INTERESTING CORRESPONDENCE.

RAIN WATER SALT-WORKS IN YUCATAN.

MESSRS. EDITORS:—As the SCIENTIFIC AMERICAN is the *nucleus* of all that is valuable in regard to natural phenomena, I submit the following curious facts, hoping that they may be interesting to many of your readers.

When we compare the productions of men with those of nature, we must acknowledge that, though our efforts be great and the results admirable, natural productions are wonderful and grand beyond the power of man's imitation. This is particularly the case in the tropics, where the display of nature's wonderful productive power dazzles and bewilders the natives of a less congenial climate. Those who have not seen the banana tree, the mamey, the zapote, the papaya, the camote and innumerable other tropical fruits and productions, cannot believe such fabulous power of vegetation as really exists. Can you imagine a volcanic limestone formation, with here and there hardly more than a handful of earth in its cavities, producing giants in the vegetable kingdom, where, in our latitude, not a handful of grass would grow? With such a soil, men almost feel justified in saying that they do not need to work, nature being so rich that they have enough to supply all their necessities.

Along the northwest coast of Yucatan, from Campeachy to Sisal (a distance of about 120 miles), and on the northern coast, from Sisal to Telchac, and from the mouth of the river Lagartos to Chiquila, and, I think, from Telchac to Tilam (a distance of about 180 miles), there exists a piece of soil varying in breadth from half a mile to 3 miles, separated from the waters of the Gulf of Mexico only by a narrow strip of sand, this latter forming a bulwark against the sea-water and a protection to this soil, which is composed of a kind of clay from which the Indians manufacture their drinking cups or vessels in general use. (I send you a specimen of this soil, in case any of your readers or yourselves should be willing to make the analysis before I can have it made.) Into this soil tanks or reservoirs are dug to the depth of from 24 to 36 inches, with an area to suit the proprietor. There are a good many of these tanks which are nothing but natural cavities, from 2 to 5 feet deep, saving even the labor of digging a tank, the inexhaustible and lasting source of wealth and income. The only care that has to be taken is to situate a tank in such a manner that at no time the salt water of the gulf ever has access to it; this seems to be a paradox, if not an absurdity, but the fact is that if such is the case, there is no production of salt for one and even several seasons. Another fact is that in digging these tanks it is not unusual to find small springs of perfectly sweet water. These salines are not (as in Europe) leveled and prepared with art, divided into many receptacles for purifying sea-water, and effecting its concentration; *here* nature does all the work, and its operation for the production of salt by the agency of sweet water, is as follows:—

The tanks being clean, they are filled with rain water during the rainy season, which begins in May and lasts till September, but generally with intervals sufficient to gather two harvests from May till October. In November and December enough rain generally falls again to produce a third one in March or April. As soon as the rain ceases, a kind of fermentation takes place, raising the temperature of the water gradually to 100, 110 and 120 degrees Fah., a temperature much above that of the atmosphere, after which the water begins to clarify itself by precipitating to the bottom a kind of brownish, gelatinous matter about $\frac{1}{8}$ of an inch thick. Up to that time the water has sustained its perfect sweetness, though there has been some concentration by evaporation; but from the time of the clarification it begins to acquire a salty taste, almost imperceptible in the beginning, augmenting quite rapidly until, by the constant influence of the sun, evaporation being sufficiently advanced, crystallization sets in, and crystals shoot out everywhere on the surface of the water, agglomerating and augmenting until the whole surface of the tank is covered with a crust of salt from 4 to 5 inches in thickness, which, by its own weight, precipitates to the bottom of the tank, where it is broken with a kind of pick-ax and taken out by hand by the native Indians; they wash it in the remaining water, load it upon carts and bring it to the depot, where they put it into bundles surrounded by huano leaves, in which it is sent to the interior of Mexico. (For curiosity's sake, I brought one of the bundles, which I submit herewith to your inspection.) This salt is of a light gray color and very pure. Some of the salines produce white salt, which has less value because they say that it salts less; the chief reason is its bitter taste, which seems to indicate the presence of sulphate of magnesia. Some of the proprietors told me that it was a kind of froth forming on the surface of the water, which is carefully collected and laid aside for crystallization. There is also the rose-colored salt, containing, probably, some of the mineral oxyds, may be oxyd of iron. An analysis of these products will alone clear this question.

When the harvest is made, the tanks are cleared, which is very little work, and nature's bounty fills them again with its spontaneous production, so that man has nothing to do but to reap always and forever, the supply being inexhaustible. LOUIS KOCH.

New York, May 31, 1860.

[We are obliged to our correspondent for the above interesting description of the remarkable salines of Yucatan. The continuation of his letter, which we omit, cites an article on this subject in the *Mejoras Materiales*, written by M. Villeveque—formerly French consul in Campeachy—which contains some profound reflections in regard to the source from which the salt is derived. The specimens brought by Mr. Koch of the formation in which the vats are dug are evidently full of salt, and the suggestion is so obvious that this salt is simply dissolved by the rains and washed into the pits, that we respectfully suggest to Mr. Koch to make a thorough examination of the facts in their bearing upon this hypothesis, on his return (in June) to that country of tropical marvels. If any of our scientific friends would like to examine specimens of this salt and the formations in which it occurs, they will find them at our office.—EDS.

VENTILATION OF MINES—THE STEAM JET.

MESSRS. EDITORS:—Being a constant reader of that valuable paper, the SCIENTIFIC AMERICAN, and having noticed frequent allusions to the ventilation of mines, I have thought it would interest some of your readers to peruse a description of a system of ventilation lately introduced by Mr. Wm. Milnes, Jr., of this place. Mr. Milnes owns and works a very extensive colliery at St. Clair, in Schuylkill county; and in order to ventilate his works, he has driven an air-way of 30 feet area to the surface, where there is an arched flue, 30 feet in length, containing a grate or furnace on which a very strong fire is constantly kept up. At the end of the flue is a chimney, 6 feet internal diameter and 60 feet high. The air-way is connected with the different parts of the works by means of *brattices* and doors, so that all the workings receive their proportionate supply of pure air. This plan of furnace and chimney worked very well until lately, when, the works becoming more extensive, it was found necessary to increase the ventilation. The furnace was driven to its fullest extent, sometimes using resin and oil to increase the draft, but it failed to draw off the explosive gases. After fully investigating the matter, Mr. Milnes concluded to introduce what is known in England as the "steam-jet system," and with the co-operation of Messrs. Pomeroy & Son, machinists, he has done so with the most gratifying results.

At the foot of the chimney he erected two boilers, 30 inches diameter and 20 feet long, from which a steam pipe is carried into the chimney, and so arranged as to distribute 25 jet pipes equally throughout the area of the chimney; these pipes point directly up and have an opening of $\frac{1}{8}$ of an inch, through which the steam passes at a pressure of about 75 pounds to the square inch. This plan works admirably, and it was found, by actual measurement, to have *nearly doubled* the amount of air passing through the air-way. So well pleased was Mr. Milnes with the result, that he has since put up two more boilers and increased the number of jets to 45, with proportionate effects.

In an answer to a recent correspondent, you truly remark that, where ventilation depends exclusively on a fire, *it cannot be regular*. There are other causes besides those mentioned by you, that operate against the furnace system. It is well known that no chimney will draw as well when the atmosphere is dull and heavy as it will in clear weather. This is one of the principal causes of explosions in mines, as they almost invariably take place during the former state of the atmosphere; for instead of having an increased ventilation at such times (which they should have, as the air is not so pure), it is diminished in consequence of the chimney not drawing. The explosive gases accumulate in such weather, and the workmen are either compelled to leave the mine or run the risk of an explosion. With the steam-jet system, as it is adopted by Mr. Milnes, this is all avoided, as the ventilation is under the perfect control of the proper persons. Should it become necessary to increase the draft, all that is to be done is to increase the pressure of the steam, and it is accomplished. Mr. Milnes assured me, a few days ago, that it would have been impossible to have carried on his works during the greater part of this Spring, had it not been for the steam jet, as the weather has been very bad for ventilation. R. ALLISON.

Pottsville, Pa., May 30, 1860.

HINTS TO IMPROVERS OF COTTON GINS.

MESSRS. EDITORS:—Having read several articles in the present volume of your valuable paper (pages 212, 246, 278 and 292) in relation to the process of ginning cotton and the construction of cotton gins, I will take the liberty of throwing out a few hints for the benefit of those now engaged in making experiments with a view to supersede the old saw or Whitney gin. I am well aware there are many good roller gins now made for the purpose of ginning Sea Island cotton, but as that kind of cotton commands from 30 to 50 cents per pound, the planter can afford to operate a machine that is or may be capable of turning out only 150 to 200 pounds of lint per day; but he could not use that kind of a gin for his Upland cotton, which (as a general rule) will not bring more than 10 cents per pound in the market; hence the almost universal use of the saw gin. A good 60-saw gin, driven by four mules, will turn out from three to four bales of Upland cotton per day—averaging 500 pounds each. In producing a gin for general use, to supersede the Whitney, the questions to be taken into consideration by the inventor are: "Can I get up a machine that will turn out as much lint per day as the saw gin? if not, will the superior quality of the lint or staple induce the planter to throw aside the gins now in use? and further, can they be adapted to the gearing, power, building, &c., now in use? and last (but not least), can or will the negro understand and operate the machine as readily as the saw gin?" Now, if any of the numerous readers of the SCIENTIFIC AMERICAN can make or have already produced a machine that can gin from three to six thousand pounds of seed cotton per day, and the lint be worth one cent per pound more than that ginned by a saw gin, and the machine requires no greater number of hands to operate it, no more power to drive it, and costing no more than the Whitney—then I will say (with your correspondent, "A. J. H.,") that the fortunate inventor will soon own plantations and gin his own cotton as it ought to be done. H.

Camden, N. J., May 28, 1860.

AGRICULTURAL CAPACITIES AND CLIMATE OF WESTERN TEXAS.

MESSRS. EDITORS:—On page 243 of the present volume of the SCIENTIFIC AMERICAN, under the head o. "Steam Plowing in Texas," Mr D. M. Richings, after speaking very highly of the whole State for general agricultural purposes, says, of western Texas, that, "owing to the drouths that annually visit that portion of the State, it cannot be said to be at all calculated for planting or farming." Mr. Richings has probably been led into this error, not by his own observation, but by the representations of people residing in other parts of the State, where there is a prevailing prejudice, as is common in all new and rich countries, in favor of their own locality above all others. The fact that there is not so much planting and farming done in western Texas as in other parts of the State, is calculated to foster these impressions. But there are two more obvious reasons for it. One is because the country is not as fully settled—the other, that the present inhabitants are satisfied with more profit from the spontaneous productions of the earth, without labor, than they can make anywhere else with all the labor at their command.

The agricultural readers of the SCIENTIFIC AMERICAN, I presume, would like to know why planting and farming cannot be done to advantage where the most luxuriant grasses grow spontaneously, of the richest species, at all seasons of the year, of some variety or other. There is scarcely any vegetable growth of the farm that requires more rain or moisture than a heavy crop of grass, such as grows in western Texas every year. This fact is known to every practical farmer everywhere. All prairie countries are more or less subject to drouths at some season of the year; but in a climate where there is so little frost as in western Texas, there is plenty of time and plenty of rain to raise one crop, at least, during any year.

The time is fast approaching when western Texas will, in spite of the Mexicans and Indians, be as numerously inhabited, and her soil as successfully cultivated, as any other part of the State. The present inhabitants are well calculated to bring about these results. They know the value of the country, and if Congress will not protect them they will protect themselves. They are encouraging a healthy emigration, which is daily increasing from all parts of the older States, as well as from foreign countries. They are calling loudly for internal improvements; many of these have been authorized, well calculated to develop the vast resources of the country. Some have been commenced, and others are approaching completion, the effects of which are beginning to foretell the future of this nature-favored region. When peace shall have been restored and secured on our frontier and swords beaten into plowshares—when the steam plow shall be the champion and the reign of Ceres shall succeed that of Mars—then shall we see that planting and farming can be done to advantage in western Texas. It is now already known to some that the finest Sea Island cotton can be produced anywhere on the coast within reach of the sea breeze, at the rate of a bale to the acre, a sample of which I send you enclosed.

D. S. Howard.

Corpus Christi, Texas, April 26, 1860.

A STEAM AND AIR ENGINE-ELECTRICAL PHENOMENON.

Messrs. Editors:—While I was in Mulhouse (France), in 1858, a local company owned a steam engine of 12 horse-power, which was furnished with a boiler having only 8 horse-power of heating surface. As it became an urgent matter to increase the power, which was shown by the dynamometer to be 660 kilogrammes (1450 lbs.) lifted one meter (40 inches) in a second, an air-pump was added to the engine, the capacity of which pump was double the diameter and stroke of the feed-water pump with which it acted in concert. This arrangement brought the effective horse-power of the engine up to 750 kilogrammes lifted one meter in a second. The engine was kept running one-fifth faster, and the same pressure was maintained in the boiler; but it required more fuel, although not an increased proportion, to the gain of power. The necessary quantity of feed water was reduced by about one-eighth.

I was reminded of this case by having seen it recently stated in the Scientific American that only about one-fifth of the heat of coal is absorbed in boilers. In the case alluded-to, the air was fed in through a pipe commenced near the top of the chimney, thence descending through it, growing gradually warmer, and finally entering as feed into the boiler at its bottom Perhaps such an arrangement may be found profitable in other cases, even when the boilers are not small. It was claimed for this plan that, besides the additional volume of elastic gas in the boiler, the steam was not so easily condensed in the pipes and cylinders as formerly; it being held in suspension by the heated air. This arrangement will not answer for condensing engines, as the vacuum air-pump would have too much work to perform, and the condensation of the steam would be much slower.

I have recently observed that if two pieces of raw india-rubber are held in close contact for some time, a brilliant line of light is seen at the joint when they are drawn asunder in the dark. If this is caused by electricity, it is not due to any of the three sources of electricity usually recognized, namely, friction, evaporation and chemical action.

E. Rose.

P. S.—Answering to the call for scientific help for the Polytechnic Association of the American Institute, in your city, I should be happy to furnish it if any member will be willing to act as my oral representative.

Ottawa, Ill., May 31, 1860. E. R.

[The engine described by our correspondent was converted into a combination steam and hot-air motor, and considerable saving was effected in utilizing the waste heat that had before escaped up the chimney, by applying it to warm the air that was fed into the boiler. The electric spark produced by the pieces of india-rubber (see last paragraph before the postscript) is undoubtedly due to frictional electricity.—Eds.

PULLING PINE STUMPS.

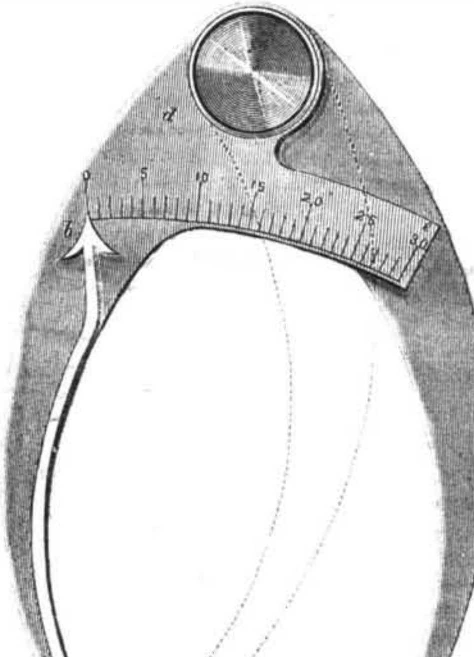
Messrs. Editors:—Our pine stumps in this section of the country are very troublesome and formidable. It is greatly to the interest of planters to have them removed. The process of digging and cutting or burning is too slow; we have a great many of them and require some machinery to work them with. Do you know of anything invented that will answer the purpose? The largest stumps are from 2 to 3 feet in diameter—most of them perfectly solid—with long, lateral roots, besides a long tap root firmly imbedded in a clay soil. The lateral roots, like the stumps, are of solid, light wood—large and long. Can you recommend any machine that will remove them from the soil? C. W. Dudley.

Bennettsville, S. C., May 28, 1860.

[There are a number of existing patents for stump extractors, many of which have been illustrated in the columns of the Scientific American, and it seems to us that the wants of our correspondent are met in some of them. We hope the matter may receive attention from those who can afford the desirable relief.—Eds.

A CUBAN INVENTION-IMPROVED CALIPERS.

Messrs. Editors:—Should you attach any importance to the invention of that instrument whose description and sketch I include in this letter, and think it worthy of occupying a place in the columns of that most excellent paper, the Scientific American (which comes to throw light even in the most remote corner of this island), you may publish it in order that if any of your readers find it useful they may adopt it.



The object of the invention is the construction of an instrument that will measure objects with greater precision than can be done with the common calipers. For this purpose the index, *a b*, girating at *c*, at the end of the leg, *c d*, of the calipers, has its arms, *a c c b*, in the proportion of one to ten. The arc, *b c*, which forms a part of the leg, *c d*, is divided arbitrarily into any number of equal parts, numbered as in the drawing.

To find out if two bodies are of equal dimensions, it will be sufficient to observe, when measuring them, whether the end of the index points to the same division on the scale; if such be the case, it is certain that both bodies are alike. As the smallest difference in the size will be augmented *ten times*, it will be made more sensible to the eye, and the measurement will be nearer to the exactness desired.

The spring, *f*, serves to keep the short arm of the index in contact with the body measured. The leg, *g*, put in the position marked by the dotted lines in the drawing, will make the instrument available for measuring inside diameters. Julius Deprez.

Colon, Cuba (W. I.), April 25, 1860.

PHILOSOPHY IN AN EGGSHELL.

Messrs. Editors:—It appears to me that the difficulty suggested by your very *wise* correspondent from Lancaster, Pa., relative to the heat of the butt end of an egg, is capable of a very simple solution. The difference of thermal sensation between the large and small ends of an egg, when applied to the tongue, is due to the fact that the large end of every egg possesses a small air-chamber, designed for the supply of the chicken, or at least supposed to be. Now, this portion of air is a good non-conductor. When, therefore, the tongue is applied to the shell, it is almost instantly heated, and such heat not being readily conveyed away by the air, the sensation of heat is felt. When the tongue is placed at the other end, the fluids within, being good conductors and in direct contact with the shell, convey away the heat rapidly from the shell and tongue, and then the sensation of cold is experienced. That this is the correct explanation is, I think, evident from the fact it is not at the *very first* touch of the tongue to the egg that the difference is experienced. A perceptible moment of time elapses ere the sensation of warmth is detected, and so, too, that warmth extends only over a small spot, answering exactly to the air-chamber, and not permeating the whole bulk of the egg, as would be the case with any "vital spark." Those persons who try the experiment will notice this. I, for one, do not consider it "a wonderful fact."

So also with the sugar question. The light proceeding from the friction or fracture of sugar is wholly electric, and the apparent sparks are only electric scintillations. I was surprised when, a week or two ago, I saw the question asked; for I thought all were familiar with the fact. If the readers of the Scientific American will attempt to produce these "sparks" on the night of some damp, warm, summer day, they will find it next to impossible to do so, thus showing that the electricity has been dissipated by the moisture in the atmosphere. I well remember (when a boy) once amusing myself on a dark winter evening, by striking out these sparks of electricity. I was then longing for an electrical machine, but the purchase of it being beyond my means, I resorted to some large lumps of loaf sugar (as I had read that it was highly electric when rubbed or abraded), and I was much delighted with the resultant light and glow. Are not these explanations correct ones? R. W.

New Berlin, N. Y., May 26, 1860.

GRIST MILLS AND MILLING.

Messrs. Editors:—On page 307 of the present volume of the Scientific American you published the letter of a correspondent in Baltimore, giving some practical information on the subject of milling. Having built about 40 flouring mills during the last 14 years, I believe that a few suggestions from me on the subject will be useful to many persons.

My present mode of constructing mills is to give stones 4 feet 8 inches in diameter, 160 revolutions per minute, and a 4-feet pair 170 and sometimes 190 revolutions per minute. In the early part of my career as a millwright, we used to run stones with a much slower motion than we do at present. My experience has led me to prefer the faster motion, because the grain is thereby passed more rapidly from the eye of the stone to the grinding or flouring surfaces, and the grain is thus ground more rapidly, and also more evenly. I have found that with large stones and a slow motion, it was very difficult to keep a sufficient amount of grain under the grinding surfaces. With 4-feet stones running at the rate of 190 revolutions per minute, I find that 1,200 pounds of wheat can be ground per hour; all things being in good order, and ample power furnished for the purpose. I now use 4-feet stones in most of the mills which I am building, and prefer those to any other size, as I believe they do as good work and grind as fast with the same power as larger stones.

My mode of manufacturing corn meal is to use a reel about 5 feet long, covered with No. 19 wire cloth, which makes finer meal than the coarser cloth that has been more commonly used for bolting. We make Graham flour by the same bolt, which takes off the coarse bran. I use 60 feet of bolting surface for wheat flour, so as to get out the whole flour in the wheat and separate it from the bran.

I. B.

Binghamton, N. Y., May 31, 1860.