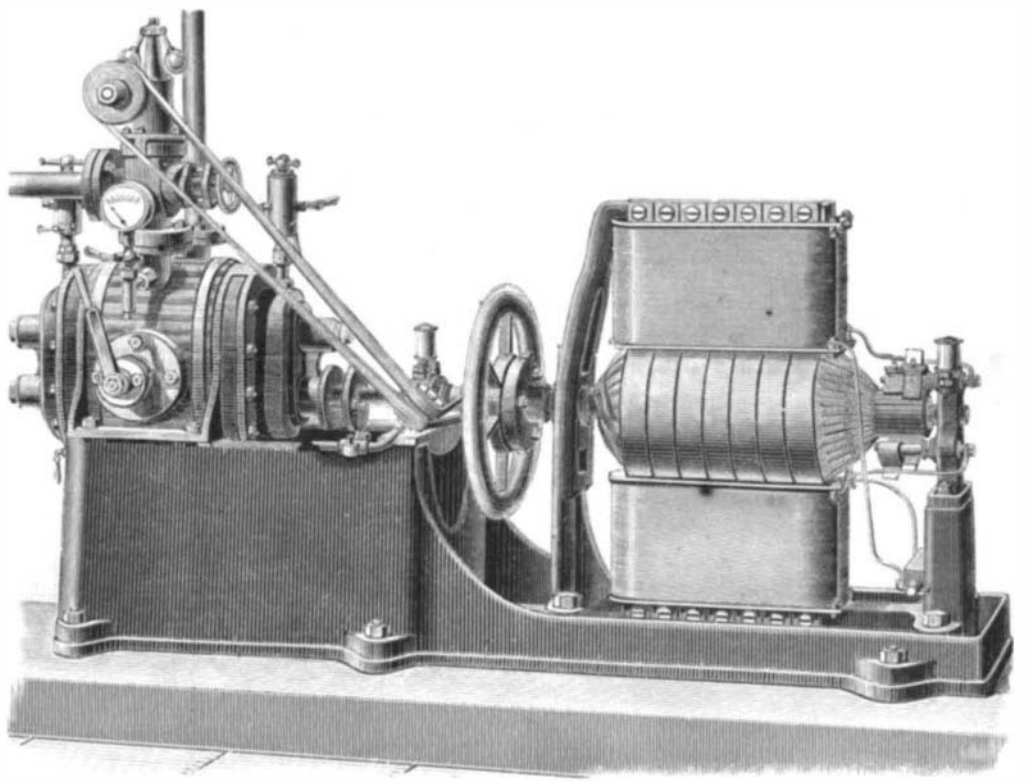


Fig. 4.—SIEMENS STEAM DYNAMO-ELECTRIC MACHINE FOR ELECTRIC RAILWAY.

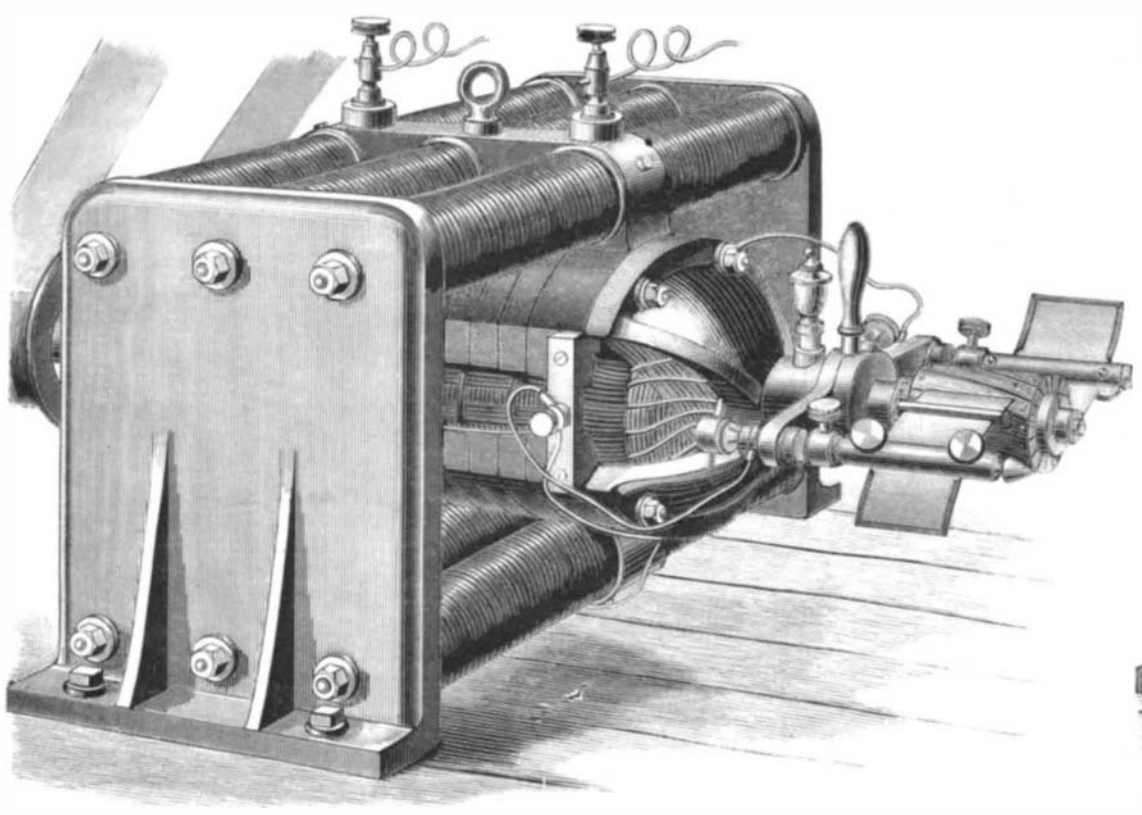


Fig. 3.—WESTON DYNAMO-ELECTRIC MACHINE—IMPROVED FORM.

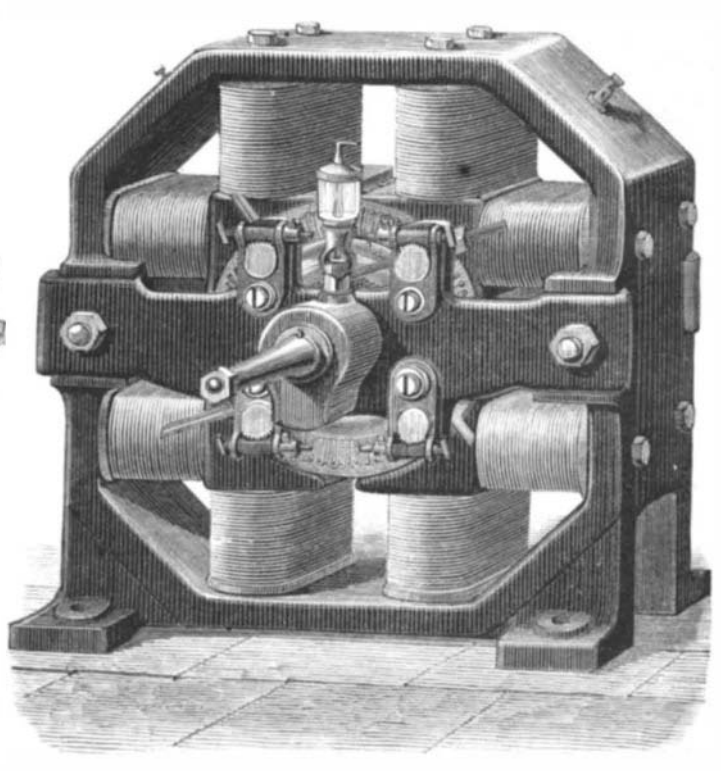


Fig. 2.—GRAMME MACHINE GENERATING CURRENTS FOR LONG DISTANCES.

THE INTERNATIONAL ELECTRICAL EXHIBITION OF 1881 AT PARIS.

Give the Baby a Drink of Water.

A city physician attributes a large part of the excessive mortality of children in hot weather to the failure of nurses and mothers to give them water; indeed more children are said to die (directly and indirectly) from deprivation of water than from any other cause. Infants, he says, are always too much wrapped up, and in any case would perspire very freely. The water lost by perspiration must be supplied. As Dr. Murdoch stated in his paper on cholera infantum, "The child is thirsty, not hungry; but not getting the water, which it does want, it drinks the milk, which it does not want." The consequence is that the stomach is overloaded with food which it cannot digest, and which soon ferments and becomes a source of severe irritation. Then follow vomiting, purging, and cholera infantum."

To prevent this, the principal scourge of infancy, the doctor says: "Have water—without ice—always accessible to the child, who will then refuse sour milk and will eat only when hungry. Water is the great indispensable article for the preventive treatment of children in hot weather. It is important enough to nursing children, but is life itself to those reared on the bottle."

THE PARIS ELECTRICAL EXHIBITION.

[*Continued from first page.*]

Two, five, ten, and twenty light machines are used in the Exhibition to light the grand aisle and other halls on the first floor. The machines are exhibited by Messrs. Sautier, Lemonnier & Co., owners of the new Gramme patents in France; also by the Spanish Electrical Society and by the Gramme Company. The Gramme Company make four sizes of machine. No. 1, for 1 to 2 lamps; No. 2, for 2 to 3 lamps; No. 3, for 6 to 8 lamps; No. 4, for 12 to 16 lamps. Nos. 3 and 4 have not been experimented with as yet, but it is thought they will excel Nos. 1 and 2.

The Weston dynamo machine exhibited differs only slightly from those already described in our columns. It will be observed by reference to the engraving that the field magnet is compound, being composed of a number of electro-magnets with cylindrical cores.

The Siemens steam dynamo used in connection with the electric railway is well represented by our engraving. The generator and steam motor are mounted on a common base, the motor being a rotary steam engine.

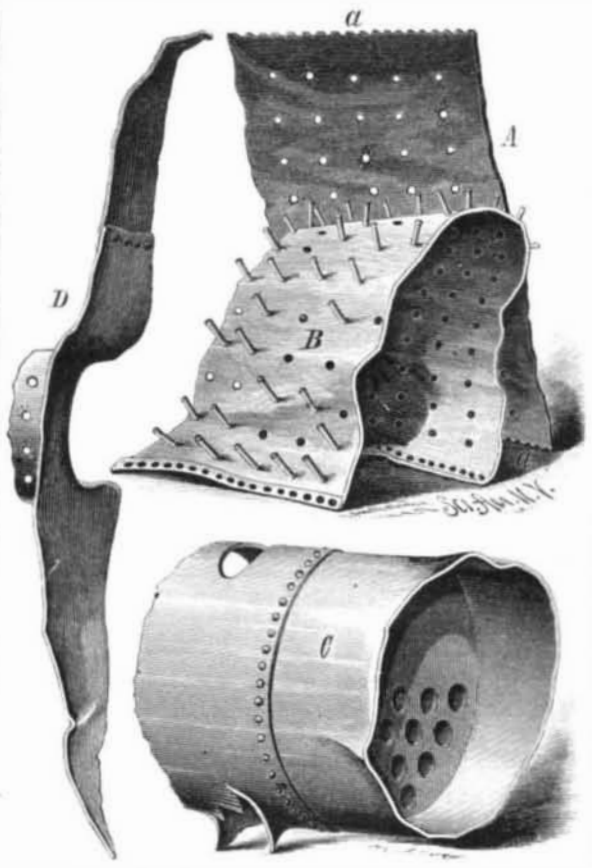
The car shown in Fig. 5 does not differ materially in appearance from an ordinary street car. The electric motor placed under the car floor is entirely inclosed. It receives its current from the rails, and the power is transferred to the car axles by means of pulleys and belts.

Other important exhibits in the various departments will be described in later issues. About one-third of the 1,800 exhibitors are from countries other than France. A list of the American exhibitors appears below. Many of them are represented in two or more classes. The Edison exhibits are naturally attracting much interest. They appear in each of the six general groups of exhibits, and represent fifteen different classes. They are shown in two salons, which contain a complete illustration of the Edison system of incandescent lighting, as well as representations of all his inventions and discoveries. It is remarkable that the labors of a single investigator and inventor should cover a field as broad almost as the entire scope of an international exhibition.

On the 25th of August an electrical fire broke out in the reading room of the Exhibition. It was occasioned by a defect in the fitting up of some incandescent lamps. The alarm was quickly given and the fire was extinguished before it had spread far. In attempting to tear out the wires with his hands a fireman received electrical shocks and was twice knocked down. A scientific commission, headed by MM. Dumoncel and Breguet, afterward made an examination of the connections of the various exhibitors, and there is now no further danger to be feared.

PARIS ELECTRICAL EXHIBITION OF 1881—LIST OF AMERICAN EXHIBITORS.

Thos. A. Edison, Menlo Park, New Jersey.
J. Morgan Eldredge, Philadelphia. Pa.
Electro-Dynamic Company, Philadelphia.
August Partz, Philadelphia.
Theodore Schmanser, Allegheny City, Pa.
U. S. Signal Office, Washington, D. C.
Joseph M. Hirsch, Chicago, Ill.
Milo G. Kellogg, Chicago, Ill.
Standard Electric Light Co., New York.
U. S. Electric Light Co., New York.
Weston Electric Light Co., Newark, N. J.
White House Mills, Hoosac, N. Y.
Wilson P. Dodson Philadelphia.
Alex. H. Ege, Mechanicsburg, Pa.
Hoosac Tunnel Trinitro-glycerine Works, North Adams, Mass.
William J. Philips, Philadelphia, Pa.
J. F. Bailey.
Alex. Graham Bell, Washington, D. C.



WATERTOWN BOILER EXPLOSION.

Sumner Tainter, Washington, D. C.
Charles Williams, Jr., Boston, Mass.
Conolly Bros. & McTighe, Washington.
George Cumming, New York.
Electrographic Manufacturing Co., New York.
Elisha Gray, Highland Park, Ill.
Pond Indicator Co., New York.
Chas. W. Hubbard, Boston, Mass.
A. E. Dolbear, Somerville, Mass.
E. W. Serrell, Jr., New York.
Clinton M. Bell, Troy, N. Y.
Photo-relievo Co., New York.

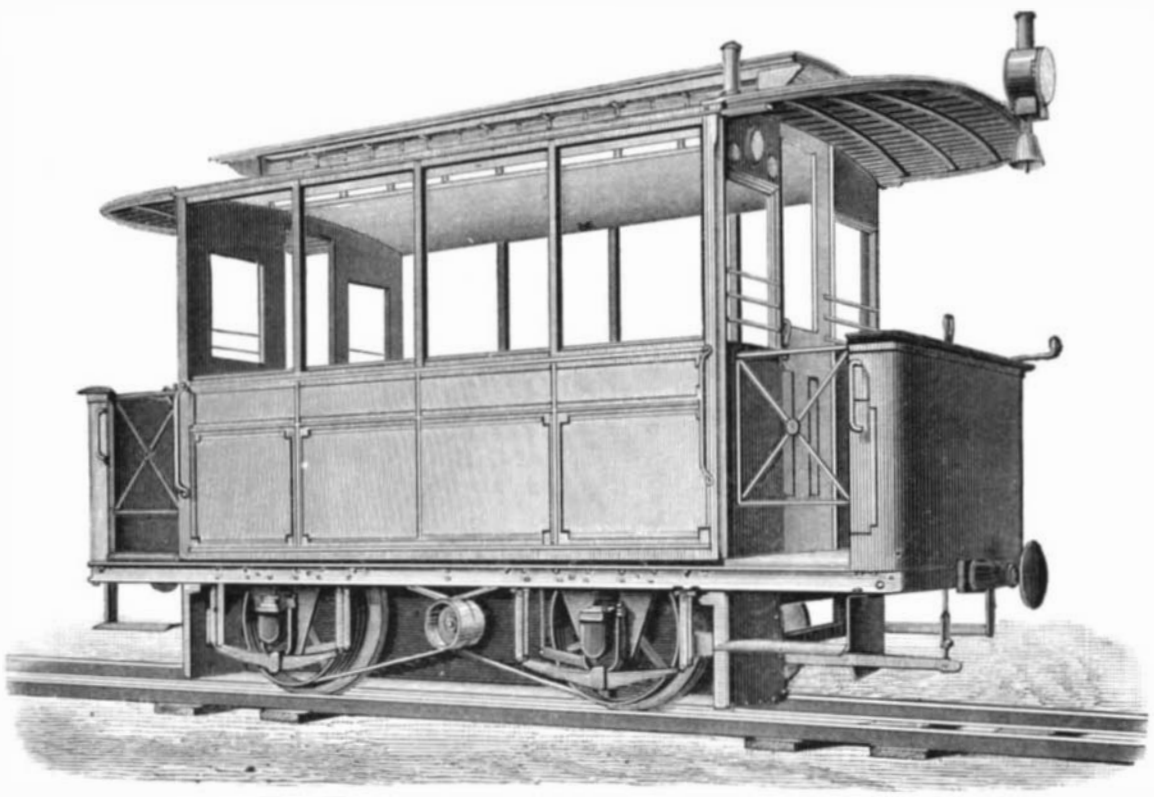


Fig. 5.—ELECTRO-MOTOR CAR ON THE ELECTRIC RAILROAD AT GROSS-LICHTERFELDE.

W. G. A. Bonwill, Philadelphia.
Electric Purifier Co., New York.
Robert Hasse, Indianapolis, Ind.
Volney W. Mason, Providence, R. I.
U. S. Patent Office, Washington.
John Michels, New York.
Smithsonian Institution, Washington.

Charred Bran for Preserving Fruit.

The use of charred bran for preserving delicate fruit while on the road to market, bids fair to solve the problem which has so long perplexed our millers. Converted into charcoal, the light and slippery product of the mills ceases to be unmanageable; and it is quite likely that a large local demand for charred bran will arise in the vicinity of most mills, for packing not only quickly perishable fruits like peaches, plums, and grapes, but also apples and other firmer fruits, for storage as well as for transportation.

WATERTOWN BOILER EXPLOSION.

To the Editor of the Scientific American:

I went to examine the boiler lately exploded near Watertown, this county, by which three lives were lost. The fragments of the exploded boiler show the terrible nature of the force at work in this explosion. It is a difficult matter to learn any particulars as to the cause which might lead to the explosion of this boiler, as no one who knows much about it now lives. As to whether the water was low or not we do not know. The mill had been idle for some time, and the engineer wanted to clean out this boiler before starting up, but the owners said no, "Go ahead and fire up." He did so, and in the afternoon the explosion occurred, probably about eight hours after starting. There was no coroner's inquest, consequently there is no evidence to give as to the previous condition of the boiler.

In my examination of the remains of the boiler I find that the stay bolts were *eight inches from center to center*, and a large number of the bolts remain in the fire box sheets yet, showing that the outside or shell of the box tore loose, and the piece represented at A is the shell of the fire box, which also goes to form the top of the boiler. The edges, *a a'*, were respectively riveted to the bottom of the legs of the fire box, and gave way through the rivets along this edge and opened up and straightened out flat, as shown in the cut. This piece was found 150 feet or more from its starting point. It went up about 30 feet, and struck and cut off a gum tree about a foot in diameter. A large number of the stay bolt holes show that at some past time there has been sufficient strain on them to start them, as the holes show cracks radiating from the circumference; but these cracks do not go through the sheet, consequently they would indicate nothing on the outside except a small indentation around the head of bolts. The flues were all torn out, and the fire-box, B, was smashed into a shape somewhat resembling a hat if taken by both hands and smashed together.

One piece of the boiler, C, including the front flue sheet, remains but little injured. One piece, D, immediately in front of the fire-box and forming part of the front leg of boiler, is in a curious shape. It is about 10 feet long and 2 feet wide at its widest place, but each end runs off to a point. The crown sheet shows no indication of excessive heat, as the stay bolts are yet in it, which would not have been the case if the sheet had been left bare of water.

As near as I can get at the cause of this explosion I am led to believe that it was caused by an insufficient number of stay bolts, and that the explosion took place in the fire-box end of the boiler, the shell of the fire-box blowing up away from the fire-box, and at the same time the firebox was smashed in and the other parts of the boiler were torn to pieces.

The boiler was of the common type of portable boilers, with fire-box at one end, and it seems to me criminal carelessness on the part of the builders to construct a boiler with stays *eight inches* apart, and there should be some way to prevent this careless way of constructing boilers. The iron seems to be of fair quality, but shows laminated edges in some of the fractured pieces, showing that it is not of the best quality.

I have frequently examined this kind of a boiler after explosions, and have invariably noticed this laminated appearance; and in this particular case I noticed that where the stay bolts had partly pulled out or started to pull out at some past time, the cracks around the holes passed only through the inside layer of the boiler plate. This fact leads me to believe that explosions occur frequently from this laminated condition of the plates or imperfect weld of the plate in manufacture.

Marietta, O., July 30, 1881. WM. M. MORSE.

The Great Heat of the Sun.

Prof. S. P. Langley has made the following calculation: A sunbeam one centimeter in section is found in the clear sky of the Alleghany Mountains to bring to the earth in one minute enough heat to warm one gramme of water by 1° C. It would, therefore, if concentrated upon a film of water 1-500th of a millimeter thick, 1 millimeter wide, and 10 millimeters long, raise it 83⅓° in one second, provided all the heat could be maintained. And since the specific heat of platinum is only 0·0032, a strip of platinum of the same dimensions would, on a similar supposition, be warmed *in one second* to 2,603° C.—a temperature sufficient to melt it!