Correspondence.

A Suggestion as to Railway Sleepers.

To the Editor of the Scientific American :

Your article in a late number of the SCIENTIFIC AMERICAN, calling the attention of inventors to devise a substitute for the increasing demand and diminishing supply of railroad sleepers, suggests one feasible and practicable way of meeting this great demand. There are thousands of acres along the lines of all roads that might be planted to chestnuts. The chestnut tree will grow on all except wet land, and when once planted is always there, as they sprout from the stump.

The chestnut is a rapid grower, and is all useful for sleepers, poles, and stakes. About fifteen will grow on an acre at six feet apart, and at twenty-five to thirty-five years (according to soil) they will be worth a dollar each—better than money at compound interest.

Would it not be well for railroad companies to consider this, and encourage the planting of chestnut trees?

E. MYRICH.

Ayer, Mass., May 5, 1884.

The Walled Lakes of Iowa.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of April 19, in speaking of the walls around lakes, whether they are the work of an extinct race or natural formations, you say that in his "Geology of Iowa," Prof. Charles A. White presents as a theory "that in shallow portions of lakes, the ice along the shore freezes fast to everything along the bottom, whether sand, gravel, bowlders, or mud, and the *expansive power of water in freezing* is exerted upon them, acting upon them from the center of the lake in all directions toward its circumference." I have resided on the shore of a walled lake for 24 years, and have recorded observations and measurements two or three times a day of the outward movement of the ice, for months at a time, together with the temperature.

Ice never expands when freezing, but water in the act of changing into ice expands. After the ice is once formed, it is subject to the same laws as other bodies, and is expanded by heat and contracted by cold. The ice in these lakes, as months of careful measurements and observations have demonstrated beyond a doubt, invariably expands when the temperature is rising and contracts when the weather is growing colder. I have seen it shove up on the shore ten to fifteen feet in the course of a month without gaining an inch in thickness, keeping about twenty-two inches thick. The most fragile vessel can be filled with water and frozen solid without bursting, provided a small vent hole is kept open for the escape of the surplus water. The only expansion in freezing is just this, and no more: each crystal of ice as it forms occupies a larger space than the water did of which it is composed. When a tight vessel with water begins to freeze ice soon forms all over the top, surrounding the water with an unyielding coat. The little crystals of ice as they are formed are forced into the water, causing such a pressure that the water bursts out at the weakest point. This same cause, heat and cold causing the expansion and contraction of ice, is the principal cause of the glacial movement, forcing rivers of solid ice to move on down to the sea or plain with a slow but irresistible movement.

E. H. ATWOOD.

Maine Prairie, Minnesota, April 26, 1884.

Sea Monsters Unmasked.

In all probability, monsters wonderfully and fearfully made equaling in ugliness those described in the fables of history, inhabit the sea and occasionally present themselves to view, assuming to the excited beholder both the appearance and movement of a serpent. In the SCIENTIFIC AMERICAN of Dec. 27, 1879, one of these monsters was most graphically portrayed by Daniel C. Beard, who in his description pointed out the fact that a giant cephalopod moving upon the surface of the water would appear to have all the characteristics of a huge serpent. "The fin, or what was supposed to be the serpent's tail, can be readily accounted for by the fact that in some species of the cephalopod the longest tentacle widens and flattens at the end, and might easily be mistaken for a caudal fin."

Mr. Henry Lee, in his work "Sea Monsters Unmasked" (London, 1883), admits the probable existence of monster sea serpents, and clearly shows that nearly all of those which have been seen can be accounted for by the forms and habits of known animals—calamaries or squids of great size. During the past ten years our knowledge of the inhabitants of the vast deep has been enlarged and extended, especially in regard to the so-called monsters; deep see dredgings have brought up fishes of unknown species; cuttle fish measuring more than sixty feet have been met with on the coast of Newfoundland.

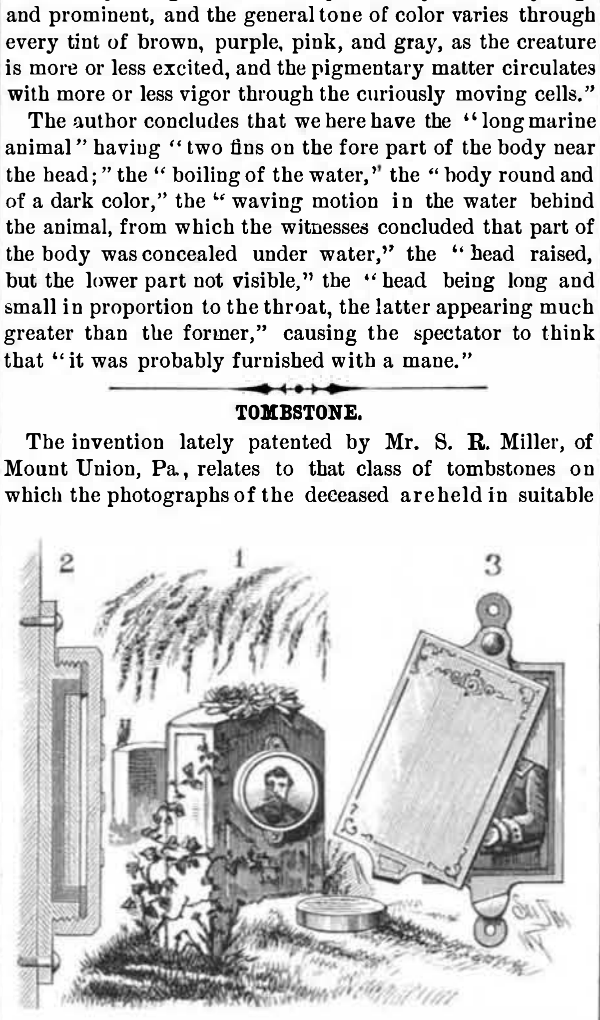
The cuttle fish is described as being most sensitively timid, watching its captor, and upon the slightest movement belching forth its ink, which rolls over and over like a volume of smoke and mixes with the water with marvelous rapidity. It is very intelligent, soon learning to discriminate between friend and foe, and in time becomes quite tame, ceasing to shoot its ink unless irritated.

Squids propel themselves backward by forcing out a stream of water from a tube pointed in a direction contrary to that in which the animal is going. The body tapers toward the tail, which is provided, at a short distance from the end, with two flat fins, one on each side, so that this portion of the body resembles in shape the government "broad arrow." When swimming in smooth water, the tail is raised above the surface to a height which might be three feet or more in a large individual; "and, as it precedes the rest of the body, moving at the rate of several miles an hour, it of course looks, to a person who has never heard of an animal going tail first at such a speed, like the creature's head. The appearance of this 'head' varies in accordance with the lateral fins being seen in profile or in broad expanse. The elongated tubular looking body gives the idea of the neck to which the 'head' is attached; the eight arms trailing behind (the tentacles are always coiled away and concealed) supply the supposed mane floating on each side; the undulating motion in swimming, as the water is alternately drawn in and expelled, accords with the description, and the excurrent stream pouring aft from the locomotor tube causes a long swirl and swell to be left in the animal's wake, which, as I have often seen, may easily be mistaken for an indefinite prolongation of its body. The eyes are very large and prominent, and the general tone of color varies through every tint of brown, purple, pink, and gray, as the creature is more or less excited, and the pigmentary matter circulates with more or less vigor through the curiously moving cells."

The author concludes that we here have the "long marine animal" having "two fins on the fore part of the body near the head;" the "boiling of the water," the "body round and of a dark color," the "waving motion in the water behind the animal, from which the witnesses concluded that part of the body was concealed under water," the "head raised, but the lower part not visible," the "head being long and small in proportion to the throat, the latter appearing much greater than the former," causing the spectator to think that "it was probably furnished with a mane."

TOMBSTONE.

The invention lately patented by Mr. S. R. Miller, of Mount Union, Pa., relates to that class of tombstones on which the photographs of the deceased are held in suitable



MILLER'S TOMBSTONE.

frames. The photograph is placed within a glass covered casing which is bolted to the tombstone, and which is made air and water tight, so that the picture will not be injured. When the casing is made circular as in Fig. 1, a cap is screwed on firmly. When the picture holder is square as in Fig. 3, the cover is pivoted at its top, so that it can be swung to one side. The inner side of the cover is provided with a packing of rubber—shown in the sectional view, Fig. 2—so that the cover will at all times form an absolutely close joint with the frame.

Preservation of Cast Iron.

The common practice of painting the unfinished portions of machines is not very attractive, and that of making all cast iron of some uniform color for all machines is almost offensive. In most cases the use of paint on the cast iron is intended to make a contrast between the unfinished material and the polished parts; incidentally it is also to prevent oxidation and a blotchy appearance. But if the oxidation was general, and even, and permanent, nothing could be finer; for the red oxide of iron is even more agreeable to the eye than the blue-green oxide of copper or bronze, which is so much admired. There is no question about the durability and the permanency of iron oxide in color and texture any more than of that of bronze or brass; the browned gun barrels of fowling pieces are instances.

Experiments have been made to avoid the dauby annoyance of paint by less mechanical means. The cast iron, after being pickled to remove the scale, was left to dry with the acid still on it. Then it was cleaned with a wire brush, and scraped with a coarse file. The result was a mottled surface, the lower portions being a grayish brown, and the outer or upper portions bright. The surface was then swabbed with crude petroleum, and before it was dry was rubbed with a wire brush. Such treatment insures an unchangeable surface, and gives an agreeable color. Even without the petroleum the rust of the acid insures a very pleasing and permanent effect; but the petroleum prevents after stains, and mellows and blends the tints. In either way used it is an improvement on paint. Cast iron has a beauty of its own that is no more dependent on paint than that of bronze or brass.

Sorghum Sugar.

Prof. Collier, late chemist of the U. S. Department of Agriculture, has long been an ardent believer in the idea that sorghum is in time destined to furnish all the sugar needed in this country, and probably yet more for export. He has just published a volume* presenting the most important facts bearing on this subject, as obtained from extended examinations of different varieties of sorghum, and the actual working results of numerous trials on a practical scale. In an address before an agricultural convention in Connecticut, four years ago, the Professor predicted that, within five years from that time, we would be producing our own sugar. He then referred to the large possibilities of making sugar from corn stalks, then, as now, almost entirely wasted; pointed out the wasteful manner in which sugar was made at the South and in Cuba from the sugar cane, and claimed that, either from sorghum or beet raising, though preferably from sorghum, we could more regularly and economically obtain all the sugar the country would consume.

We are very far as yet from having attained the development of this industry that was then predicted, but that we are progressing toward it there is much proof. Counting the average consumption of each individual at about forty pounds a year, we produce only about one-eighth of the total supply required. The trouble seems to have been that, though the sorghum has been demonstrated to have sufficient saccharine matter, and can be raised at a cost not greater than that of sugar cane, the amount of crystallized sugar obtained therefrom has generally been far below what had been expected. In some of the trials most excellent results have been reached, but more often, owing to the planting of wrong kinds of sorghum and defective methods of manufacture, the results have been disappointing to those who at first were most confident of an early and brilliant success. Prof. Collier has enjoyed exceptional advantages for the observation of all that has thus far been done in the United States in this direction, and now admits that "there are still many unsolved questions relating to the perfection and cheapening of working processes," but claims that, with proper conditions, and attention to the rules for practice which experience has shown to be necessary, the "successes will greatly outnumber the failures" in the manufacture of crystallized sugar from sorghum.

Turning and Grinding.

A good finish to a turned cylinder, as a shaft or stud, can be obtained by means of the turning tool—the square nosed tool fed with water. But it may be safely asserted that the apparent truth will not stand the test of trial, except as an approximation to truth. It is almost impossible—probably it is absolutely impossible—to turn a shaft or stud perfectly true; and in most cases the deviation is so great as to be sensible to the touch. Resting thumb and finger against opposite sides of a turned and finished shaft while revolving fast will in most cases prove that, however carefully turned, the shaft is not round. Still more exact tests have demonstrated that the best specimens of turning, from the cleanest and most homogeneous steel, retain in a proportion the faults of the less carefully wrought specimens.

The reasons are obvious; the stud or shaft is suspended on centers at the ends, the intermediate length being unbraced, except in the occasional use of the steady rest. And the tool post and carriage and the tool of a lathe are parts which as a whole are not absolutely rigid. In turning, also, the speed is not so rapid as to prevent vibration, or repulse and return.

The best results are obtained by grinding; a swiftly revolving corundum wheel traversing the more slowly revolving shaft. By this means the plug and template gauges are constructed, which are so perfect that the plug inserted in the template is air tight, although it turns so freely as to suggest perfect lubrication. This method of finishing for fits is becoming quite general in the fitting of journals in the best machine tool manufactories; almost absolute perfection in the fit of boxes and bearings having been already assured.

A Sheet Iron Hen.

The *Inter-Ocean* describes a novel invention as follows. It was not patented through the SCIENTIFIC AMERICAN Patent Agency.

An ingenious fellow in Ohio has constructed a sheet iron hen that promises to lay him a golden egg. It is finished up to life, full size, cackles, clucks, and looks with one eye at a time so naturally that it will deceive the oldest hen hawk in the country. It is so arranged that when a hawk, mink, or polecat pounces on to it, the back springs open and the wings fly up and force the assailant on to a ravenous buzz saw that makes 1,700 revolutions per minute. After moving half a minute the saw stops, the hen closes up, folds its wings, and begins to cackle as though it had just laid an egg. One winding up will answer for three massacres, provided the rather delicate machinery does not get clogged up too much with the blood, bones, and feathers. He set a freshly painted one out in the sun to dry the other day, which attracted the attention of a fine old cat belonging to a doctor who had been poking a great deal of fun at the fool thing. The hen is there, but the cat is hence.

* Sorghum; Its Culture and Manufacture Economically Considered as a source of Sugar, Sirup, and Fodder. By Peter Collier, Ph.D. Robert Clarke & Co., Cincinnati, Ohio.

Hickory.

Some of our native woods cannot be equaled or be superseded by any foreign woods; in all our knowledge of natural history there has been found nothing possessing the excellent qualities of our native hickory. It is not, as commonly supposed, that good hickory must be grown in the north to be of the best; its habitat extends from the Green Mountains in Vermont, following the coast range, the Alleghanies, and the Blue Ridge through the Carolinas, and even to upper Florida. And, contrary to general supposition, the very best of the hickory used in the arts, where toughness is required, is obtained from North Carolina and eastern Tennessee.

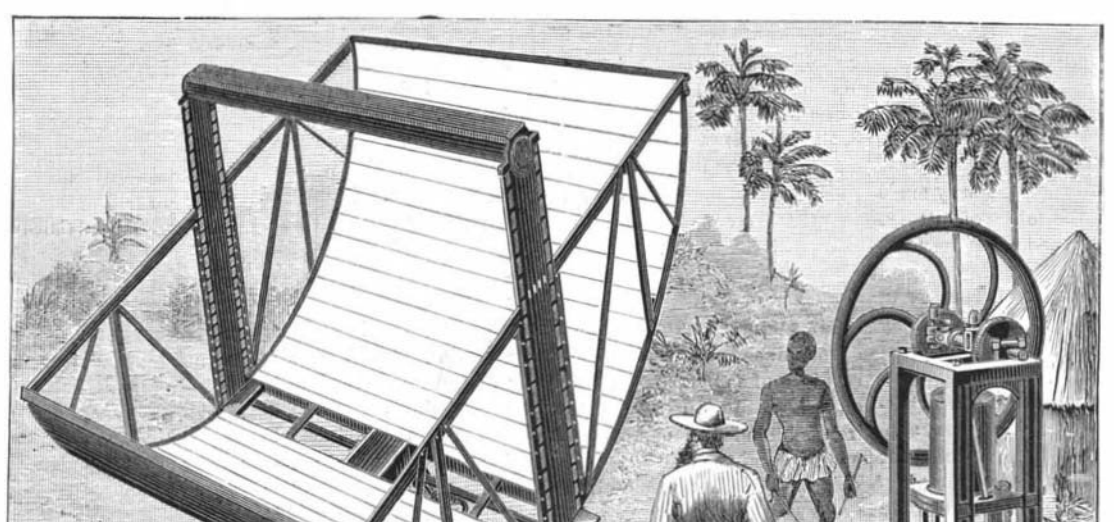
"It is wonderful what toughness the hickory timber of that mountain region is capable of," said a wheel maker recently. "We can turn a piece completely around a circle without breaking a fiber." This, of course, after it is thoroughly steamed.

ERICSSON'S SUN MOTOR.

We illustrate the curious steam engine designed by Capt. John Ericsson, and built by him in this city in 1883, in which the use of coal is dispensed with, and steam power is generated by the heat of the sun. The generator consists of a large concave reflector, in cradle or trough form. The rays of the sun fall on this reflector, and are by it concentrated against the outer surface of the horizontal bar or heater, which stretches across and above the reflector. Said bar is hollow, and so are the side pillars that support the bar or heater; they are hollow, and contain water; they constitute in fact a portion of the boiler. When the hollow horizontal bar is highly heated by the sun's rays its contained water is converted into steam, by which the engine is worked. Such in brief is the construction of this novel and economical steam motor.

For tropical countries, and wherever sunshine is plentiful, this engine would seem to have great utility. The bottom of the rectangular trough consists of straight wooden staves, supported by iron ribs of parabolic curvature secured to the sides of the trough. On these staves the reflecting plates, consisting of flat window glass silvered on the under side, are fastened. It will be readily understood that the method thus adopted for concentrating the radiant heat does not call for a structure of great accuracy, provided the wooden staves are secured to the iron ribs in such a position that the silvered plates attached to the same reflect the solar rays toward the heater. Fig. 2 represents a transverse section of the latter, part of the bottom of the trough, and sections of the reflecting plates; the direct and reflected solar rays being indicated by vertical and diagonal lines.

Referring to the illustration, it will be seen that the trough, 11 feet long and 16 feet broad, including a parallel opening in the bottom 12 inches wide, is sustained by a light truss attached to each end; the heater being supported by vertical plates secured to the truss. The heater is 6¼ inches in diameter, 11 feet long, exposing $130 \times 9 \cdot 8 = 1{,}274$ superficial inches to the action of the reflected solar rays. The reflecting plates, each 3 inches wide and 26 inches long, intercept a sunbeam of $130 \times 180 = 23{,}400$ square inches section. The trough is supported by a central pivot around which it revolves. The change of inclination is effected by means of a horizontal axle—concealed by the trough—the entire mass being so accurately balanced that a pull of 5 pounds applied at the extremity enables a person to change the inclination or cause the whole to revolve. A single revolution of the motive engine develops more power than needed to turn the trough and regulate its inclination so as to face the sun during a day's operation.

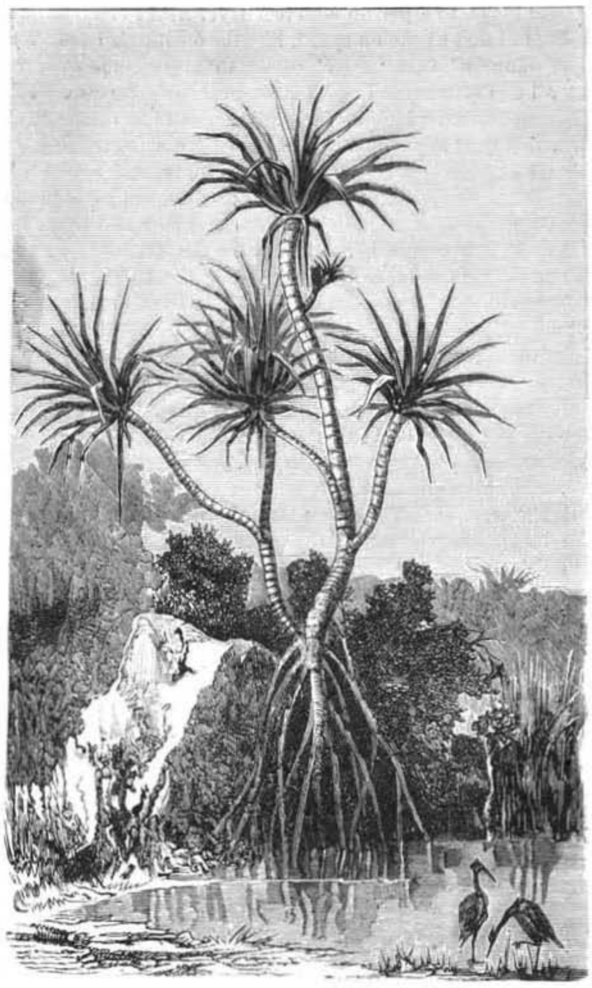


CAPT. JOHN ERICSSON'S NEW SOLAR ENGINE.

The motor shown by the illustration is a steam engine, the working cylinder being 6 inches in diameter with 8 inches stroke. The piston rod, passing through the bottom of the cylinder, operates a force pump of 5 inches diameter. By means of an ordinary cross head secured to the piston rod below the steam cylinder, and by ordinary connecting rods, motion is imparted to a crank shaft and fly wheel, applied at the top of the engine frame; the object of this arrangement being that of showing the capability of the engine to work either pumps or mills. It should be noticed that the flexible steam pipe employed to convey the steam to the engine, as well as the steam chamber attached to the upper end of the heater, has been excluded in the illustration. The average speed of the engine during the trials last summer was 120 turns per minute, the absolute pressure on the working piston being 35 pounds per square inch. The steam was worked expansively in the ratio of 1 to 3, with a nearly perfect vacuum kept up in the condenser inclosed in the pedestal which supports the engine frame.—*La Nature.*

A BEAUTIFUL HOUSE PLANT.

The usefulness of large numbers of stove plants is due to their singularly graceful forms when young as compared with those of full sized specimens seen growing wild in the tropics, or here and there in large gardens where space is provided for the development of large growing stove plants.



THE SCREW PINE (*Pandanus utilis*).

Among palms, dracænas, aralias, and similar plants, we have many instances of this, so to speak, doubleness of character, and although many of these assume in the adult stage forms more or less attractive, it may be safely said that such plants are of little value for garden purposes, except when young. To this class of plants belong the Pandanuses, or screw pines. Travelers tell us how noble an appearance many of the screw pines have when seen luxuriating in groups, or in the form of large, weird-looking, isolated specimens along river banks or sea coasts, or crowning stony hills; the tall naked stem, from which long arm-like branches are produced near the top, and stretch out horizontally; the long stilt-like aerial roots, which, growing out of the branches, extend down to the ground, where they ramify freely, and so afford safe anchorage to the tree against strong winds and heavy rains; the large sheaves of long sword-shaped leaves borne on the end of the branches—these are all characteristic features of the Old World tropics, and especially of the Mascarene Islands.

But screw pines are not tree-like in habit; we have the graceful little P. pygmæus, the small unarmed P. inermis, and the bushy, variegated P. Veitchi and P. javanicus. These form either flat-topped, table-like plants, or dense globose shrubs, sometimes growing out from a rift in the side of a rocky coast or mountain, or creeping by means of their snake-like stilts—the aerial roots—along the surface of the soil, until they become many yards in circumference. Such are screw pines "at home." As to their uses, they are almost as valuable to the natives as palms. Their pineapple-like fruits are eaten in a variety of ways; the roots are used as ropes, and are made into baskets, mats, and hats, as are also the leaves, which are, moreover, used for paper making, nets, etc. In Mauritius the leaves of P. odoratissimus are made into bags, in which coffee, sugar, and grain are exported, and the "bases" used by fishmongers in this country are made from the sugar bags.

In the Palm House at Kew there are several gigantic specimens of Pandanus, the immense plant of P. odoratissimus being one of the attractions of the house, and perhaps the finest specimen of the kind in Europe. For horticultural purposes the screw pines are much valued in this country, only, however, in a small state. The most popular, perhaps, is P. Veitchi, a graceful variegated species from the South Sea Islands. Whether used for table decoration, or as an exhibition plant, this is always effective, and as it is easily grown and propagated, it has become one of the most frequently used among plants for decoration and exhibition.

Before the introduction of this species we possessed in P. javanicus variegatus our only variegated Pandanus; and if not so graceful as P. Veitchi, and less fitted for decorative uses, owing to the strength and sharpness of its spines, it still ranks second, its beautiful variegation being much more permanent than that of P. Veitchi, which is apt to "run out" when the plants get large. P. utilis is a dark green species with purple spines; it is quite as graceful as the variegated species and equally useful. The plant known as P. candelabrum must be referred to this species, as also must some of the screw pines, known in gardens under the names sylvestris, odoratissimus, and media. It is a native of Mauritius. P. pygmæus is the P. graminifolius of gardens.

It is a pretty little plant, more like a Freycenetia than a Pandanus. The leaves are narrow, pale green, and edged with white spines. It branches when only a foot high, and continues to grow horizontally rather than in an upright direction. It is a native of Madagascar. P. inermis, a spineless, bluish-green leaved species; P. Pancheri, a broad leaved plant with white marginal spines and a flesh-colored keel; P. decorus, P. ornatus, and P. Vandermeeschi are other species cultivated in gardens, and all more or less ornamental when young.

It would be difficult to refer all our garden screw pines to their proper botanical position, the characters of young plants being so very different from those of flowering specimens. Being all natives of extremely hot countries, the Pandanuses will thrive only in our warmest stoves; they require plenty of water always, and grow well in a mixture of peat and loam, with a little sand added. The variegated kinds should have a light position close to the glass, in order to fully bring out their beautiful markings. In fact, all the species prefer a light position, although they thrive fairly well in a shaded one. We must remember that naturally they grow in very open places, seldom, if ever, occurring under the shade of trees.—*The Garden.*

The Health of Cincinnati Improved by the Floods.

For the second time it has been proved in Cincinnati that a flood, instead of being followed by sickness, prepares the way for a period of unusual healthfulness. It was so after the flood of last year, and is so now. A prominent physician says that the flood cleaned and purified that part of the city which has always been the starting place for all the diseases which have prevailed. The flooding of the lower stories of filthy buildings, the moving of household goods to other parts of the city and the moving of them back again, and the general cleansing which the flood made necessary seem to have destroyed the lurking germs of disease. In the bottoms, where there is usually more or less of diphtheria, scarlet fever, malaria, etc., at this time of year, there is now hardly a case of sickness reported. In other words, the human pig sties have been washed out. The doctors are complaining that they have nothing to do.

Hot Lemonade for Diarrhœa.

Some people prefer hot lemonade to the usual form, but it is only recently that we have seen it recommended in diarrhœa. Dr. Vigouroux recommends a glass of *hot* lemonade every hour, or half hour, as an easy, agreeable, and efficient treatment for diarrhœa.