THE MEASUREMENT OF HEAT.

The heat which a pound of coal can produce, either with or without light, is all that gives it its value. It is only in a rough, experimental way that we know how much heat any given description of coal is capable of producing; but it is substantially from what we do know of their calorific powers that the relative prices of all coals are regulated. Our knowledge, however, of the hidden powers of nature, of which heat is the greatest, is constantly increasing. The mechanical theory of heat is one of the greatest, and, at the same time, most beautiful additions to natural philosophy. With the aid of this theory we have been made comparatively familiar with one of the most intangible elements of force, and to deal with it in much the same way as with visible, ponderable matter. This kind of knowledge is calculated to remove much of our conceit; for, while we have been boasting of the perfection of our steam machinery, it shows us that we are hardly utilizing one-twentieth of the actual power residing in the fuel which we burn in our furnaces. Such knowledge as this is invaluable as leading to improvement, and every step in modern steam-engineering shows the advantages which it is capable of conferring.

The relation between the quantity and intensity of force of all kinds is another important branch of knowledge in which great progress is being made. Electricity, the best suggestion of imponderability, is already measured quantitatively, and in its intensity or range of momentary action. The distinction between absolute quantity and the mere density or pressure of steam is well understood, and the steam gage, simple as it is, is one of the finest examples of our resources for the measurement of the invisible sources of power. Mechanical power itself is frequently weighed, and the use of the dynamometer is likely to become general.

In respect of heat, our definite knowledge of its intensity in the various processes in which high temperatures are employed, has been generally very deficient. Beyond the thermometer, employed almost entirely for the measurement of atmospheric temperatures, we have rarely consulted any instrument capable of showing the higher ranges of thermal action, or such as occur in nearly all our applications of artificial heat. Of the heat in a steam-boiler furnace we seldom know anything. It is only very rarely that we know the temperature of boiler flues. Nobody knew anything of the heat existing in the funnels of the *Great Eastern* on the occasion of the explosion, and whilst there are those who believe they were never heated above 325°, there are others who stoutly affirm that they were heated beyond 1,000°.

Soyer always maintained that there could be no good cooking where the scales, the watch and the thermometer were not in constant reference. These instruments are as essential to steam-engineering as to cookery. We already weigh our coals and time their combustion, but we shall never properly apply the heat derived from them until we can measure its intensity at every moment. It is for this that we must use pyrometers, not experimentally and exceptionally, but practically and constantly, as we do weighing-machines, clocks or steam gages. There are many who believe that we should indeed measure and always refer to steam by its temperature merely, and not by its pressure. It has been shown, with considerable force, that, under such a system, steam-boiler explosions could hardly ever occur. However this may be, heat gages should be in constant use in our furnaces, or rather in the escaping-flues, and in all apparatus where high temperatures are employed. The pyrometer introduced by Mr. Gauntlett has already enabled many steam-boiler proprietors and owners of hot-blast furnaces to effect a considerable saving in fuel by maintaining equable firing, and as the knowledge of this and similar instruments extends, further and most important advantages are likely to ensue.—*London Engineer.*

RAIN AND PAINT PHENOMENA.

MESSRS. EDITORS:—On Sunday morning, Nov. 13, 1859, at 10¾ o'clock, a rain storm commenced from the south-west, which changed the color of two houses situated on the west side of Little Neck Bay, and also one at Hunter's Point, L. I. The effects were similar to that of dilute sulphuric or muriatic acid when poured upon a newly-painted surface. Those houses were painted in light and dark drabs, and were finished in April, May and June, 1859 One would have supposed that they had been entirely spoiled; for they looked like old weather-beaten crafts, and the painters, of course, were immediately blamed by the owners. I noticed that, when the rain commenced, it was warm upon the face and hands; and the rain came with a very sudden dash, like water forced violently through a sieve. The most remarkable part of this story remains to be told. Another rain storm followed some days afterwards, from the opposite point—north-east—when, lo! it restored the paints on these houses to their original colors.

Several buildings at White Stone, L. I., on the southern shore of the East river, which had been painted with the same color, were not the least affected by this rain storm. I do not know whether the phenomena was confined to Long Island, or had been witnessed in other places. It may be accounted for by currents of atmospheric electricity, carried with the rain over the surface of the paint. As opposite currents of electricity produce heat and cold alternately, a positive current first sent over the face of a wet painted board, and this succeeded by a reverse current, will sometimes produce effects similar to those stated in the foregoing. J. Q.

Flushing, L. I., Nov. 28, 1859.

HORSE-TAMING.

It appears that Mr. Rarey, our countryman, is still astonishing the natives of the British Isles with his wonderful power of taming the wildest studs and making them gentle as lambs. A short time ago he made a journey through Scotland, and several very vicious animals, which had defied all the arts of some of his pupils to subdue them, were taken in hand by the professor, and mastered with his usual consummate ability and success. By the latest account from Europe we learn that he is in Ireland, putting the lively Irish nags through his American process, and making as *decently*-behaved beasts as are to be found on *terra firma*. Mr. Rarey has a peculiar personal power in taming horses, which none of his pupils have acquired fully. In a late exhibition given by him in Dublin, he induced a rather fiery unbroken horse to stand quietly while a large drum was mounted on his back and beaten. This horse, which never before had a rider upon his back, permitted Mr. Rarey to mount him; and the whole assembly were in raptures with the American horse-tamer.

A REMARKABLE FACT.—Professor Mitchell, in his lectures on astronomy, has related a very remarkable fact. He said that he had met, not long since, in the city of St. Louis, a man of great scientific attainments, who for 40 years had been engaged in Egypt in deciphering the hierogylphics of the ancients. This gentleman had stated to him that he had lately unraveled the inscriptions upon the coffin of a mummy, now in the British Museum, and that by the aid of previous observations, he had discovered the key to all the astronomical knowledge of the Egyptians. The zodiac, with the exact positions of the planets, was delineated on the coffin, and the date to which they pointed was the autumnal equinox in the year 1722, before Christ, or nearly 3,600 years ago. Professor Mitchell employed his assistants to ascertain the exact position of the heavenly bodies belonging to our solar system on the equinox of that year, (1722, B. C.,) and send him a correct diagram of them, with out having communicated his object in doing so. In compliance with this, the calculations were made, and to his astonishment, on comparing the result with the statements of his scientific friend already referred to, it was found that, on the 7th of Oct., 1722, B. C., the moon and planets had occupied the exact position in the heavens marked upon the coffin in the British Museum.

CORRECTION.—In Mr. H. O'Rielly's letter on the "Liquefaction of Flint in Water," published on page 346 of the present volume, several words were omitted in the "copy" furnished by the author, who has since sent us the correct phraseology which should have been expressed by the first paragraph in the second column of the above page. It should have read thus:—"Without dwelling on the extent to which Mr. Hardinge's views were stimulated by the operations of those humid volcanoes—safety-valves for the thermal operations of nature's great geologicallaboratory, and without discussing his views concerning the origin of rocks from the first gaseous elements through the fluid, semi-fluid, semi-solid to the solid granite, where Hugh Miller began his "Testimony of the Rocks;" thence through the metamorphic changes and combinations down to the tertiary and quaternary formations, I take pleasure," &c.

DETECTING COUNTERFEIT SILVER COIN.—When a sheet of silver is plunged in a solution containing 1½ part of bichromate of potassa, and 2 parts of sulphuric acid, it becomes quickly covered with red crystals of bichromate of silver; but this beautiful coloration is not produced with the other metals nor with silver money very rich in copper. It is useless to plunge the whole of the suspected piece in the liquid. A drop of the liquid applied to the metal is sufficient to give a result; but when the coin is recently made, or if it is presumed that it has been covered with silver by a galvanoplastic process, it is sufficient to scrape off a small portion with a knife and touch with a drop of the liquid. If the surface is nearly pure silver, the alloy beneath is seen to preserve its metallic lustre in the midst of a red formed by the silver of the surface—*Polytechnic Journal.*

ACCUMULATION OF COTTON.—We have heretofore mentioned the fact that all our cotton sheds were filled, and all the available space on the bluff and elsewhere were occupied by cotton awaiting transportation. We were informed yesterday, by the officers of the Memphis and Charleston Railroad, that their yard contains 7,000 bales of the staple, and that 2,500 were being received daily. They have room at their depot for only 10,000 bales, and this accumulation is putting them to serious inconvenience. Their were eight or nine boats loading with cotton at the levee, last evening, yet the imports seem to equal the exports.—*Memphis* (Tenn.) *Avalanche, Nov. 16th.*

DANGER OF READING BY TWILIGHT.—The London and Edinburgh *Philosophical Magazine* contains an account of the sudden loss of power to distinguish colors, produced by straining the eyes under a very feeble light. It says:—"A sea-captain, who was in the habit, when time hung heavy on his hands, of occupying it by working at embroidery, was one afternoon engaged upon a red flower, and being anxious to finish it, prolonged his labor until twilight came on, and he found it difficult to select the suitable colors. To obtain more light, he went to the companion-way, and there continued his work. While thus taxing his eyes, his power of distinguishing colors suddenly vanished. He went upon the deck, hoping that an increase of light would restore his vision. In vain. From that time to the present (more than ten years) he has remained color-blind."

MONTREAL VICTORIA BRIDGE.—A train consisting of an engine and a single car passed over this great bridge on the afternoon of the 24th ult. There were about 50 persons in the car, among whom were A. M. Ross, Esq., Chief Engineer, and several of the directors. The time of passage was 12½ minutes, it was a mere test experiment, as the bridge is not yet quite finished. The passage of this, the first train, we understand, was gratifying. It is expected that the bridge will be completed and opened to the public for traffic about the latter part of this month.

FUEL FOR EGYPTIAN LOCOMOTIVES.—There are now over 300 miles of railroads in Egypt. A foreign correspondent gravely states that, on some of these lines, the engine-stokers burn "mummies" for fuel, that the latter make a very hot fire, and that, as the supply is almost inexhaustible, they are used by the "cord." The firemen of those engines must have no *tender* feelings for departed greatness. What a destiny for the Egyptian Kings! Think of your body being carefully preserved for three thousand years, and then used to "fire up" a locomotive! "To what base uses do we come at last!"

BEWARE OF MUSK-RAT HOLES!—Three years ago some musk-rats burrowed in the banks of the canal at Blackrock, N. Y., and the water flowed through and at last carried it away, causing a flood in the adjacent creek which destroyed a saw-mill, and floated off a great quantity of logs. The owner of the mill sued the State for damages, and has received $3,500.

IRON WORKS.—From a table recently compiled by the American Iron Association, we find that there are only eight States destitute of iron works, viz.:—Mississippi, Louisiana, Florida, Texas, Iowa, Minnesota, California and Oregon. There are 1,545 works, 882 furnaces, 488 forges and 225 rolling mills, which produce annually about 850,000 tuns of iron, the value of which, in an ordinary year, is $50,000,000.