[For the Scientific American.]

The Distribution of Heat.

The early portion of last summer was remarkably cold while the autumn has been quite mild. It is generally the case, that unusual coldness or heat in one portion of a season is compensated for at another period. There has never, within our recollection, been but one summer in which the general temperature throughout exhibited a marked difference from that ordinarily experienced. This was in 1836, and was probably caused by the large spots on the sun which were visible to the naked eye. These large dark spots would seem to have detracted temporarily from the heating power of the sun. Heat is continually radiated from the earth into space, and as continually received from the sun. In case the supply be in the least diminished, the radiation lowers the temperature. It was a great omission in Byron's terrific dream of darkness, not to allude to the marked degree of cold which would follow from the total absence of the sun, even for a single day.

Although the solar rays have an immensely preponderating influence over all other causes in controlling the terrestial heat, there are influences somewhat mysterious which affect the subject. If we trace on the map of our country the lines of equal temperature, they will differ very widely from the parallels of latitude. The mild winter temperature of North Carolina, for example, is imitated by Texas which is some three degrees further south, and by Washington Territory which is seven degrees further north. The winters of Delaware are similar to those of central Indiana, one degree further north, those of Missouri and southern Kansas, a trifle further south, and those on Puget's Sound in the extreme north of Oregon, a locality nearer the North Pole than freezing Quebec.

There are local causes due to the influence of prevailing wind, etc., which greatly affect the temperature of a country. The warmth on the Pacific coast is due to warm ocean currents, and the temperature of the British Islands, France and Spain, is materially affected by this influence, in consequence of the Gulf Stream, which, commencing in a warm latitude, flows across the ocean, avoiding our coast, and impinging directly on the shores of Europe.

There is supposed to be an influence due to the lines of magnetic variation, though it may reasonably be doubted whether the variations in magnetic influences should not be considered as the effect of the differences in heat.

Bones of elephants, and of the tropical animals, have been found among the icebergs of Greenland, and although this might be explained by supposing the temperature of the whole earth to have been once greater than at present, in consequence of internal heat possessed at creation, and that the polar regions first became habitable only for animals adapted to a very warm climate, the question is rendered extremely complex by the discovery in soft and balmy Italy of remains positively known to be those of animals now inhabiting only the mountains of Siberia. But we are no believers in the igneous theory, and consequently ascribe this to the precession of the Equinoxes, which causes a gradual change in the position of the magnetic meridian. It is difficult to explain these phenomena by a supposition that the character and habits of the animal races have changed, and we must believe that the temperature of various localities has undergone, at various times, immensely great changes, and that such may be now gradually progressing. The climate of New England is thought by many to be much milder than in the days of our forefathers, although we are of the opinion that the records which have been kept of its temperature do not show such changes to be at all important, but there are traditions of a much warmer climate, being once enjoyed by the whole of our northern continent. The subject is certainly one of great interest.

T. D. S.

Water Heated by Friction.

Messrs. Editors—In your issue of the 31st ult., you briefly allude to a paper by George Rennie, of London, on this interesting subject. During the exhibition at the New York Crystal Palace in 1853, I had many opportunities to notice the effect of friction on the temperature of water. You and many of your readers will remember among the pumps then on exhibition two of "Gwynn's Centrifugal Pumps;" one the large fountain pump, in the east nave, with a capacity for elevating 7,000 gallons of water per minute; and the other, a smaller one in the machine arcade, with a capacity of about 300 gallons per minute. Both these pumps were arranged to work the same water over till it was best to change it, and in both the effect in raising the temperature was very apparent. The suction pipe of the small pump was four inches in diameter, while the discharge was but $2\frac{1}{2}$ inches, and yet at an elevation of but five or six feet, 400 gallons per minute or 26,000 gallons per hour were constantly driven through this small orifice when the pump was in motion. This motion in an atmosphere not higher than 40 or 50 degrees would in a few hours bring the water to blood heat, and in the summer weather, if I may judge by comparison and my own feelings, I have frequently noticed the temperature of water so heated as high as 150°

The larger pump was erected with a view to the "Delights of a Gushing Fountain," and the cooling effect of water in motion, and when a fresh supply was introduced from the Croton, we in a measure realized our hopes; but, after a short agitation, the glow was changed by a scattering damp that made it impracticable to keep it long in motion.

The laborious duties of my position prevented me from noting for publication at the time this, as well as many other interesting phenomena, which should more attract the investigation of philosophic minds. I am glad such men as George Rennie have directed their especial attention to this matter, and I hope we shall learn the true cause and source of the heat evolved.

My own opinion has been that the sensible heat apparent is more the result of the sudden compression of the particles or *bubbles* of air constantly carried into the water, and by its force possibly reduced momentarily to one-half or even one-fourth of its natural bulk, thus for the moment having its heat doubled or quadrupled above the temperature of the water, and, of course, giving off a portion to the water surrounding it. The air bubbles do not fully regain their natural size or bulk till they are liberated from the water and do not carry out as much heat as they carried in, and to this I attribute the cooling and grateful effects of "babbling brooks" and the "rushing waterfall," so long as the supply comes fresh from the fountain.

Please let us have more of your own philosophy on this subject, and induce some one who has leisure to try further experiments by keeping the surrounding atmosphere within one or two degrees of the increased temperature of the water, and also to try the agitation in a vacuum, and let us know whether pure water can be heated by friction.

Joseph E. Holmes.

Newark, Ohio, Nov., 1857.

[The opinion hitherto in vogue among philosophers is opposed to an increased heat being produced in liquids by their own friction, and also to an increased heat being produced by the friction of a current of air or gas upon a liquid or solid. It is well known that water contains a portion of atmospheric air, and by compressing it, heat will be changed from low to high intensity. As the discharge pipe of the pump to which Mr. Holmes alludes was much smaller than the suction, the air in the water must have been compressed, as he suggests, thus developing increased sensible heat, a part of which was left in the water, even when the air escaped, because the water has nearly five times a greater capacity for heat than air, and therefore parts with its caloric more slowly. Probably the heat generated by the friction of the solid parts of the pump was also communicated to the water, and tended to elevate its temperature. Count Rumford, by boring a cylinder of cast iron, raised the temperature of several pounds of water to the boiling point.

New Fire-Engine Trial.

Messrs. Editors—As many of your readers are interested in fire-engine matters, I send you an account of the performance of a new engine in this place. It was built for Ocean Engine Co., No. 3, by William Jeffers, Pawtucket, R. I. This engine has 10-inch cylinders, and 10-inch stroke. After the parade on the 7th inst. she was tried, with the following result:—Drawing her own water, and playing through 400 feet of hose, she threw a good solid stream 184 feet perpendicularly. This, for a new engine, manned by a new company, (many of them never having been on the brakes before), certainly speaks well for it.

E. A. H.

Springfield, Mass., November, 1857.

[This certainly was a good performance, as 130 feet perpendicular hight, out of 100 feet of hose, is held to be excellent playing.—Eds.

Preventing Cars from Running off Railroad Tracks.

Where the road forms a curve of 2000 feet diameter, the difference between the length of the outer and the inner track is equal to 5 feet for every 1000 feet of road when the gauge is 4 feet, and nearly 6 feet to the 1000 for a 6 foot gauge. This difference causes the inner wheel to drag on the rail, thereby increasing the resistance and wearing out the tire.

If, by this cause, one of the wheels gets worn out more than the other, its diameter will be smaller and the motion of the car in a straight line will become dangerous from the same cause: the larger wheel causes the smaller one to drag.

If one of the wheels drags, the sliding friction produced thereby gives a tendency to the car to place itself crossways on the track. It is dangerous therefore to run at great speed even on a curve of 3000 feet diameter, and as this makes it necessary in building a railroad to avoid curves as much as possible, a road through a rugged or uneven country is very expensive. The axles have to be made unnecessarily strong as they have to sustain a twist from the same cause. An Austrian civil engineer undertook to avoid this difficulty by putting the wheels on a separate axle each and uniting the two halves by different means; none of them, however, seems to us perfect enough to deserve recommendation, and we expect our inventors will come to the rescue and will find out some cheap and simple plan to give each of the wheels an independent motion from the other, still making the whole strong enough and safe against accidents.—*Journal of the Society of Austrian Civil Engineers.*

How Coal is Sold in London.

The coal used in the city and neighborhood of London is chiefly brought from the northern coal district of England by large iron propeller colliers. From them it is unloaded on to a wharf, where it is screened or sifted by being thrown on an inclined riddle, the size of the lumps having some influence on the price, which is generally from $5 to $10 per tun, according to quality. It is then put in sacks, containing one hundred weight, or sometimes two each. These are loaded on large carts drawn by enormous horses, with scales and weights to each cart, and, if desired by the purchaser, the sack is weighed by the driver. When the honesty of the coal merchant and the integrity of the driver is well established, the weighing of the sack is seldom required. And in the purchase of a cartload of sacks, some three or four of them, taken promiscuously, are tested by the scales, and if found correct, the weighing of the remainder of the load is dispensed with. This mode of buying and selling coal is the result of many years' experience in the vast city of London.

Signal Apparatus.

This apparatus is intended for communication between the pilot-house of a ship and the engine-room, or other place. It is so constructed that by pulling a knob in the pilot-house a cylinder is rotated in the engine-room, on which cylinder is painted the desired signal, at the same time calling attention by a bell. There are also two bell hammers, which are arranged in such a way that the striking of them ensures the rotation of the cylinder to the desired signal. It is the invention of J. R. Hopkins, of Lincoln, Me., and was patented this week.

Lime Kiln.

This invention ensures a rapid, yet regular and uniform burning of the lime, and avoids a blowing of the draft entirely across the kiln, or through one furnace door and out at another. It likewise exposes a greater surface to be acted upon by the fire, which, by this arrangement, is brought in direct and positive contact with the whole mass throughout at the same moment, and thus the difficulty from the outer portion being subjected to a much greater heat than the central portion, is entirely overcome. It is the invention of P. Griscom and C. S. Dean, Baltimore, Md.

Hemp Cutter.

This improvement effects the delivery of the hemp after it is cut, in such condition and in such relation to the team and the body of the machine, that it shall not be trampled upon by the horses, or disturbed by the machine. To accomplish this result, a reel with spirally twisted blades, two inclined directing boards, and two hinged trailing platforms are employed. The reel bends down the hemp stalks, the inclined boards direct them upon the platforms, and the platforms deliver them in a collected state into a central space existing between the platforms. It is the invention of J. L. Hardeman, of Arrow Rock, Mo.

Drilling Machine.

William Wakely, of Homer, N. Y., has patented an improved drill, the principal feature of which is that the driving movement of the drill is connected in such a way with the feed movement that both may be operated simultaneously when desired, by the turning of a single crank, and the feed also operated singly or alone, when necessary, so that the drill or arbor may be moved forward or backward with irregular speed, to any desired point.

Sawing Felloes.

This invention consists in having two band saws attached, one to the outer and the other to the inner periphery of the wheel, the saws being attached to the rim by means of bands or straps, and the outer saw expanded or contracted by interposing bands between the saw and the periphery of the wheel; the whole being arranged so that the felloes may be sawed with facility and the depth or thickness varied as occasion may require. It is the invention of Jacob Vaughan, of Exchangeville, Pa.

Printing Presses.

Richard M. Hoe, of this city, has patented another improvement in printing presses. This has relation to the operation of the fly frames, which are usually made to move by means of a cam and complicated arrangement of levers, connecting rods and bell cranks. The improvement consists in having a cam shaft at each end of the machine, and operating the fly frame immediately from it, making it much more simple in its action.

Corn Husker.

This improved corn husker consists in two cylinders grooved around their circumferences, and armed with teeth, so that they meet at such an angle as to draw away the husk, and throw the corn into a receptacle beneath. It is the invention of H. A. Doster, of Bethlehem, Pa., and was patented this week.

Hemp Brake.

G. F. S. Zimmerman and A. Beattie, of St. Joseph, Mo., have patented a new and improved hemp brake, in which the brake cylinders and feed rollers are so arranged that they separate the broken part from the filament or fiber in a perfect and expeditious manner.

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