

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

We continue this week our remarks on and extracts from the reported proceedings of the above association.

WISCONSIN POTASH KETTLES.

An important paper was read by Professor Charles Whittlesey, on "Drift Cavities," as the "Potash Kettles" of Wisconsin. Along the summit of the dividing ridge between the waters of Rock river and those of Lake Michigan, there are numberless crater-like depressions, which are called by the people "Potash Kettles." They are in the form of cavities sunk below the general surface 10, 15 and even 100 feet, their outline rudely circular, and their sides as steep as the earth will stand. They have been traced about 100 miles. The materials in which they have been found is coarse drift. They seldom contain water; boulders are found in and around them. While exploring the State in 1849 it occurred to the professor that these cavities cannot be explained by the usual and well-known examples of aqueous deposits. Terraces and oblong ridges of sand and gravel might be formed by currents and eddies acting on loose material; but these are depressions on an even surface. He stated that in the present state of knowledge it was difficult to account for all the phenomena of western drift, but to his mind the depressions in Wisconsin were most readily and satisfactorily explained on the theory that they were the result of glacial action.

[There are several depressions of the same character in various parts of New York, such as Oneida and Madison counties; some of them contain water, others are dry during summer.—Eds.]

ICE WELLS.

Professor Hitchcock then read a paper on "The Ice Well at Brandon, Vt." (first noticed by us on page 229, Vol. XIV., SCIENTIFIC AMERICAN), and considered that the cause of ice forming in that and several other wells was owing to the nature of the soil and underground currents of air. Prof. Dawson, of Montreal, stated that he had met with similar phenomena in Nova Scotia, and accepted the views presented by Prof. Hitchcock. Mr. Hagar, of Proctorsville, Vt., said that from the first he had considered it owing to present causes. He had visited some abandoned iron mines in Essex, and had found ice in summer at a depth of 125 feet.

OZONE.

Professor Brocklesby then read a short paper on "Ozone." It gave the result of observations extended through a period of three months in the year 1857, for the purpose of endeavoring to ascertain the connection, if any, existing between that substance and atmospheric moisture. The conclusions arrived at were that it is most plentiful in the air during wet weather, particularly during the prevalence of easterly winds when loaded with moisture, less so when the winds are north-west, and least of all in dry weather.

[As ozone is principally due to electrical action in the atmosphere, its occurrence during the east winds which prevail on the Atlantic coasts may be the cause of those rheumatic pains with which persons in feeble health (as stated by physicians) are then affected.—Eds.]

MUSIC.

Mr. J. H. Safford then read a paper on "The Mathematical Theory of Music." The subject was illustrated theoretically on the black-board, and the practical illustration may be made by a piano key-board. There are twelve semi-tones in the octave whose vibrations are made to harmonize as nearly as possible in the ratio of twelve halves. There is a disposition in the temperament of a piano to change. Those chords struck oftenest become the most harmonious, and those less frequently used become more discordant. The chord of A flat is but little used in church music. In old church organs, the chord of A flat major is frightfully discordant.

INFUSIBLE METALS.

Professor W. Gibbs, of New York, read an abstract paper on "Platina, Iridium, Rhodium, Ruthenium, and Osmium," which are found in part or all alloyed together. He stated incidentally that the specific gravity of some osmiridium which he tested was 19.35, and some of the same obtained from California platinum he could not fuse even with the flame of a compound blow-pipe.

CARBONIFEROUS FLORA.

Professor Dawson, of Montreal, read a very important paper upon "The Fossil Flora of the Paleozoic

Period, and the Devonian Period." He gave an interesting description of a fossil plant found at Gaspée, Nova Scotia, which had been mistaken for the fucoids. He had named it the *lepidodendron gaspeiana*. It belongs to the *coniferæ*. He had been shown specimens of fossils from Maine, which he believed would upon investigation show that there was an interesting flora yet to be discovered in the Devonian rocks of that State. He had made recent microscopic investigations, by boiling it in nitric acid and had been able to obtain good views of the atomic structure of the various fossils to be found in Nova Scotia coal. His microscopic observations were exceedingly minute and extended over a wide range. They were beautifully illustrated on carefully prepared diagrams. In regard to the mass of Nova Scotia coal it is of gymnospermous or cryptogamous origin, and the rate of accumulation must have been very slow. In a vertical foot of coal we may have the barks of successive generations of trees that were a hundred years in growing. The climate of the coal-producing eras was warm and moist, like the temperature of the southern hemisphere at the present day. The foliage of those times was dense and covered large plains; as trees fell they decayed, and a dense vegetation soon covered the whole mass. The growth of sigillaria was more rapid than that of trees at the present day of like size; still they did not spring up in a day or two, as some have supposed.

NORTHERN COLD.

Professor A. D. Bache then presented several valuable papers embodying the results of Dr. Kane's observations at Van Rensselaer harbor, North Greenland, in the years 1853-4-5. These observations were hourly made for almost two years, and include temperature, direction and force of the wind, and the varying atmospheric pressure as indicated by the barometer. He showed a diagram representing the diurnal variation of temperature for the month of May, when the sun is wholly above the horizon, and also for the month of December, when it is wholly below. The greatest cold was 66 degrees, in February 1854, and the greatest heat 51 degrees, in July, 1854. Mercury froze at 40.2 degrees. The average yearly temperature of the place was 2 1/2 degrees. It was found that calms tended to depress the temperature of the atmosphere, and winds to raise it. The frequency of calms is greater than all the winds from various quarters combined. Warm winds came from the direction of Spitzbergen, and cold winds from the north point of America. Professor Bache thought the establishing of this fact was worth all the trouble and expense which the Arctic expeditions had cost. Snow fell every month in the year, rain fell only in July. An elevation of 210 feet made a difference of 1 degree in the temperature of the air. The temperature of the sea at the surface in winter was 28 degrees and constant. The mercury in the barometer stood highest in May, and lowest in September. The wind was east when the atmosphere was densest, and the warmest wind was from the north-east. The winds were generally from the east—the stormy quarter. During a fall of snow the weather was calm. Professor Henry said these facts were of the highest interest, and tended to prove that the heavy air descended at the poles, assertions to the contrary notwithstanding.

CENTRIFUGAL GOVERNORS.

This title has no reference to the governors of States but to a more unerring class of agents. A paper was read by Mr. Charles T. Porter on the effect of the centrifugal governor in the regulation of machinery; in theory it approaches more nearly to perfection than engineers have supposed possible. Mr. Porter is the inventor of the governor illustrated on page 36, Vol. XIV., SCIENTIFIC AMERICAN, where a full description of the nature of the improvement will be found. He employs a heavy counterbalance weight on the slide of the governor, and much lighter balls than those in common use, giving these a much higher velocity, so that the action of the governor upon the valve is very sensitive, because he obviates the usual counteracting resistance of the friction to the rapid action of the governor upon the valve.

SPIRITUAL SCIENCE.

Conceiving that the members of the association indulged too much in old bones, boulders and similar dry stuffs, Mr. Prince, of Flushing, L. I., very properly directed their attention to more refined matters, and wished to introduce a resolution for discussion, calling upon the association to recognize mentalism and spiritualism

so far as they form the medium for the communication of knowledge to the human race. "You may refuse spiritualism a hearing," he said, "but if spiritual science courts investigation and you evade it, the world will form its own opinion and my purpose will be answered." He requested a committee of six to be appointed to investigate the subject. Mr. Prince was *coughed down*.

LIGHTNING IN GAS-PIPES.

Professor B. Silliman, of Yale College, read a paper which stated that during the past year two cases had fallen under his observation of the discharge of atmospheric electricity through the iron gas-mains of New Haven, with effects, which, so far as he knew, had not been previously noticed. On the last Sunday of June, 1858, a violent thunderbolt on the spire (227 feet high) of the Wooster-place Baptist church, in New Haven, was carried without injury to a point less than 25 feet from the earth. On this point, owing, as was afterwards ascertained, to an imperfect ground termination of the conductor, the electric tension was sufficient to produce a discharge through a wall of brick nearly twenty inches in thickness to meet a gas-pipe on the side of the wall, directly opposite to the lightning conductor. By the new channel thus forcibly gained, the discharge was conducted to the main pipes of distribution, and no further immediate effects were seen. Soon afterwards, however, the escape of gas on the street in front of the church was noticed, as well by the odor as by the sickly condition of the shade trees lining the street. Upon opening the ground it was found to be saturated with gas, and every joint in the whole length of the street (some forty in number) was discovered to be leaking profusely. The inference seemed unavoidable that the leakage was occasioned by the electrical discharge.

During the last week of July, 1859, another very energetic discharge fell upon a house in George-street, New Haven, which was supplied with gas, and while but little injury was done to the house, and none at all to its inhabitants, the gas mains in the whole street, to the number of over sixty joints, were found to be leaking profusely.

These effects are plainly due to the sudden and explosive expansion of the gas in the mains at the point of electrical discharge, and notwithstanding the enormous extent of the metallic circuit—over twenty miles of pipes buried in moist earth.

LUMINOUSNESS OF THE ATMOSPHERE.

A paper was then read by Rev. George Jones, U. S. A., on "The Occasional Luminousness of the Atmosphere on the Summits of the Andes." He referred to the case mentioned by Baron Humboldt in his "Cosmos," which occurred in Germany about the year 1833, when the atmosphere was so luminous that people could see to read fine print. While at Quito, in 1856-7, he (Mr. Jones) noticed a similar luminousness, not constant, but occasional, and made records of the phenomenon. About that time and before he had spoken to any one about it, an Irish gentleman, Col. Lanegan, who had taken part in the revolutionary struggle in Ecuador, mentioned a similar case which he had observed at Machede, about three days' journey from Quito, when the light was so bright that his servant called him up, and they started on a journey supposing it to be day, but after a while it became so dark that they could not see at all. Mr. Jones said his own observations were made in cloudy nights when he could get no light from the stars, and the luminousness of the atmosphere was such at times that he could read the headings of newspapers—the N. Y. Herald and N. Y. Journal of Commerce, for instance. The next night, perhaps, would be so dark that he could not see his hand twelve inches from his face. The newspapers state that the St. Louis aeronauts had a similar luminous atmosphere about them at night, and were able to distinguish the figures on the dials of their watches. He could not account for this phenomenon unless on the supposition that all space was filled with luminous matter, that vibratory matter is self-luminous, and that it is sometimes swept by us in dense waves.

VARIATIONS OF THE SEASONS.

Rev. Mr. Barnap, of Baltimore, presented a paper in which he showed the great variations in particular seasons. The causes of variation were the inclination of the sun to the ecliptic; the conformation of continents; the ocean currents; the currents of air; the formation of clouds. The most probable cause is the influence of

the moon, changing the motion of the water in the ocean twice a day, and affecting also the atmosphere, which, being a ponderable body like water, must move in tidal swells. Electricity was another cause. The sun also was a force making itself felt in the variation. In conclusion he said that the wisest observer will find it unsafe to risk his reputation on definite predictions. He will find himself embarrassed and misled by his own rules, and the exceptions will multiply upon him so fast as finally to annihilate them altogether.

VERMONT WHALES.

Mr. F. Mitchcock Jr., of Easthampton, exhibited a fossil whale found in 1849, on the line of the Rutland and Burlington Railroad, in the town of Charlotte. It was imbedded in clay, about eight feet below the surface of the ground, was exhumed from one of the deep excavations, and is in a good state of preservation; but few bones being wanting. It was found many hundred feet above the sea which is conclusive that the ocean once rolled over the Green Mountains. This skeleton belongs to the State cabinet of Vermont, and is a part of the valuable collection of the late Professor Z. Thompson, illustrating, more perfectly than any other collection, the zoology of Vermont. The bones have been put in position, and any one who has a smattering of knowledge in comparative anatomy can readily see that it belongs to the whale family. The blow-holes are distinct. It resembles the living rather the extinct type, and the osteology of the head is very like the small northern whale. They have been carefully scrutinized by Agassiz, who has pronounced the conclusion arrived at by Mr. Thompson to be correct. There are 52 vertebrae in the skeleton. The total length of the animal must have been 14 feet. The locality where it was found was one and a half miles from Lake Champlain, 60 feet above it, and 150 feet above the ocean. Sir Wm. E. Logan afterward spoke of some few bones found at Montreal, which seemed identical with this skeleton, but he was not certain to what species it belonged to. This is one of the most extraordinary discoveries of fossils yet made on our continent.

WISCONSIN BONES.

Professor J. D. Whitney exhibited fossil bones and teeth found in the northwest, in the lead region. In the cap rock, as it is called by the miners, there are fissures and cavities, from 50 to 100 feet beneath the surface. These cavities are usually lined with lead ore; in them are found the teeth of the mastodon; also of the buffalo. The teeth were in a good state of preservation. They are found in many localities. He believed that this part of the country never was subject to the drift, as no boulders were to be found. Beneath the surface to the depth of 50 feet, vegetable formations are found. The legitimate conclusions were that this was the home of the mastodons, and that they existed immediately prior to the advent of man.

WHAT SHOULD MECHANICAL WORKMEN BE TAUGHT?

This is an important question in this country, where the mechanical trades are so eagerly and industriously followed, and we are pleased at being enabled to give an abstract of a lecture from the London *Builder*, delivered by Mr. Scott Russell, F.R.S., builder of the *Great Eastern*, and proprietor of an immense machine-shop on the banks of the Thames. The lecturer said they should learn drawing and theoretic mechanics, plane trigonometry and solid geometry, conic sections and the nature of curves. To do this, when the men who have to learn are engaged 10 or 12 hours a day at hard physical labor, will require a new set of text-books, interesting and truthful; night-schools, where learning is made a pleasure and not an extra toil; and teachers whose heart and soul is in the work. Mr. Russell thinks that governmental aid ought to be secured to pay the expenses, especially of the books. He concluded by giving forth the idea that machinery would, in time, do all the unintellectual part of the mechanic's labor, and that the mechanic himself would be only the thinking and inventing machine of the works; and he made his address very practical by saying that he would give all men who had received such an education \$15 per week, to commence, and afterwards raise them to be foremen, at \$2,500 a year.

We cannot help reflecting, as we write, how many

thousands of dollars, and how much wasted brainwork would have been saved to the inventors of this country, if our common schools had paid more attention to the physical and mathematical sciences than they have hitherto done; and how much time we should have had for other and more useful purposes than endeavoring to convince men of their folly in trying to invent against the laws of nature, which they did not know, if they had learned those laws in early youth. Now that the world is so eminently practical, and the mechanic arts are so predominant, educational systems must change, and geometry take the place of rhetoric, and the laws of bodies in motion and at rest throw æsthetic philosophy into the shade. Scott Russell has led off the ball, and we shall be anxious to hear of his followers.

STEAM-BOILER EXPLOSIONS.

MESSRS EDITORS:—The recent explosion of our steam boiler, throwing it to a distance of nearly half a mile, has given rise to many speculations in explanation of the cause. We need not resort to any mysterious, undefinable explanation, which is often preferred to the simple, reliable information most always at command.

There is no doubt in our minds that it was the result of mere pressure of steam without the means of escape. There is no evidence that there was an inadequate supply of water. It doubtless had its origin in undue pressure from progressive accumulation of steam of great pressure and density rapidly rising to a degree beyond the strength of the metal, with the safety valve inoperative at the time, as it has since been ascertained.

The safety valve had become so out of order that it would leak under a low pressure; the engineer had fastened it down with a hook so arranged that (he supposed) it would yield under a pressure within the strength of the boiler. Similar causes, if subsequently known, would no doubt explain nine-tenths of all the explosions that take place, which, if unexplained, often lead the minds of persons away from the true source of the evil, and thus produce carelessness or indifference in the care of boilers.

We are happy to say that some of our men who were injured have been out, and the others we trust will be at their work in a week or two. We are again in operation with a set of new boilers manufactured by Messrs. Rice & Goddard, of this city, of a new construction of extraordinary promise both for safety and economy of fuel.

ICHABOD WASHBURN.

Worcester, Mass., August, 1859.

[The letter of our correspondent corroborates in a clear and candid manner the views which we expressed on the subject on page 85 of the present volume of the *SCIENTIFIC AMERICAN*, and we are much obliged to Mr. Washburn for giving the public such a correct and timely version of the accident. In a recent number of our able cotemporary—the *London Engineer*—Mr. Desmod G. Fitzgerald discusses the electrical theory of steam-boiler explosions in a very scientific and able manner, and he expresses opinions very similar to those which we published on page 301 of Vol. XIV, *SCIENTIFIC AMERICAN*, and on page 85 of this volume.

NEW INVENTIONS.

EVAPORATING PANS.—We notice in this week's list of claims two patents for these useful articles. One is the invention of Evan Skelly, of Plaquemine, La., and it consists in the employment, for heating the contents of an evaporating pan, of a steam heater made of two conical corrugated plates of galvanized iron, copper or other metal, united by a central ring and external flanges, by which a rapid natural circulation of the liquid or solution to be evaporated, over the heating surface, is obtained.

The other is the invention of H. O. Ames, of New Orleans, La., and consists in a certain arrangement of the evaporating, supply, and escape steam-pipes, and their connections, whereby provision is made for heating all parts of the pan to a uniform or nearly uniform temperature, the collection of the water of condensation to any extent in the evaporating pipes is effectually prevented, all the connections of the pipes are brought outside of the pan, and provision is made for the repair of the pipes and for the removal of such of the evaporating pipes as may be necessary for repair or other purpose

without rendering it necessary to stop the operation until it is replaced.

SEWING MACHINES.—William F. Pratt, of Bristol, Pa. has invented some improvements in this interesting machine, which relate to that kind in which a lock-stitch is produced by means of the combination of an eye-pointed needle, an oscillating looper, and a nearly stationary thread-case. The invention consists in a novel construction of the thread-case and of the slide ring that is employed to hold it in proper relation to the oscillating looper, whereby the loops of the needle thread are properly checked and controlled in their passage over the thread case, and the looper is prevented catching the loops that have been extended and have received the locking thread. It further consists in a certain method of producing the oscillating movement of the looper.

R. Eickemeyer, of Yonkers, N. Y., has invented a machine for sewing in the lining of hats, the invention of which consists in certain novel modes of applying, arranging and combining devices which are common to other sewing machines, and in novel contrivances employed in combination therewith, the whole combining to constitute a new kind of sewing machine adapted for sewing in the lining of hats around what is termed by hatters the "band," that is to say, the angle formed at the junction of the brim with the part of the hat which fits the head, the machine making a seam of novel character. The inventor has assigned the patent to himself and E. Underhill, of the same place.

PAPER-CUTTING MACHINES.—E. Bu roughs, of Rochester, N. Y., has invented an improvement which relates to a machine for cutting paper for the use of printers, book-binders, and others, and consists in the employment of an oscillating, reciprocating knife, arranged and operating in a peculiar way, and used in connection with a movable bed for adjusting the paper beneath the knife, and a clamp for holding the paper in proper position on the bed while being cut. The object of the invention is to obtain a machine that may be readily manipulated, and capable of being operated either manually or by other power, and one that may be driven with a small or moderate application of it.

LOCOMOTIVE FIRE-BOX.—This improvement, although applicable to all steam boilers, is more especially designed for coal-burning locomotives. Its object is to consume the inflammable products of imperfect combustion, and at the same time present to the direct action of the fire a large area of heating surface, thereby economizing in fuel, and augmenting generally the efficiency of coal-burning locomotives.—The invention consists in the employment of a "midfeather" or water-chamber placed directly over the fire and provided with a plurality of small flues which form a communication between the fire-box and a gas-chamber above, into which, as well as into the fire below, air is admitted through hollow stay-bolts at the sides and end of the boiler, and the desired object attained. The inventor is Ralph Greenwood, of Altoona, Pa.

STATION AND STREET INDICATOR FOR RAILROAD CARS.—Lewis Koch, of New York, has invented a very convenient apparatus as an addition to railroad cars; it consists of an apron or belt which is attached to rollers and placed within the car at any suitable spot, and it is operated with a continuous movement from one of the axles of the car by any suitable gearing. The apron or band has the names of the stations or streets painted or marked on it at the proper points and an index projecting over the edge of the apron so as to point out the precise situation of the car both when in motion and at rest, that is to say, the station or street is not only indicated when the car is stopped, but the intermediate points are pointed out on the apron by the index as the car passes along, so that the passengers can know at any time how far they have proceeded on their journey and how far distant they are from their destination. The inventor has assigned this valuable device to himself and H. Forstrick, of this city.

NAIL-PLATE FEEDER.—In the manufacture of cut nails the plate from which they are cut has to be turned over as each nail is cut to give the proper taper to the next, and this invention of J. P. Sherwood, of Fort Edward, N. Y. causes this turning over to be performed by the action of drawing back the plate. This is performed by suitable mechanism which cannot be explained without the aid of drawings.