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.

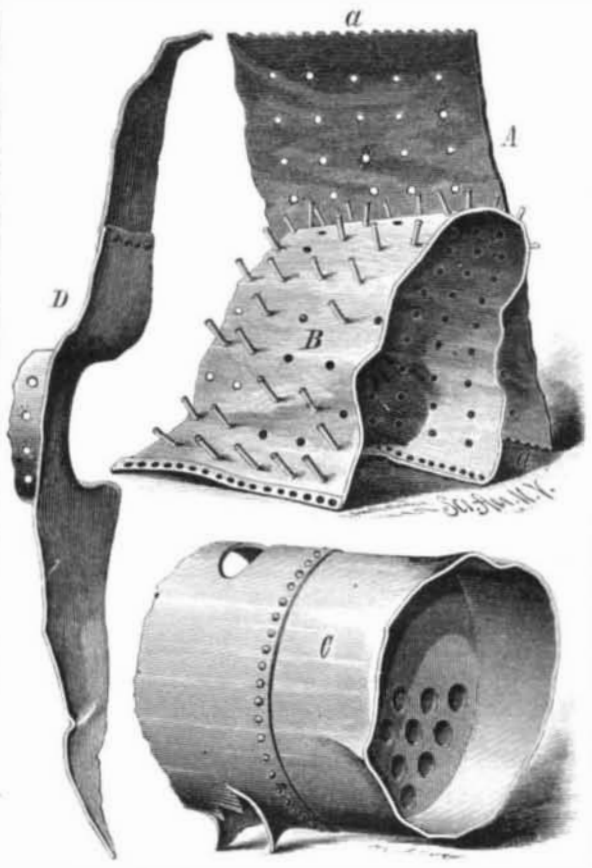
The car shown in Fig. 5 does not differ materially in appearance from an ordinary street car. The electric motor placed under the car floor is entirely inclosed. It receives its current from the rails, and the power is transferred to the car axles by means of pulleys and belts.

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.

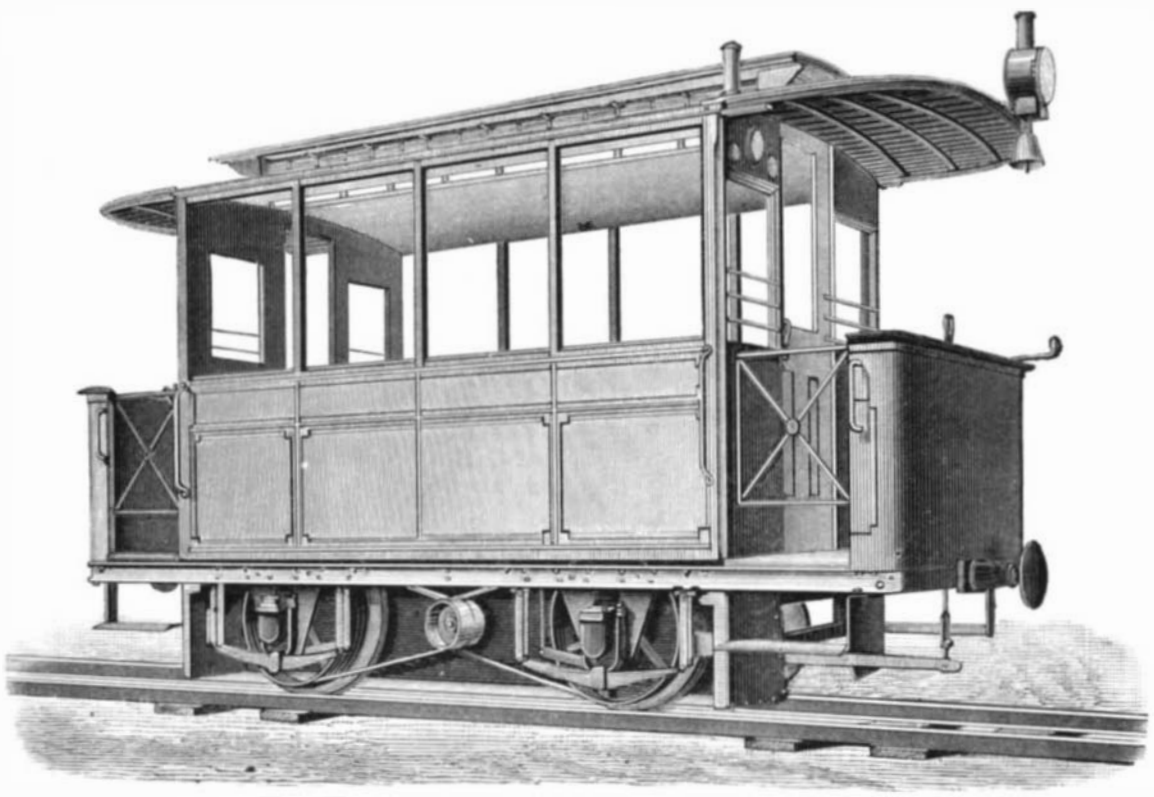


Fig. 5.—ELECTRO-MOTOR CAR ON THE ELECTRIC RAILROAD AT GROSS-LICHTERFELDE.

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 $83\frac{1}{3}$° 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!

The Manufacture of Needles.

From a lecture on "Steel in Modern Times," by Mr. S. Perissé, reproduced in a recent number of the *Revue Scientifique,* we take the following notes on the curious and interesting needle manufacturing industry:

The needle, says Mr. Perissé, passes through the hands of eighty workmen before it is ready to deliver to the trade; and, if we take into consideration that these articles cost at the very most only $2 per thousand, on an average, we find that the 8,000 operations are remunerated by the sum of 20 cents.

Owing to the progress effected in the art of drawing steel into wire, cast steel has been principally employed for some years past. Formerly, in France and Germany, manufacturers used iron wire, which was converted into steel during the course of the operation. The manner of manufacturing differs but little. At Borcette, the center of needle production of the continent of Europe, there are five series of operations involved in the manufacture: (1) Conversion of the wire into needles in the rough; (2) tempering and annealing; (3) polishing; (4) softening of the polished needles; (5) putting up into packages.

1. *The Conversion into Needles in the Rough* involves twenty operations, the principal ones of these being gauging the wire, cleaning, reeling, and cutting into pieces of a length equal to two needles. Sharpening or pointing is done by means of grindstones. By the aid of a leather thumbstall the workman holds fifty wires at a time. The latter become red hot by friction on the stone, and a constant stream of fine particles of steel and stone is thrown off, which formerly brought about phthisis in the workman after a time, but the adoption of powerful ventilators has now remedied all that. After pointing, the wire is cut in two, the head is flattened, and it is then annealed. Then the eye is punched in the head by means of a steel punch, the operation being performed by children in less time than it takes to describe it. Other children "hole" the needles, that is, remove the particle of steel detached by the punch. After this the heads are hollowed, sorted, and, when necessary, cemented.

2. *Tempering and Annealing* of the raw product requires nine operations, but they are performed with lots of 30 pounds weight, each containing more than 300,000 needles.

3. *Polishing* is the longest operation, although a million are polished at once. It requires five operations, each of which is repeated seven or eight times. The needles are put into rolling cylinders along with small hard stones and oil of colza. The stones gradually become crushed, and the friction of the particles during the motion of the rollers effects the polish. The last polish is performed with oil alone and coarse bran.

4. *The Sorting of the Polished Needles* involves five operations, and, after burnishing, which is a very delicate and important process and that which gives the luster, the needles undergo the last operation of being put up into packages.

IMPROVED HORSE HAY-FORK.

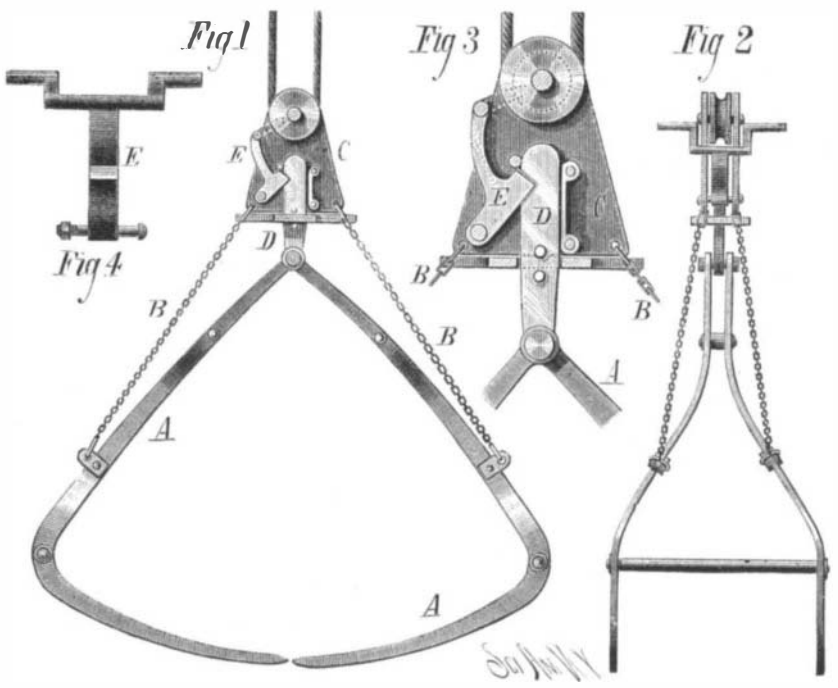
We give an engraving of an improved horse hay-fork recently patented by Mr. Townsend Albertson, of Mineola, N. Y. This fork, although very simple in its construction, is very convenient and easily managed, and is perfectly automatic in discharging its load.

The general form of the fork is shown in Fig. 1, and Fig. 2 is a side view, showing the double arrangement of the fork. Figs. 3 and 4 are detail views of the catch and releasing mechanism.

The fork tines are curved inward, as shown in Fig. 1, and are connected in pairs by a crossbar, as shown in Fig. 2. The shanks of the tines are hinged together at their inner ends, and connected with a catch, D, carrying a horizontal plate. The shanks of the tines, near the bends, are attached to chains. B, which are connected with the lower corners of the plates of the pulley block, C. The fork is raised and lowered and carried along by a rope that passes under the pulley in the block.

A latch, E, is pivoted between the plates of the pulley block, C, and is capable of engaging a notch in the catch, D, when the latter is pushed up into the pulley block. The latch, E, is provided with trip arms (as shown in Figs. 2 and 4), which engage with cleats or other stops on the track upon which the carriage runs.

When the fork is drawn back and lowered upon the load the tines are separated and supported by the chains, B. As the tines are thrust into the hay their curved shape causes them to move inward slightly, and the pulley block, C, is drawn downward so that the catch, E, will be engaged by the latch, E. When the pulley block is raised by the rope the load is lifted more or less by the catch, D, and when the load is carried to the point where the latch, E, strikes a stop and releases the catch, the load drops.



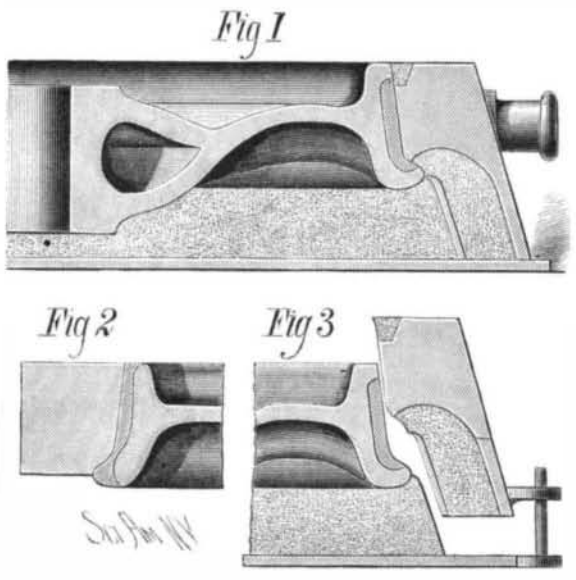
ALBERTSON'S HORSE HAY-FORK.

Lemon Juice in Diphtheria.

Dr. I. R. Page, of Baltimore, calls the attention of physicians, in the *Medical Record,* to the topical use of fresh lemon juice as a most efficient means for the removal of membrane from the throat, tonsils, etc., in diphtheria. He states that in his hands it has proved the best agent that he has as yet tried for the purpose. He applies the juice of the lemon to the affected parts every two or three hours by means of a camel's hair probang. In eighteen cases in which he has used the remedy the effect has been all that he could have wished. He finds that several of his professional brethren are prepared to give the same favorable account of the remedy.

IMPROVEMENT IN CASTING CAR WHEELS.

Considerable interest has lately been aroused among railway managers in favor of what is known as sand flange car wheels, and a great deal is claimed for them on account of



TAWCETT'S IMPROVEMENT IN CASTING CAR WHEELS.

their superior strength, durability, and largely increased mileage. All past attempts to make sand flange wheels have been mere experiments, and, as a rule, have been failures. It must, therefore, be inferred that the means heretofore employed for moulding them have not been satisfactory, and the results too uncertain to be appreciated or adopted by the practical wheel makers, many of whom have strong preference for sand flange wheels.

Fig. 1 in the engraving is a section of the improved flask for moulding the flange of chilled car wheels in sand, showing the position of the flask when rammed full of sand. The inner or dividing ring, B, is made conical, and serves as a parting line for separating the two bodies of sand, and allows all the sand under the pattern to remain in the usual manner on the bottom plate, A, as shown in Fig. 3, and by its peculiar construction carries the sand that has been rammed on the upper side of the flange and holds the sand between the rings while the flask is being lifted off to allow removing the pattern and finishing the mould.

This form of a flask combines the best and most desirable features of construction, and is designed for long-continued regular work. This method of moulding insures neatness and cleanliness in carrying on the work and obviates the necessity of loose parts. Where economy in moulding, combined with accuracy in casting, is an object to be accomplished, this flask has been found very satisfactory.

Fig. 2 is a section of the ordinary chill, showing the chill in contact with the flange of wheel, and its effects on the rim of the wheel.

Further information in regard to this invention may be obtained by addressing W. Tawcett, Omaha, Nebraska.

Poteline.

The *Chronique Industrielle* states that M. Potel has recently communicated to the French Société d'Encouragement a new compound, which may be employed for preserving meat and hermetically sealing bottles, flasks, etc., or for making an artificial marble for the manufacture of various useful and ornamental articles. It is composed of glycerine, gelatine, and tannin. To preserve meat the inventor covers it with this new product, rendered liquid by exposure to a temperature of 90° to 100° C. The compound hardens very quickly and prevents access of air to the inclosed meat. When it is desired to offer the latter for sale the covering is simply torn off. The inventor has made many experiments during the past year, and has found that meat coated with the product could be kept from thirty to sixty days, and at the end of that time be apparently as fresh and sweet as any meat exposed for sale by butchers.

Sulphate of baryta or zinc white may be added to the compound to make it opaque, and it may be dyed of any desirable tint by means of ordinary vegetable colors when employed for ornamental purposes.

A Large Raft.

An unusually large raft of timber was recently floated down the Hudson. It was 900 feet long and 34 wide, and contained 254 pine logs, varying from 70 to 96 feet in length and from 18 to 30 inches in diameter. The logs were cut during the past winter in Ontario, Canada, near Capetown, Linden, and Onondaga. They were floated down to Toronto, on Lake Ontario, and on June 24 last they began their journey to Boston, in care of Capt. Edward Locke. They were made into a raft, and towed in three days and a half across the lake to Oswego, where they were separated into two rafts of six cribs each and a third raft of seven cribs. These were towed through the Erie Canal by John Wells, of Oswego. The journey occupied thirty-one days. The three rafts were then united into one large raft with two sections abreast, and floated down the river, traveling only on ebb tides. On its arrival at Gowanus Bay, Brooklyn, the raft was prepared for towing to Boston. The logs were chained together, and 113 logs from Pennsylvania were added, making a raft 1,300 feet long and 64 feet wide. The value of the raft was put at $25,000. The cost of towage $3,500, or one-third less than it would have cost to send the logs by rail.

Sensibility of the Telephone.

Every one knows that the very feeblest currents produce audible sounds in the telephone, which is more sensitive than any galvanometer to feeble currents. M. Pellat lately declared that the heat necessary to warm a kilogramme of water one degree would, if converted properly into the energy of electric currents, suffice to produce in a telephone an audible sound for ten thousand years continuously.

Carbon Electrics.

The galvanic properties of carbon have been closely examined by Dr. Hanichi Muraoka, a Japanese student at Strassburg. He determined the specific resistance and the change of resistance with increase of temperature of all kinds of hard carbon, including Siberian graphite, gas-retort carbon, the artificial carbons used for electric lighting by several well-known firms, and even the graphitic compound used in Faber's lead pencils. The specific resistance (at 0° C.) of the last was 952, while that of the first was 12·2. The artificially prepared carbons ranged from 36·86 to 55·15. In all, however, the resistance *decreased* with a rise of temperature, the coefficient of decrease being greatest for the Siberian graphite, least for a carbon pencil prepared from coke by Heilmann of Mühlhausen. This result entirely confirms the recent researches of Siemens and Beetz.

The thermo-electric powers of the various samples of carbon were also determined, with respect to that of graphite; their thermo-electromotive force was in every case + to graphite, and varied from 423 microvolts for the Faber pencil carbon to 9·26 microvolts for the gas retort carbon (of Parisian manufacture) used for battery plates.

A Railway on Stumps.

In the upper part of Sonoma county, Cal., a railroad track crosses a deep ravine upon the upright trunks of tall trees, which have been sawed off upon a horizontal line. In the center of the ravine a firm support is furnished by two huge redwood trees which have been lopped off seventy-five feet above the ground.

Sewing in a Boston Public School.

The Boston papers give favorable accounts of the recent exhibition in that city of the results of the instruction in sewing in the Winthrop School—a girls' school with six grades. In the three lower grades they have lessons of an hour each twice a week, and in the upper three classes once a week. The pupils furnish their own work, bringing the materials from home, the city having no expense except for needles and thread, in cases where the parents do not sup-