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

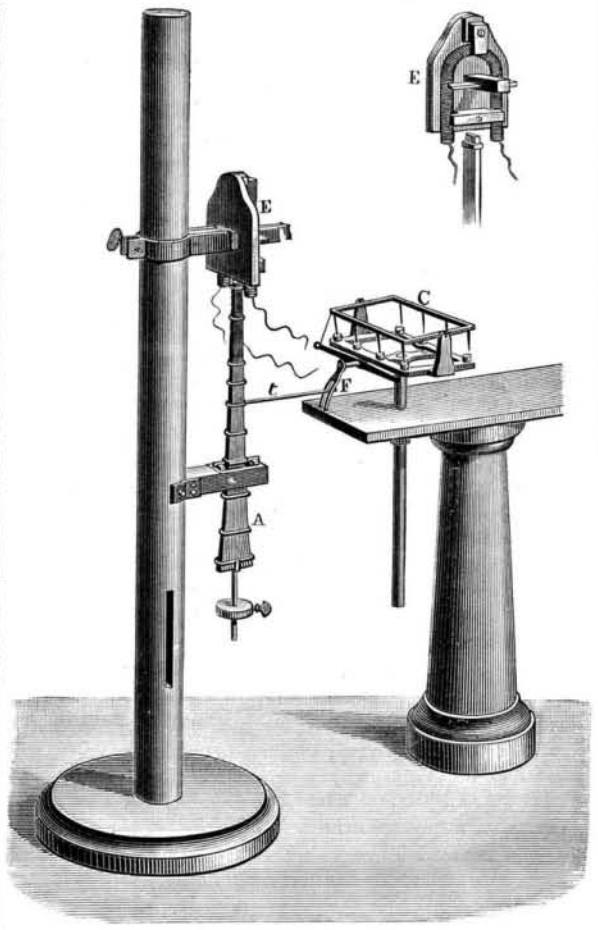


Fig. 1.—DAL NEGRO'S ELECTRIC MOTOR. (1830.)

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.

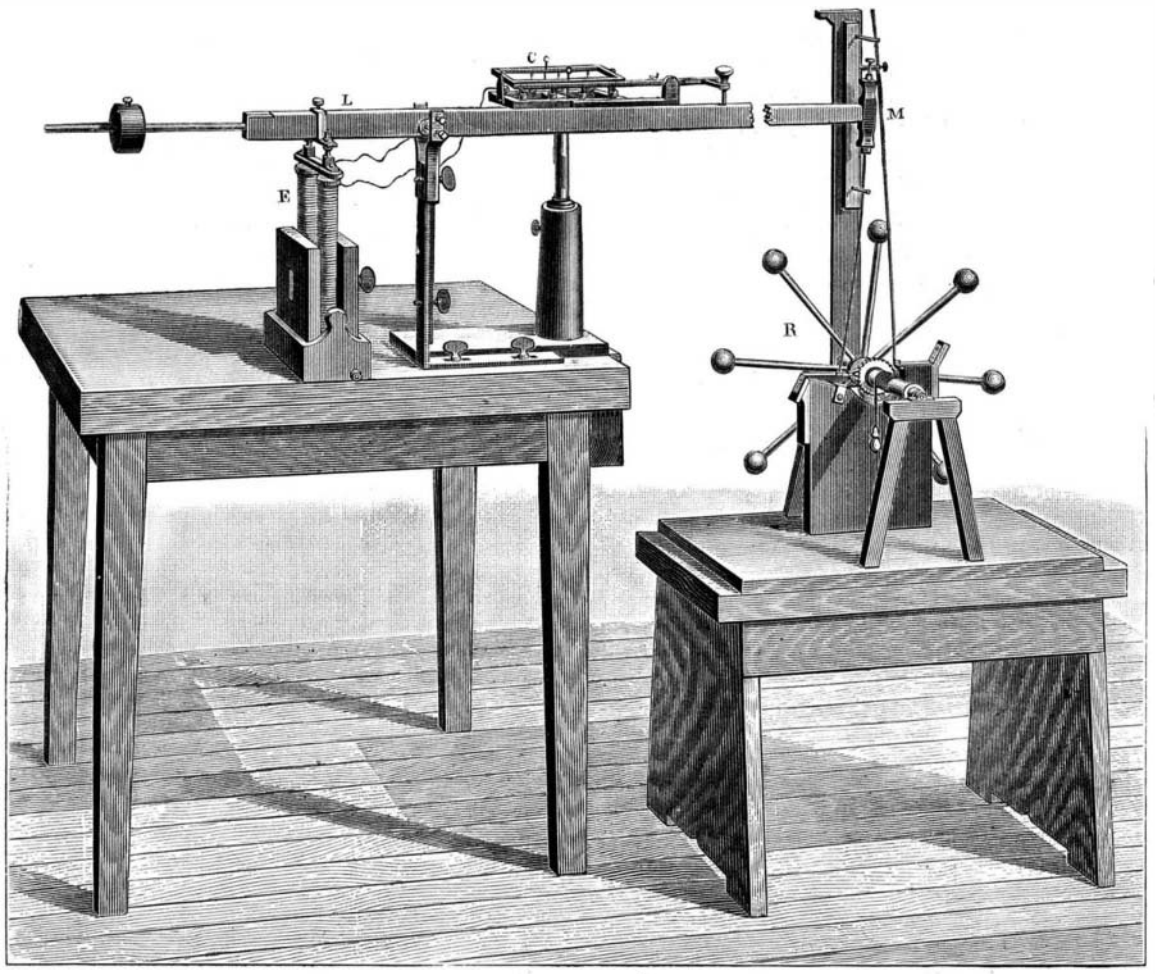


Fig. 2.—DAL NEGRO'S ELECTRIC MOTOR. (1831.)

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.

The Progress of New York.

In 1771 the population of the city of New York was a little over 21,000; and in 1786, three years after the close of the revolutionary war, it had 23,614 inhabitants. The several censuses taken during the past 100 years exhibit the marvelously rapid strides which New York has made toward her present imperial position. In 1790, however, the population was little more than it was in 1771; but by 1800 it had risen to 60,515. The remaining censuses are thus given; 1810, 96,373; 1814, 95,518; 1820, 123,706; 1825, 166,086; 1830, 202,589; 1835, 270,089; 1840, 312,710; 1845, 371,223; 1850, 515,547; 1855, 629,906; 1860, 813,669; 1865, 726,384; 1870, 942,292; 1875, 1,041,886; and 1880, 1,206,299. On only two occasions has the enumeration shown a decrease from the figures of the preceding census. The first time was after the war of 1812, and the second after the civil war. The population of New York city has doubled six times within a century—doubling, on an average, once in every 17 years. In other words, the New York of to-day, is 64 times as large as the New York of 100 years ago. The rate of increase in the country at large is insignificant beside that of the metropolis. In 100 years the population of the United States has multiplied itself by 16; but the population of New York has increased at four times that rate. At the rate of increase shown by the last 25 years alone—a rate diminished by the decline of American commerce and the influence of the civil war—there are children now nursing who will behold a New York city containing no less than 10,000,000 inhabitants.

The California Redwoods.

A correspondent of the *Federal Australian* from San Francisco describes the cutting down of some of the great trees on the Pacific shore. He says:

"It is a magnificent yet a painful sight to witness the operations in one of these redwood forests. You stand in the midst of vast trees, so close together that there is a dim religious light around you like that of a cathedral. This delusion is furthered by the apparent regularity with which many of these trees grow. You can look down a long aisle as if it were a groined arch of cathedral roof, and the only thing which undeceives you is, on looking up, far above your head, to see rifts of blue sky between the branches. But you are suddenly startled by a long cry of warning, which follows the rhythmic chopping sound of the axe and the swish of the saw. It is the woodman, and his melancholy cry portends the fall of a mighty tree. There is a long and labored groaning sound; it is the tree breaking away from the friendly base which has held it, perhaps, for ages. Then there is a sharp "crack." The tree has snapped in twain. The mighty mass trembles slightly for a moment, then inclines in the direction toward which the practiced woodmen have designed it to fall. It topples—it falls. There is an awful crash—the falling tree is smiting the branches from a fellow tree which still stands upright, but not for long. There is a sound like a peal of thunder—the tree has struck the ground. The earth trembles for rods around, as if there were an earthquake; there is a cloud of dust, and all is over.

"The redwood is a most valuable kind of timber. It is very slow to burn, and if ignited is easily extinguished. It is very heavy and very dense in fiber, yet very easy to work, splitting with the most perfect accuracy, and yielding to the saw, the chisel, etc., with the utmost ease. When polished it makes a most handsome wood for interior fittings, and many of the finest houses in California are fitted with this wood in its polished state."

The Woodchuck.

A special committee of the New Hampshire Legislature has been amusing the members of the legislature and the readers of its reports by a semi-serious diatribe against the woodchuck; the occasion being a bill to authorize a bounty of fifteen cents on each woodchuck killed.

But really the "woodchuck," or "wood hog," is a terrible pest to farmers in New England and in the northern tiers of counties of our Middle States. It does immense havoc to growing crops, and its devastations seem to require as encouraging legislative enactments for its destruction in the way of bounties as in former years the legislatures offered for wolves' heads or foxes' skins.

The woodchuck is one of the most wary of animals. He is as bad a sneak as the weasel. He makes his ground burrow in a field planted to corn, or to other vegetables, or cultivated to clover. His hole may be found, but long before the beast can be reached he is far away. It is difficult to attempt to drown out a woodchuck by filling his hole with water. Long before the water can be brought the sly woodchuck has made a new home. Indeed, it is a fact that a chased woodchuck has made a new burrow almost in sight of his pursuers while they were searching for him.

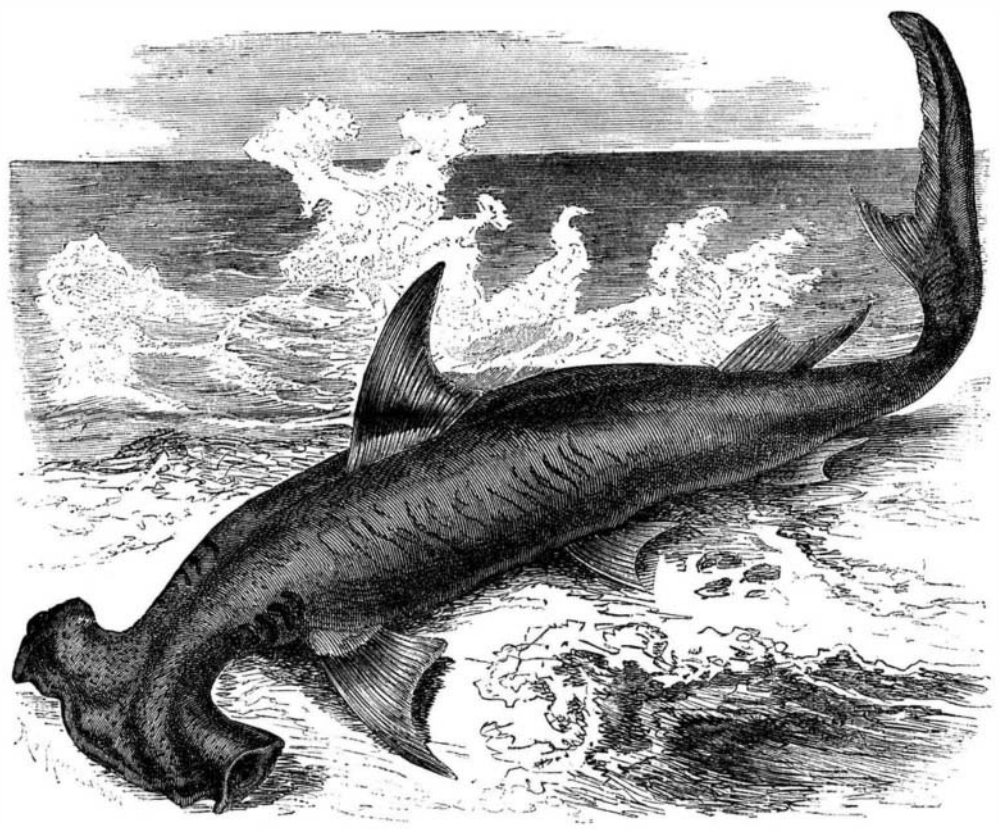
There is nothing succulent and of a salad quality that the woodchuck does not relish; growing beans, lettuce, peas, springing corn, new potatoes, anything that is good for humans is good enough for him. He will make a meal off of clover, or will subsist on ordinary grass.

But all his life he knows that he is a sneak thief. He does not come out and rob like his betters of the *ferox* tribe, but is very careful about exposing himself. Just after the sun has sunk in the west, in the intergloaming between daylight and dark, he sneaks out of his hole and goes to feeding, but he never feeds without watching. His down nibblings and uprisings are so frequent as almost to be instantaneous. It is considered in New England localities where the woodchuck abounds a fair trial of skill to send a rifle bullet through one as he shows himself above the grass or stubble. This extraordinary quickness of movement makes the hunting of the woodchuck a sport. Usually the woodchuck is caught with dogs and "drowning out" by pouring water in his subterranean habitation, after driving him in and being sure that he is there.

The woodchuck, to those whose prejudices do not extend beyond reason, makes a palatable dish. He is a cleanly fed animal, taking only vegetable food. He is a hibernating animal, sleeping like the bear from frost to spring, and grows fat on the growing vegetation of the field and garden, until in the fall he is "fat as a hog," which he is, and deserves to die to give food to those whom he has robbed a whole season through.

HAMMER-HEADED SHARK.

The hammer-headed shark (Zygæna malleus) is a very remarkable fish, and has from ancient times excited general attention. It resembles others of the shark family in the



HAMMER-HEADED SHARK.

number and position of its fins, but is distinguished from them and all other vertebrate animals by the lateral expansion of the head, especially of the bones and cartilage around the eyes, so that the head resembles a hammer, the eyes being placed at the projecting extremities.

This fish is found in the Mediterranean Sea, and sometimes strays as far as the northern coast of Europe. It is about seven or eight feet long, but specimens have been found eleven and twelve feet in length. Its body is covered with a granulated skin, the upper side being of a grayish brown, and the under side a grayish white; the large eyes are golden yellow. The teeth are long, sharp, almost triangular, and serrated on the edges.

They search for prey around ships. Gessner says: "They are large, hideous, terrible animals, and destroy men who are swimming, and it is considered a sign of ill luck to see them."

They produce living young. In a hammer-headed shark captured on the English coast were found thirty-nine fully developed young, averaging nineteen inches in length.

Oil is procured from the liver, but the flesh is not good, being hard and ill-flavored.—*From Brehm's Animal Life.*

The Indications of the Clouds.

Some of the oldest text books, or the reading books, of the present mature generation show by text and illustration the shape and the proportional construction of clouds, giving them names; as, the *cirrus*, *stratus*, *cumulus*, *nimbus*, and their names compounded. A recent contributor to our cloud knowledge is an English meteorologist, Rev. W. C. Ley, who has initiated the appearance of the clouds as a study by means of photography. He claims that by observing cloud forms he can predicate rain from the surface of a cloud whose *nimbus* portion may be forty miles away. His plan comprehends the material as well as the forms of clouds. The *cirrus* is an ice cloud sailing at an altitude of from three and a half to seven or eight miles above the general surface of the earth, with a very high velocity, at times exceeding that of the locomotive. The icy structure of the upper clouds is evidenced, not only by the fact that at the levels on which they move the temperature must be extremely low, but by the fact that halos and mock suns, formed by *cirri*, cannot be explained in accordance with optical laws, except on the hypothesis that the light is refracted through minute prisms of ice. "Outlying streaks of this cloud, often from 20 to 100 miles in advance of the main pack," he shows, serve as "the pioneers of the coming army"—these attenuated threads of ice crystal, between 25,000 and 40,000 feet above the earth, arranged in parallel lines, gradually overspreading the sky with a milky looking film of whitish cloud matter. This stage occurs at a place lying in the storm's track before the barometer gives any warning, and sometimes while the mercury in the weather glass is rising. Thus the trained observer may consider these clouds as storm signals, advertising, by their peculiar movements, not only the coming of the storm, but also the bearings of its center.

Uses of Slag.

Among the utilizations of furnace slag, those by Mr. Charles Wood, of Middlesbrough-on-Tees, promise to be of considerable commercial value. From the slag he has formed building bricks by reducing the slag to a sand and mixing it with lime, the mixture being pressed, dried, and air hardened, without baking. It is claimed that bricks thus made were not only so tough as to resist splitting when a nail was driven into their substance, but that they had a crushing resistance fully equal to the ordinary bricks.

A finer sand was used also to form a cement, the composition being two and a half parts each, by measure, of slag sand and ground brick to one part Portland cement. The slag sand was obtained by running the molten slag into water kept in agitation.

Paving blocks and tile, and even railway sleepers, have been made direct from the molten slag, but it is doubtful if the economy of this method of utilization would permit the transportation of these weighty materials, substitutes for which could generally be found on or near the place of using.

Glass of the coarser sorts has been produced from molten slag mixed with sand and alkalies in the proportion generally of one-half slag. The heat of the fused slag was an advantage in its use over the use of other materials, although a remelting was necessary after the addition of the other materials. The production of "mineral wool" for non-conducting and similar purposes is only another treatment of the slag as a vitreous substance, it being torn into filaments by the force of steam. Even this use of slag is so slight in amount that it seems to have no appreciable effect on the growing masses of residuum from blast furnaces in our iron producing localities.

Two years ago Mr. A. D. Elbers, of Hoboken, N. J., patented a process for rapidly cooling the flowing slag in successive layers, or rather in a welded mass, so as to form coherent blocks or slabs of any required form and dimensions. But none of these attempts can keep pace with the continuous waste of slag material at the ore reducing furnaces, even when these furnaces are the centers of increasing populations and parts of busy cities.

New Statue of Washington.

This statue, of bronze, to be thirteen feet high and to weigh more than one and a half tons, is expected to be ready to be unveiled November 26, on a pedestal at the center of the flight of steps on Wall Street, New York, leading to the doors of the Sub-Treasury building. The statue is by J. Q. A. Ward, and is to be of bronze cast in Philadelphia, and will cost at least $35,000, which has been raised by a committee of the New York Chamber of Commerce. The statue is intended to represent Washington just after he has taken the oath of office as the first President, as he stood on the 30th day of April, in the year 1789, on the balcony of the old Federal Building, which occupied the site of the present Sub-Treasury building. He stands in an easy, natural, yet very dignified pose, looking out to the right, with his right arm extended, and his left hand placed on the hilt of his sword. The moment chosen is that when, after taking the oath, he said, "I will, so help me God!" The expression of his face, modeled from the Houdon bust and the Stuart portrait, is calm, earnest, and resolute. Its completion and erection will add another to the attractions of the metropolis, and to the mementos of the early history of the country as a Union of States.