Correspondence.

Electricity from Machine Belts.

To the Editor of the Scientific American:

Seeing in this week's (Nov. 15) SCIENTIFIC AMERICAN and SUPPLEMENT notes about electricity on machine belting, in which I was very much interested, I concluded to send you a word of my experience, hoping some others may do the same, who may have it.

We have at present a very marked production of electricity on a pair of elevator engines in a very unfavorable place, it being in a basement of a large warehouse for stoves. This basement is very moist at all times, and the engines are well connected electrically through the steam pipe to boiler and feed pump, and to the ground by water main, also steam traps in the ground; the engines being set on large stone slabs. In spite of this, they at all times produce enough electricity to be seen. I have seen sparks 2¼ inches long, this being from the belt to nearest point on the frame of the engine. Another effect is that both kinds of electricity are produced, the electricity being reversed when the engines are reversed. When the belt is running from the lower side of drum pulley to engine pulley, positive electricity escapes from edge of belt to brake rod. When the belt runs in opposite direction, negative electricity escapes from the frame of engine to face of belt. To judge from the experiment I made, as below mentioned, a moist temperature does not seem to totally prevent the production of electricity. I have brushed the edges and face of belt with a handful of moist waste, after which the sparks were as usual. Even on rainy days I have noticed the sparks to pass the same, when I was not able to produce any with the plate machine.

I have no doubt about the sparks setting fire to combustible dust. I have burnt holes through papers of several thicknesses. The sparks are of a very bluish to a yellowish color, with a loud crack, the passage of negative being most bluish. I notice by running a wire across the face of belt, it reduces the size of the sparks, but it did not prevent the production of same. Have oiled the belts with castor oil without producing any change.

The elevator engines are made by Crane Brothers, of this city. They are a pair of 4,000 pounds capacity, double vertical engines, in the basement of the new stove warehouse of Rathbone Sard Co., running for two hours every working day.

I have no doubt there are engines in more favorable places than these which do not produce electricity. G. A. H.

Chicago, Ill., Nov. 17, 1884.

First Principles for Young Mechanics.

A well grounded knowledge of the great law or principle of conservation of energy should be taught with the multiplication table. It can be so taught if the teachers themselves are certain that there is in the universe only so much energy, and that we cannot make one particle more than already existed. With a clear understanding of this principle, no time will be wasted in search after perpetual motion machines, and fewer mistakes will be made by really earnest seekers after improved machines for use or improved methods. When a young man brings to me some wonderful improvement over the ordinary crank motion, some device that is to supersede the crank of the steam engine, a feeling of utter helplessness comes over me; I know not where or how to begin; he has had no opportunity to learn the simple laws of mechanics, and to point out the fallacy of his argument means to teach him the laws of mechanics, so I can only say to him, "Don't," and may advise him what books to read.

We hear or read almost daily of the wonders of science, and what is to be accomplished by electricity. "It is to be the great power of the future." Is it a power now? We may use it indirectly to drive machinery, we may make use of it to propel the cars on our street roads, but is it a power in the sense that steam is a power? Let us think of this a few moments. We call steam a power, and our factories are driven by steam power; or we call water when falling a power, and we drive the machinery in other factories by water wheels; or we pump water into the reservoirs at Fairmount by water power. Where we have no fall of water, and where fuel is scarce but wind plenty, we grind corn in a mill driven by wind, and the wind is our power; these and other sources of power may be called primary powers.

Secondary power is that which is transmitted from the prime motor to a machine. One machine may be driven by belt power, and another may be driven by gearing, etc. Electricity, as we now use it, as a power must be classed in its greatest economy with the secondary powers, with the belt or the gearing, not with the steam engine and the water wheel. We dig from the earth coal that contains the stored up energy of the sun's heat expended on forests that existed long before man came to live on this planet. We burn that coal under our boilers, and the steam generated by this application of heat to water is used to drive the piston of the steam engine, and from thence is the power conveyed by belt or gearing by shafts, or even by electricity, to the machines to be operated. We can burn up zinc in costly acids, and generate electricity that can be used to drive an electric engine, and so in turn operate machines exactly as in the case of the steam engine. In this case electricity is a power exactly as steam is to be considered as a power; and what is more, the electric battery will give us more nearly the whole of the stored up energy of the metal eaten up in the battery than the most improved steam engine can give us of the stored up energy of the coal that is devoured in the furnaces under the boilers. With all this advantage, electric batteries are not used to drive machines with any hope of economical results.

Zinc has been gathered from the earth as an ore, it has been converted into a metal, or the metal has been gathered from the ore by means of coal and much labor; its market price is measured by the cost of its production. To burn up zinc at five cents a pound in acids costing but few cents per pound, with a certainty of getting from the metal 70 or 80 per cent of its theoretical energy in motive force, yet makes the venture a more costly one than the burning of coal under a boiler with the knowledge that we are at the best getting but little more than ten per cent of the theoretical power that lies hidden in that coal. The electricity that is now lighting our streets, the electricity that is utilized in places to drive the street cars, has behind it the steam engine or the waterfall, the windmill, or some other motor.

By means of a steam engine we drive a dynamo electric machine, and the electricity thence proceeding lights our streets or may be reconverted, with some loss, back into the power that created it; for one dynamo machine can be made thus to drive another, the electricity being carried from one to the other by proper conductors. What, then, is electricity as we now use it in the way of power, but as the belts and the gearing that carries our steam power to the machines? It is a belt with more or less slip. But this is not to remain so forever. The future of electricity as a power is full of promise. The coal we now squander, using but a small percentage of its theoretical dynamic force, is capable of yielding its energy either as heat or as electricity; and the time will come when we will not burn this coal to boil water, and in that boiling lose say 1,000 units of its heat at the moment of the conversion of water into steam, lose all this, never to be getting it back, but we will take from the coal its energy in the form of electricity, we hope in more near ratio to its true value, and then we can convert that energy into whatsoever other form of energy we may require. The best that science can do is to point out just what energy there is in this or that source of power. The most we can hope to utilize of this energy as power will never amount to 100 per cent. Nature gives us nothing without exacting something in payment.

A pound of water is the same as a pound of metal so far as its power from gravity is concerned. In falling through space it will exert just as much force as any other pound weight is capable of doing, and no more; it will do the work due to one pound falling at any given velocity less the friction of the machine or of the moving parts. We turn water into steam with a certain knowledge of the power that can be gained by using the elastic vapor as a spring, or we may tear the gases, which combined form water, apart, and use these gases in recombination to produce power, but less power than was taken to tear them apart, never more.

Science has made us so sure of these facts that we can base our faith on them, and with this knowledge we are willing that others than ourselves shall invest their money in machines which are claimed to be able to develop from five drops of pure water inclosed in a ball, power enough to propel the largest steamship across the ocean. It is ignorance of the unalterable laws of physics that leads ignorant people into squandering money on so-called wonderful inventions that, out of nothing, are to give us great results. An ignorant man will spend his time pondering over perpetual motion machines, so will a man with brain gone wrong; the first will quit his folly with more learning, the second finds his home in the madhouse. A third and worse class aim to deceive, and, for a time, many a one has done so. When shrewd ignorance resorts to dishonest methods, the confiding public is apt to suffer in pocket.—*Coleman Sellers.*

A Smoke Burning Locomotive.

A new locomotive, invented by Mr. Charles B. Coventry, tried on the Chicago and Northwestern Railway, has given great satisfaction. During two succeeding weeks it has been on trial on the suburban trains on the Chicago, Rock Island, and Pacific. The poorest quality of bituminous coal was used, and yet at no time, although at one point it ran 50 miles an hour, did any black smoke come out of the stack. Not a particle of cinders and dust was thrown out. The smoke that was emitted was thin and white looking—much like escaping steam. There was no bad odor from escaping gas, as is the case in ordinary engines. Mr. Coventry explained that the gases on ordinary engines are usually thrown out of the stack, which is the cause of the density of smoke. On his engine the gases are all burned, and that is what causes the absence of smoke, which results, of course, in a saving in fuel. The new locomotive presents an entirely different appearance from those now in use. Instead of having a large, conical-shaped smoke stack in front, it has a straight smoke stack, similar to those in use on locomotives in England and Europe, in the rear just in front of the cab. The boiler has two sets of flues, small ones in the lower part and larger ones in the upper part. The smoke runs twelve feet through the lower flues, and then returns by the larger flues to the rear, where the smoke stack is placed. Thus the smoke traverses twenty-four feet before reaching the smoke stack, instead of twelve feet, as is the case in ordinary boilers. The heavy cinders and dust, not being able to rise from the lower small flues into the upper large ones, fall into a smoke arch in front and can be emptied on the ground at any time. There is another smoke arch to catch the lighter particles of dust and ashes at the end of the larger flues in the rear of the boiler. Thus nothing but a light white smoke passes through the smoke stack in the rear, and no cinders, sparks, or fire is thrown out.

Oysters.

The oyster industry is rapidly passing from the hands of the fishermen into those of oyster culturists. The oyster, being sedentary, except for a few days in the earliest stages of its existence, is easily exterminated in any given locality, since, although it may not be possible for the fishermen to rake up from the bottom every individual, wholesale methods of capture soon result in covering up or otherwise destroying the oyster banks or reefs, as the communities of oysters are technically termed. The main difference between the oyster industry of America and that of Europe lies in the fact that in Europe the native beds have long since been practically destroyed, perhaps not more than 6 or 7 per cent of the oysters of Europe passing from the native beds directly into the hands of the consumer. It is probable that from 60 to 75 per cent are reared from the seed in artificial parks, the remainder having been laid down for a time to increase in size and flavor in the shoal waters along the coasts.

In the United States, on the other hand, from 30 to 40 per cent of all the oysters consumed are carried from the native beds directly to market. The oyster fishery is everywhere carried on in the most reckless manner, and in all directions oyster grounds are becoming deteriorated, and in some cases have been entirely destroyed. It remains to be seen whether the governments of the States will regulate the oyster fisheries before it is too late, or will permit the destruction of these vast reservoirs of food. At present the oyster is one of the cheapest articles of diet in the United States, while in England, as has been well said, an oyster is usually worth as much as, or more, than a new laid egg. It can hardly be expected that the price of American oysters will always remain so low as at present: but, taking into consideration the great wealth of the natural beds along the entire Atlantic coast, it seems probable that a moderate amount of protection will keep the price of seed oysters far below the present European rates, and that the immense stretches of submerged land along our coasts especially suited for oyster planting may be utilized and may be made to produce an abundant harvest at a much less cost than that which accompanies the complicated system of culture in France and Holland. *G. Brown Goode.*

Animals as Barometers.

Says a writer in the *Cincinnati Enquirer:* I do not know of any surer way of predicting the changes in the weather than by observing the habits of the snail. They do not drink, but imbibe moisture during a rain and exude it afterward. This animal is never seen abroad except before rain, when you will see it climbing the bark of trees and getting on the leaves. The tree snail, as it is called, two days before a rain will climb up the stems of plants, and if the rain is going to be a hard and long one, then they get on the sheltered side of a leaf, but if a short rain on the outside.

Then there are other species that before a rain are yellow; after it, blue. Others indicate rain by holes and protuberances, which before a rain rise as large tubercles. These will begin to show themselves ten days before a rain. At the end of each tubercle is a pore, which opens when the rain comes, to absorb and draw in the moisture. In other snails deep indentations, beginning at the head between the horns, and ending with the jointure of the tail, appear a few days before a storm.

Every farmer knows when swallows fly low that rain is coming; sailors, when the sea gulls fly toward the land—when the stormy petrel appears, or Mother Carey's chickens, as they are called, predict foul weather.

Take the ants: have you never noticed the activity they display before a storm—hurry, scurry, rushing hither and yon, as if they were letter carriers making six trips a day, or expressmen behind time? Dogs grow sleepy and dull, and like to lie before a fire as rain approaches; chickens pick up pebbles, fowls roll in the dust, flies sting and bite more viciously, frogs croak more clamorously, gnats assemble under trees, and horses display restlessness.

When you see a swan flying against the wind, spiders crowding on a wall, toads coming out of their holes in unusual numbers of an evening, worms, slugs, and snails appearing, robin redbreasts pecking at our windows, pigeons coming to the dovecote earlier than usual, peacocks squalling at night, mice squeaking, or geese washing, you can put them down as rain signs. Nearly all the animals have some way of telling the weather in advance. It may be that the altered condition of the atmosphere with regard to electricity, which generally accompanies changes of weather, makes them feel disagreeable or pleasant. The fact that the cat licks herself before a storm is urged by some naturalists as proof of the special influence of electricity. Man is not so sensitive. Yet many people feel listless before a storm, to say nothing of aggravated headaches, toothaches, rheumatic pains, and last, but not least, corns.