## Correspondence.

### Discoloration of Brick Walls.

*To the Editor of the Scientific American:*

In your issue of July 21, a correspondent states that the white substance on houses is not sulphate of magnesium, but carbonates of sodium and potassium. While not doubting that such was the case with the substance he obtained, I can state positively that the substance on some of the Philadelphia houses last winter was sulphate of magnesium, I being a student in the University of Pennsylvania at the time, and making analysis of it. The theory of its formation is so evident that I will not encroach on you with the explanation.

L. G. EAKINS.

Silver Cliff, August 20, 1883.

G. F., of Va., sends specimens of apple leaves that are injured by insects, and asks what they are.

*Ans.*—The brown blotches on the upper surface of the apple leaves are the mines of the larva of the little tineid moth *Tischeria malifoliella*, Clemens. The eggs are laid in the spring on the surface of the leaf, and the larva on hatching bores in between two surfaces, and, as it increases in size, forms a mine. It changes to pupa within its mine, the walls of which are lined with silk. If this insect becomes so abundant as to threaten injury to the tree, the fallen leaves should be raked up carefully and burned in the late fall, as it hibernates in its mine.

### The Locomotive Whistle Heard at a Distance of Fifteen Miles.

*To the Editor of the Scientific American:*

The SCIENTIFIC AMERICAN of August 18 states that the whistle of a locomotive is heard 3,300 yards, and the noise of the train 2,800 yards.

The railway station is distant from this post 5½ measured miles, and on calm days, when no wind is blowing, I can hear the whistle of the locomotive and the rumble of the train arriving at the station quite distinctly. The elevation of this post is about 5,000 feet. Reliable men working in the mines in the mountains north of the post, and distant about 14 miles from the post (about 9 miles in a direct line), at an elevation of about 7,000 feet, tell me they can plainly hear the whistle of the locomotive and the noise of the train, and also the reports of the muskets at target practice at the post. Fort Cummings is situated at the foot of the mountains, and the country between the fort and the station is flat. This would make the whistle heard a distance of 15 miles, or about eight times that stated. The mountains may assist in transmitting the sounds *from* the post, but they certainly cannot those from the station *to* the post, as the intervening ground is comparatively level.

CHAS. S. HALL.

Fort Cummings, N. M., August 23, 1883.

### Manufacture of Sorghum Sugar.

*To the Editor of the Scientific American:*

I have read with interest, and in the cause of truth and justice desire to controvert, certain statements made and conclusions drawn in an article contained in your issue of August 18, under the title "The Sugar Canes."

You describe the juice obtained from sorghum as "unstable in its chemical character; . . . that its sucrose has a strangely perverse tendency . . . to become . . . glucose." And you add: "Unless this tendency is arrested every grain of available sugar may have disappeared, and probably will, within twenty-four hours from the commencement of the change; that is, from the time of cutting the sorghum. The transformation can be prevented by the use of lime, but, practically, this is best done by boiling."

I also desire to call attention to one or two statements contained in the "Report of the Commissioner of Agriculture" for the years 1881 and 1882.

On page 20 of said report you will find that from nearly 100 acres of cane the average yield was less than 2½ tons per acre, from which "were obtained 2,977 gallons of sirup and 165 pounds of sugar," *only*.

I do not stop to note the fact that "the expenses of raising the cane were $6,589.45," nor that the expense of converting the cane raised into sirup and sugar "was $1,667.50." The total amount of "money covered into the Treasury" was $768.24.

After such returns as the foregoing it is not surprising that, on page 680 of the same valuable report, we find Commissioner Loring forced to admit that "the business of manufacturing sugar from sorghum at the department . . . failed in 1881, and . . . furnished discouragement rather than information to those engaged in it."

My interest in the sorghum industry dates from the spring of 1880. Small experimental works were then erected at Cold Spring, near Cape May City, under the supervision of Mr. Henry A. Hughes. Mr. Hughes crushed 292 tons of sorghum, which was raised by our farmers in this vicinity. By a process of defecation discovered and applied by Mr. Hughes this amount of cane was made to produce, in round numbers, 16,000 pounds of sugar. The mill was small, the works were imperfect, evaporation was in open pans, and only a small percentage of the sugar was obtained; but such was the encouragement which these results afforded that at the next session of our legislature an act was passed offering a bounty, to be paid by the State, of one dollar per ton for every ton of cane raised and one cent per pound for every pound of sugar produced. Thus encouraged, what is known as the "Rio Grande Sugar Company" was formed, large works were erected, cane in large quantities was obtained, and "expert sugar boilers" were procured from New Orleans and Cuba. These "experts" attempted to obtain sugar by means of the old lime process alone. Except from one small, inferior lot of juice, and by a "chance shot," as you would describe it, a small quantity of inferior sugar was obtained. In this instance the juice "chanced" to be nearly neutral, a circumstance which occurred at no other time during the season.

This failure caused the abandonment of the lime process; the method of defecation pursued by Mr. Hughes with such signal success the year before was resumed; the juice was found to crystallize readily, and from the day that Hughes' method was resumed it has been attended with unvarying success.

Last year the company produced from 6,206 tons of crushed cane 1 022 barrels of molasses and 319,944 pounds of sugar; the juice was tested four times each day, and showed a coefficient of purity as high as 92°, with the season's average of 84°.

Unless the character and quality of sorghum elsewhere in the United States are different from what they are in southern New Jersey, farmers, manufacturers, and experimentalists, Government or otherwise, will obtain no sugar unless at a "chance shot" by the use of common lime alone; it will not prevent the "transformation" to which you refer.

I submit that the manufacture of sugar from sorghum is an established success here in this part of New Jersey, and its success is altogether due to the abandonment of the "lime alone" process, and the adoption and utilization of the process discovered by Mr. Hughes, general manager of the Rio Grande Sugar Company.

Mr. Hughes' process is no longer a secret, inasmuch as he has recently been granted letters patent by the proper department at Washington.

At the present moment over a thousand acres of sorghum are rapidly ripening, and the work of cutting the cane and making sugar will be begun within twenty days, and will proceed until the crop has all been harvested.

The process of regularly, successfully, invariably producing sugar on a large scale may be seen by visiting the Rio Grande sugar works at any time during the coming fall.

The works are situated on the West Jersey Railroad, two hours' ride from Philadelphia.

There is no act of my public life that I regard with more satisfaction than I do the fact that, as Senator in the New Jersey Legislature, representing this county, I introduced at the session of 1881 the bill which became a law, and which confers the bounty to which I have referred. In accordance with the terms of this law the amount paid out of the State treasury last year was $8,837.44.

Yours respectfully,

W. B. MILLER.

Cape May, N. J., August 23, 1883.

### A Steamer in the Niagara Whirlpool.*

In the year 1846 a small steamer was built in the eddy just above the railway suspension bridge to run up to the Falls. She was very appropriately named The Maid of the Mist. Her engine was rather weak, but she safely accomplished the trip. As, however, she took passengers aboard only from the Canada side, she did little more than pay expenses. In 1854 a larger, better boat, with a more powerful engine, the new Maid of the Mist, was put on the route, and many thousands of persons made this most exciting and impressive tour under the Falls. The admiration which the visitor felt as he passed quietly along under the American Fall was changed into awe when he began to feel the mighty pulse of the great deep just below the tower; then swung around into the white foam directly in front of the Horseshoe and saw the sky of waters falling toward him. And he seemed to be lifted on wings as he sailed swiftly down on the flying stream through a baptism of spray. To many persons there was a fascination about it that induced them to make the trip every time they had an opportunity to do so.

Owing to some change in her appointments, which confined her to the Canadian shore for the reception of passengers, she became unprofitable. Her owner, having decided to leave the place, wished to sell her as she lay at her dock. This he could not do, but had an offer of something more than half of her cost if he would deliver her at Niagara, opposite the Fort. This he decided to do, after consultation with Robinson, who had acted as her captain and pilot on her trips under the Falls. The boat required for her navigation an engineer, who also acted as a fireman, and a pilot. On her pleasure trips she had a clerk in addition to these. Mr. Robinson agreed to act as pilot for the fearful voyage, and the engineer, Mr. Jones, consented to go with him. A courageous machinist, Mr. McIntyre, volunteered to share the risk with them. They put her in complete trim, removing from deck and hold all superfluous articles. Notice was given of the time for starting, and a large number of people assembled to see the fearful plunge, no one expecting to see either boat or crew again, after they should leave the dock. This dock, as has been before stated, was just above the railway suspension bridge, at the place where she was built, and where she was laid up in the winter; that, too, being the only place where she could lie without danger of being crushed by the ice. Twenty rods below this eddy the water plunges sharply down into the head of the crooked, tumultuous rapid which we have before noticed as reaching from the bridge to the Whirlpool. At the Whirlpool the danger of being drawn under was most to be apprehended; in the Rapids, of being turned over or knocked to pieces. From the Whirlpool to Lewiston is one wild, turbulent rush and whirl of water without a square foot of smooth surface in the whole distance.

About three o'clock in the afternoon of June 15, 1861, the engineer took his place in the hold, and knowing that their flitting would be short at the longest, and might be only the preface to a swift destruction, set his steam valve at the proper gauge, and awaited—not without anxiety—the tinkling signal that should start them on their flying voyage. McIntyre joined Robinson at the wheel on the upper deck. Self-possessed, and with the calmness which results from undoubting courage and confidence, yet with the humility which recognizes all possibilities, with downcast eyes and firm hands, Robinson took his place at the wheel and pulled the starting bell. With a shriek from her whistle and a white puff from her escape pipe to take leave, as it were, of the multitude gathered on the shores and on the bridge, the boat ran up the eddy a short distance, then swung around to the right, cleared the smooth water, and shot like an arrow into the rapid under the bridge. She took the outside curve of the rapid, and when a third of the way down it a jet of water struck against her rudder, a column dashed up under her starboard side, heeled her over, carried away her smokestack, started her overhang on that side, threw Robinson flat on his back, and thrust McIntyre against her starboard wheelhouse with such force as to break it through. Every eye was fixed, every tongue was silent, and every looker-on breathed freer as she emerged from the fearful baptism, shook her wounded sides, slid into the Whirlpool, and for a moment rode again on an even keel. Robinson rose at once, seized the helm, set her to the right of the large pot in the pool, then turned her directly through the neck of it. Thence, after receiving another drenching from its combing waves, she dashed on without further accident to the quiet bosom of the river below Lewiston.

Thus was accomplished the most remarkable and perilous voyage ever made by men. To look at the boat and the navigation she was to undertake no one would have predicted for it any other than a fatal termination. The boat was seventy-two feet long, with seventeen feet breadth of beam and eight feet depth of hold, and carried an engine of a hundred horse power. In conversation with Robinson after the voyage, he stated that the greater part of it was like what he had always imagined must be the swift sailing of a large bird in a downward flight; that when the accident occurred the boat seemed to be struck from all directions at once; that she trembled like a fiddlestring and felt as if she would crumble away and drop into atoms; that both he and McIntyre were holding to the wheel with all their strength, but produced no more effect than if they had been two flies; that he had no fear of striking the rocks, for he knew that the strongest suction must be in the deepest channel, and that the boat must remain in that. Finding that McIntyre was somewhat bewildered by excitement or by his fall, as he rolled up by his side but did not rise, he quietly put his foot on his breast to keep him from rolling round the deck, and thus finished the voyage.

The effect of this trip upon Robinson was decidedly marked. To it, as he lived but a few years afterward, his death was commonly attributed. But this was incorrect, since the disease which terminated his life was contracted at New Orleans at a later day. "He was," said Mrs. Robinson to the writer, "twenty years older when he came home that day than when he went out." He sank into his chair like a person overcome with weariness. He decided to abandon the water, and advised his sons to venture no more about the Rapids. Both his manner and appearance were changed. Calm and deliberate before, he became thoughtful and serious afterward. He had been borne, as it were, in the arms of a power so mighty that its impress was stamped on his features and on his mind. Through a slightly opened door he had seen a vision which awed and subdued him. He became reverent in a moment. He grew venerable in an hour.

* From "Niagara: Its History and Geology." By Geo. W. Holley.

### New Method of Mixing Hypo and Alum Bath for Gelatine Plates.

The Marquis de Ferronnay recommends a somewhat novel method of mixing the hypo and alum bath, his plan being as follows: One liter of warm water is poured on a mixture of 150 grammes of hyposulphite of soda and 40 grammes of alum, the whole being well stirred; a piece of wood being more convenient for this purpose than a glass rod. A small proportion of sulphur is deposited, but after this has been removed by filtration the solution is ready for use, and it is said that such a bath may be used more than a hundred times without becoming colored.

As the fixing bath containing alum is more or less liable to deposit sulphur, it is advisable to filter it immediately before use, and in order to guard against the possibility of a deposit of finely divided sulphur remaining on the surface of the negative, it is well to pass the hand lightly over the film while the plate is in the wash water. The alum and hypo bath does not appear to cause the sulphuration of the image, and we see no reason to suppose that negatives fixed in the composite bath are likely to be less permanent than those which have been fixed in the simple hypo bath.—*Photo. News.*

### A New Electric Light.

Among the novelties having a probable influence in the future upon photography, says a correspondent of the *British Journal of Photography*, is a new invention by Mr. Frederick Varley, of the Mildmay Park Telegraph Works, London.

In the incandescent electric lamps a fine flexible filament of carbon, inclosed in a vacuum tube, is made white hot by the electrical current. Mr. Varley also uses flexible filaments, but in a thick, rope-like bundle, and he burns them in an arc lamp. The result is curious and novel. Instead of the dazzling point of light, emitting rays from a very small area, and looking like a brilliant star, the Varley light is more like a planet, presenting a disk of appreciable diameter. Another feature is that the space between the two filamentary carbons is so heavily charged with ignited carbonaceous matter that the total electrical resistance of the circuit is considerably reduced, so that many more lamps than those containing hard carbons can be put in the circuit, and worked without any increase in the amount of electrical power. Another novel feature is that most of the luminosity comes from the arc itself and not from the ends of the carbons; whereas in the present arc lights the luminosity comes chiefly from the ignited ends of the hard carbons, and not from the intermediate arc. The carbons do not burn into large cups and cones, but burn away flat at the ends; nevertheless Mr. Varley thinks that the usual cups and cones are there, at the ends of the fine filaments. He has not, however, been able to see them under a microscope. The filamentary carbons are flexible; those as thick as a cord can be twisted round the finger. The inventor can wind his carbons on a wheel, and pay them out by clockwork or otherwise to feed the light. The light is a noiseless one, the hissing due to the tearing away of particles from the ends of the hard carbons being absent. When the power is too weak a slight noise is made now and then, like the "cry" of a diamond when cutting glass.

The diameter of the Varley carbons has to be regulated according to the strength of the current, otherwise they burn away somewhat rapidly; but Mr. Varley informs me that when the carbons are properly proportioned in dimensions to the current they burn away more slowly than hard carbons. The luminous arc between the filamentary carbons is remarkably sensitive to the action of a magnet, being easily deflected thereby. The chief objection, so far as I know, to the new electric light is that the arc being a good conductor the carbons require a greater range of "play" in the matter of distance from each other than is the case with the present arc lights; hence a special lamp has to be devised to burn the carbons to the best advantage, and there are, consequently, difficulties to be overcome. As these difficulties, however, are merely mechanical they are not likely to exist long without being surmounted.

To make the carbons, Mr. Varley takes pieces of rope or of plaited cord, soaks them in paraffine or crude ozokerite—an inexpensive fossil wax—and carbonizes them in a crucible filled with hydrocarbon vapor. The firing is continued for ten or twelve hours, and the heat is intense enough to soften wrought iron to a plastic state—slightly below its melting point. Thin pieces of wrought iron laid between pieces of rope in the melting pot have in some cases been so softened as to receive impressions from the carbonized fibers, as if the iron had been soft wax.

### Harmony and Beer.

Beer and song seem to go well together, if we are to judge by the sale of the beverage during the recent saengerfest at Buffalo. This musical festival lasted one week, during which the consumption of lager exceeded that for the corresponding week of last year by 2,130 barrels. This is equivalent to an excess of 66,030 gallons or 1,056,480 glasses over the ordinary consumption. The expenditure for beer was $52,824 more than usual. Besides this, an immense quantity of wine, alcoholic liquors, and mineral waters was disposed of. It is estimated that Buffalo profited by the festival to the extent of $300,000.

If the proposed tunnel should be made for the relief of about 180 mines in Gilpin County, Colorado, it would be one of the largest of the kind in the world. These mines produce about two million dollars a year, chiefly gold, of which the total output since its discovery in 1859 has been over thirty-seven millions, besides three and a half millions in silver.

### THE FIRST ELECTRIC MOTOR.

Works that treat of the history of electric motors generally indicate as one of the oldest of such apparatus that of the Abbé Salvatore dal Negro, Professor of Natural Philosophy at the University of Padua, and which, constructed along toward the year 1832, was described at about this epoch in

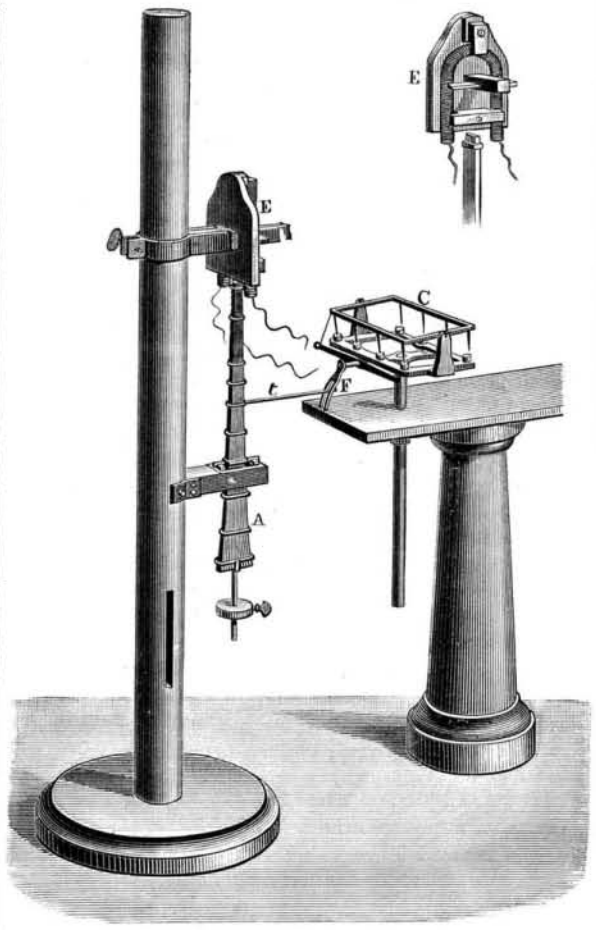


Fig. 1.—DAL NEGRO'S ELECTRIC MOTOR. (1830.)

the *Bulletin* of the Académie des Sciences, Lettres, et Arts of Padua, vol. iv., and later, in April, 1834, in the Lombardo-Venetian *Annales du Royaume*.

These indications as to date are about all that we find relative to Dal Negro's apparatus. The Italian section of the exhibition of 1881, so rich in electric apparatus, furnished upon this point, however, an interesting document in the way of two types of the motor under consideration. The data affixed to the apparatus with great care by the Italian Commission carry the date at which the first of these types was constructed back to 1830. The motor must, then, have anticipated those ideas that, according to the *Electrician* of September 9, 1882, Dr. Schulthess expressed in 1832 in regard to the construction of apparatus of this kind, and must have been the first that was ever constructed; and it is curious at the present time, when such an application of electricity has made so important an advance, to see what the idea was that constituted the germ, so to speak, of modern progress.

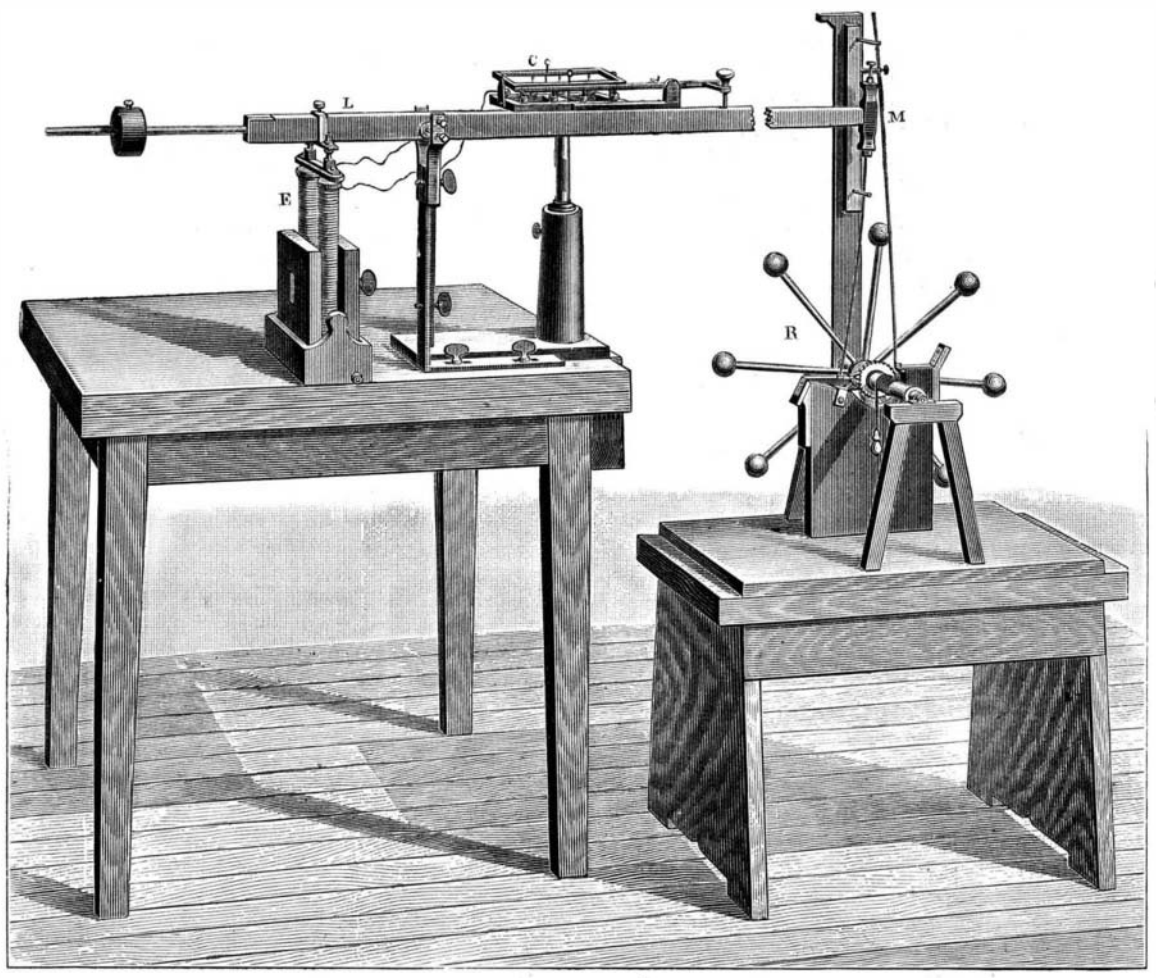


Fig. 2.—DAL NEGRO'S ELECTRIC MOTOR. (1831.)

The first type of the Dal Negro motor, which, at the Palace of Industry, bore the date of 1830, consisted (Fig. 1) of a magnet, A, movable around an axis situated at about one-third of its length, and the upper extremity of which was capable of oscillating between the two branches of an electro-magnet, E, represented separately in the figure. A current, being sent into the electro-magnet, passed through an 8-cupped mercurial commutator, C, that the oscillating magnet controlled by means of a rod, *t*, and a fork, F. As a result of such an arrangement, when the magnet had been attracted toward one of the poles of the electro, this very motion of attraction, acting upon the commutator, changed the direction of the current, and the magnet was repelled toward the other branch of the electro, and so on. It was a simple alternating motion.

The apparatus, however, contained one interesting detail: The movable magnet, when it touched the poles of the electro, abutted, not against the iron itself, but against the insulated wire that covered it. Either accidentally or designedly the author thus avoided those inconveniences connected with remanent magnetism which later on were to embarrass other inventors when polarized armatures were applied to electric telegraphs. The other apparatus, which the ticket affixed by the Commission stated was constructed in 1831, was designated on this same ticket by the name of "Prof. Salvatore dal Negro's Simple Electro-magnetic Ram."

In this second arrangement, Fig. 2, we find the same play of the commutator as in the former, but it is this time controlled by a horizontal lever, L, which, instead of itself constituting the armature, supports the latter above the electro-magnet, E. The lever, L, terminates in a sort of hammer, M, which is prolonged beneath by a stiff rod that controls a click. This latter acts upon a ratchet wheel, and thus sets in motion a sort of wheel, R, composed of rods terminating in balls.

In this case, the motor, instead of simply keeping up its motion, produced a small amount of work; but what a feeble performance, and how much had we ought to congratulate ourselves at the progress accomplished, when we reflect that at this same exhibition, at which the Pacinotti ring reigned as master, and at which the Dal Negro motor figured as a simple curiosity, inventors were still exhibiting, as practical, motors that were based like this latter upon the transformation of alternating motion.—*La Lumiere Electrique.*

### Anti-Cholera Rules.

Pasteur has published nine anti cholera rules, of which the following is an abridgment:

All table water must be boiled, and bottles half filled with it. Before being drunk, the water should, to aerate it, be well shaken. The pitchers or other vessels in which water is generally stored in kitchens ought, before they are each day replenished, to be heated to 150° Centigrade, or a higher temperature if possible. Wine should be also heated to 55°, and drunk out of cups which have been freshly plunged in scalding water. All food should be thoroughly cooked. Underdone flesh and raw vegetables promote cholera. The other vessels in which jam is to be kept are to be prepared for its reception by a passage through a furiously hot oven. Bread is to be cut about twenty minutes before it is wanted, and toasted hard, or rebaked quickly. All sheeting and cloths ought to be scalded and rapidly dried before being used. Water for toilet purposes is only safe when it has been first boiled, and then diluted with thymic acid dissolved in alcohol, or carbolic acid, in the proportion of two grammes per liter. Hands and face should be frequently washed with this mixture. Plates, knives, forks, etc., are to be taken straight from the boiler or oven to the dinner table. The ninth rule is the least practicable. Pasteur has drawn it up for the especial benefit of doctors, nurses, and persons who reside in houses or neighborhoods visited by the epidemic. It prescribes the wearing of a mask made of two thin sheets of brass, fitting well into each other, but not soldered together. A layer of phenolized wadding is to be placed between the metal strata. The operation of breathing is to be performed through mouth and nostrils covered with wadding.

THE idea that lightning is not so destructive as it used to be in the United States, because the network of railroads and telegraph wires lessens the number of accidents, is met by the record of the summer. Fatal thunderbolts have never been more common.