

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

We conclude this week the extracts from the proceedings of this association, held at Springfield, Mass. This was the Thirteenth Annual Meeting. It was held for six days, and adjourned on the evening of the 9th inst., to meet on the first of August, next year, at Newport, R. I.:-

NEW SURVEYING INSTRUMENT.

Mr. J. E. Hilgard, of the Coast Survey, read a paper by Mr. John Oakes, of New York, on a self-recording instrument to measure the sun's altitude without an artificial horizon. The instrument is a hollow hemisphere, silvered and iodized, hung on gimbles; and the sun's light is admitted through a hole in an equatorial plane, for one minute, and the center of the image of the sun thus formed taken as the true center at the end of 30 seconds. Practically tested by the Messrs. Blunts, of New York, it has proved itself capable of giving quite accurate results. The iodized coating need not be renewed oftener than once in five or six weeks.

MAGNETIZING LOCOMOTIVE-WHEELS.

Lieutenant W. P. Blake read a short paper by Mr. E. W. Serrell upon "Experiments in the magnetizing of Locomotive-wheels." The lower segment of the driving-wheels having been surrounded by a helix of copper wire, upon passing a current through the wire the friction on the rail was so increased that, when 19 lbs. of steam would make the wheel slip, unmagnetized, it required 35 lbs., magnetized; when it required 50 lbs., unmagnetized, it required 88 lbs., magnetized. The value of this invention consists in giving greater tractive power to lighter engines than those now employed. We shall have more to say on this subject in our next number.

EXPLOSION IN STEAM-BOILERS.

Mr. Hyatt, of New York, presented an able but practical paper on "The Explosion of Steam-boilers." He showed how rapidly the pressure of steam in boilers was doubled according to the following formula:-

212 degs. of heat, 15 pounds to square inch.			
251	"	30	"
294	"	60	"
342	"	120	"
398	"	240	"
461	"	480	"
568	"	960	"

This carries iron to a red heat, and, of course, softens it. The temperature rises often with great rapidity. If the water becomes low, or if it is let in suddenly, steam of high tension is generated, acting against weakened boilers. This, he had no doubt, was the true cause of the explosion of boilers.

Professor Henry said that the amount of latent and sensible heat in steam was the same, according to the law discovered by Dalton. This would lead to most terrible results when water was allowed to become low in boilers. He coincided with the view presented.

Professor Silliman said that he had never had the subject so vividly brought to his mind as at the present moment by the remark of Professor Henry. It was, he had no doubt, the true and only cause of all explosions. People resorted to other subterfuges, but this, he was satisfied, was the cause. The relations between latent and sensible heat were such that it was like kindling another fire in the boiler above the one already kindled. Other gentlemen coincided with the opinions advanced.

[In this table of pressures and temperatures, the last column should have been placed first. As it stands, it is liable to make an erroneous impression upon the minds of the uninitiated. The temperature in a boiler rises positively with the pressures, but steam may be heated to a very high temperature, and yet not exert a high pressure. The remarks of Professor Henry, as reported, does not seem to explain the nature of the heat of steam clearly; but that, we believe, is not his fault, as he understands the subject thoroughly. A pound of steam, at a pressure of 15 lbs to the square inch, and at a temperature of 212°, contains as much heat as a pound of steam at 251°, and a pressure of 30 lbs. on the square inch. High pressure steam is just low pressure steam compressed into a smaller space, and has its latent converted into sensible heat.—EDS.

CAUSES OF CHANGES IN THE EARTH'S TEMPERATURE.

Professor Peirce showed that geologists are mistaken in supposing that the heat of the earth is derived from the interior of the earth. He demonstrated that it

would require a million million years to produce a change of 1.20 of a degree of heat at the earth's surface. He proceeded to show that the heat could not come from the celestial spaces, neither from the formation of continents; it must come from the sun. But, to assume that hypothesis, in looking at the past history of the earth, it would of necessity involve a change of temperature in the sun itself. He was not ready to take that alternative, but he could see no other.

THE NATIVITY OF INDIAN CORN.

Dr. J. H. Gibbon read a paper on this subject. In commencing, he stated some facts as to maize being found at the present day in Asia and Africa. It grows, he said, in mountainous regions in China, in the latitude of 30°. The natives pay little attention to its culture, and it is of inferior quality. Dr. Livingstone had boiled green maize presented to him in Africa by negroes who had never seen a white man before. They often roast it and use butter upon it. The ancient Egyptians were great eaters of bread, and he thought they used Indian corn to a great extent. The speaker dwelt at some length upon the "manna of the desert," which the Israelites used when under the leadership of Moses, and argued that Indian corn was the very article. The fact that kernels of some grain had been used in olden time in Asia and Africa as a unitary weight, he considered proof of the antiquity of corn in those countries.

[Dr. Gibbon must be an antiquary of the highest sagacity; and, as the "mannā" in the desert fell every night, and twice as much on the fifth as the last day of each week, he may be able to inform the Farmers' Club of the American Institute how to raise Indian corn by this short-cut process.—EDS.

METEOROLOGY.

Professor Henry read a most interesting paper on this subject. He stated that there were 350 observers in the United States, who made their observations daily. The moving power in meteorology was the sun. It was originally supposed that the currents of air flowed from the equator to the poles; but that could not be true. On account of the convergence of the meridians, there was not room at the poles for the air. There were middle systems or intermediate currents of air; but these points were not fully established. There were exceptions in the general action which could be determined in their general bearings only by long observation. The cause of the fitful disturbance of the atmosphere was owing to the conversion of water into vapor. During a single shower, an amount of water fell upon the Smithsonian Institute building equal to 20,000 horse-power an hour; or the heat necessary to evaporate it would be equal to that necessary for working an engine of 20,000 horse-power per hour. Another cause of disturbance was the motion of the earth itself upon its axis. He had been assured by Mr. Wise, the balloonist, that, out of 200 ascensions, he had always been able to move east whenever reaching an upper strata of air. He (Prof. H.) therefore did not think it impossible that an aerial voyage could be made to Europe. Success would greatly depend upon the ability to make the balloon air-tight. If he kept in the upper strata, he might succeed, although it was not certain there was not a reverse current in mid-ocean. In the lower strata, there were irregularities which must be avoided. The balloon he considered as an important means of meteorological observation; by it, electrical phenomena and the formation of clouds could be observed. The reason why the English meteorologists had failed to make any satisfactory observations was because they lived on the western side of a great continent, with no opportunity to make observations west of them; while we lived on the eastern side of a great continent, with telegraph lines extending inland thousands of miles. The formation of hail, the sudden gusts, tornadoes, and other phenomena, were explained in a clear manner, which was listened to with intense interest.

STOCKINGS KNIT BY MACHINERY.—We published in our last volume an illustration of Aiken's Hosiery Knitting Machine, designed for manufacturing purposes and to be driven by power. Since then he has arranged the machine for family use, and is prepared to furnish them as will be seen by reference to Mr. Aiken's card on the advertising page. The machine is an excellent one and is made to be operated by a treadle, like the sewing machine, and is a valuable adjunct to every large family in our land.

AMERICAN PAPER-HANGINGS.

The beautiful green color on wall-paper is produced by a pigment containing arsenic, and we have, in former volumes, directed attention to cases of sickness said to be caused by the volatilization of this poison from the paper. It has been as strongly denied, on the one hand, that arsenic volatilized from the paper as it has been asserted, on the other, that it did; both parties claiming to have made experiments to test the question. This subject has very recently been brought before the public again by Mr. R. Medlock, of London, who states that he has recently analyzed three specimens of green-colored paper, and dust swept from the carpet of a room in which it was used, and in this dust he found a considerable quantity of the poison, thus showing that, whether it was exhaled from the paper or brushed from it, the fact was evident that it was in the room, and floated in its atmosphere, and that was sufficient. He therefore recommends the public to avoid purchasing wall-paper colored with arsenic-green.

On this subject, Dr. Hall, in his *Journal of Health*, for this month, says:—"If green paper, under any circumstances, poisons the human system, it is better to lay it down as a broad fact for practical purposes, that green paper ought not to be put on the walls of rooms. If the paper is well glazed, comparatively little injury may result, for then there is less furz to fly about the room."

We hope our manufacturers of wall-paper will attend to this matter. In the meantime, we assure the public that green colors of a perfectly harmless character can be used on paper, and they must not, therefore, be excited to reject the use of all paper containing this color.

PERFORMANCES OF LOCOMOTIVES.

The New Orleans *Delta* gives the following account of the performances of two Philadelphia locomotives on the New Orleans, Jackson and Great Northern Railroad:-

"The locomotive 'Black Prince,' built by R. Norris & Son, Philadelphia, ran in the month of June 3,328 miles, burning 25 cords of wood, making 133-12 miles to a cord, carrying three passenger-cars and one baggage-car. Charles Barnum acted as engineer and John Snyder as fireman.

The locomotive 'Mazetta,' built by M. W. Baldwin & Co., ran for the same month, 2,730 miles, burning 27 cords of wood, making 101-08 miles to a cord, carrying three passenger and two baggage-cars. The above wood includes firing up, switching and regular mileage. The length of the route is 206 miles: it has 35 stops each way. The engineer was Henry Frink, the fireman Patrick Murter.

We will also remark, that on one trip of the 'Black Prince' (a trial trip), the consumption of wood was 2½ cords, making 412 miles, including switching, stopping, and firing up at each end of the road, and with a train of two passenger-cars and one baggage-car—being 164-08 miles to a cord of wood."

OUR CANALS AND RAILROADS.

In *Hunt's Merchants' Magazine*, for this month, there is an able article on the above subject, by Hon. B. Brockway, of Pulaski, N. Y. He seems to view this question in the same light as we have done ourselves, and he presents similar ideas to those which we put forth on pages 253 and 299, Vol. XIII., SCIENTIFIC AMERICAN. During the present year there has been a great reduction in the amount of tolls received on the Erie Canal; but this is not good evidence of its trade being absorbed by railroads, because all kinds of traffic between the East and West has been less this year than the last, thus far. If, however, we take a series of years, such as from 1854 to 1859, we find that the traffic on the canal has greatly decreased in the aggregate, while that of railroads has increased; so we may safely conclude that the latter system of public conveyance is absorbing the trade of the former. This appears to be the case, according to Mr. Brockway, as, in 1854, no less than 4,165,862 tons were carried, on the New York canals, and only 3,665,192 tons in 1858. According to his views, our canals are moving down an inclined plane, and are yearly becoming deeper involved in debt, so that the people may yet be called upon to pay the principal as well as the interest. Unless our canals be galvanized into prosperity by the application of steam-power in towage, they must ultimately go down before the competition of railroads. It is only a question of time.