A NEW CONSTANT CURRENT PILE.

Dr. E. Obach, while experimenting with his movable bobbin galvanometer, had need of a battery that should furnish an intense and constant current of long duration, and was therefore led to devise and construct the pile which is shown in the accompanying cut.

This apparatus is nothing else than a Bunsen battery, employing zinc, water acidulated with sulphuric acid, carbon, and nitric acid, and so arranged as to secure a continuous renewal of the liquids. The internal resistance of each element is, on an average, 0·07 ohm, and the electromotive force is 2·09 volts. It is able, then, to furnish nearly 30 amperes in a short circuit.

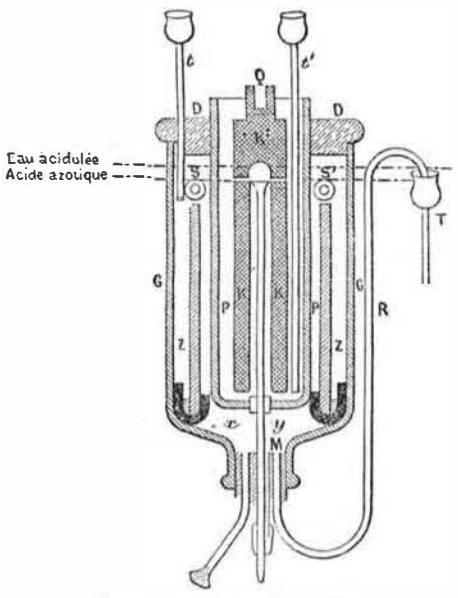
G G is a jar, 20 centimeters in height and 12·5 in diameter, placed in an inverted position over a proper support, and the bottom of which has been removed and replaced by a wooden cap covered with paraffine. The porous red earthenware vessel, P, which is held in place by a cork ring, is 23·5 centimeters in height and 6 in internal diameter. The choice of the porous vessel is very important, and the proper working of the element depends much upon the quality of it.

Those employed by Dr. Obach became entirely saturated one minute after having been filled with water, this giving the measure of their porosity.

The porous vessel is closed with a cork saturated with paraffine and traversed by a carbon, K. This latter, which is retort carbon, is 22·5 centimeters long by 3·5 in diameter, and contains in its center an aperture 15 millimeters in diameter and 18 in length. In its upper part there is a series of small radiating holes; and a glass tube, M, whose upper extremity is funnel-shaped, reaches its summit and traverses the porous vessel as well as the cap of the jar. The bottom of the porous vessel is paraffined, as is also its upper edge and the head of the carbon. Upon the bottom of the jar there rests a gutta-percha ring which forms a channel, *x y*, that is filled with mercury, and into this dips the lower part of a zinc cylinder 16 centimeters in length, 6 in diameter, and weighing 2 kilogrammes. Through the cork at the lower part of the jar there pass two tubes, R and *r*, and through the wooden cover the two funnel tubes, *t* and *t'*. The former of these, *t*, terminates in the upper part of the zinc, while the latter runs to the bottom of the porous vessel.

The liquids circulate as follows: The fresh nitric acid reaches the bottom of the porous vessel through the funnel tube, *t'*, while the spent acid flows off through the radiating holes in the carbon into the central tube, M, and into a receptacle placed at the lower part. The water containing sulphuric acid enters, on the contrary, at the upper part, at *t*, and, being rendered denser through the formation of sulphate of zinc, flows through the siphon tube, R, into the tube, T. The level of the liquids is not very different (as may be seen in the figure), but that of the sulphuric acid water is a little the higher of the two in the external vessel. S S' in a section of a glass tube bent into a circle and arranged at the upper part of the liquid, where it is warmest. This tube is traversed by a current of cold water in order to keep the liquid at a constant temperature. The tube, *r*, serves to empty the pile, and is always kept corked while the latter is in operation.

All the communications are established by mercurial con-



OBACH'S CONSTANT PILE.

tacts. The zinc cylinder is connected with a strip of copper contained in a glass tube that traverses the cover, and which dips into the mercury in the gutta-percha trough. The square end of the carbon is hollowed out at Q, and the cavity is filled with mercury which serves to establish communications with the external circuit.—*La Nature.*

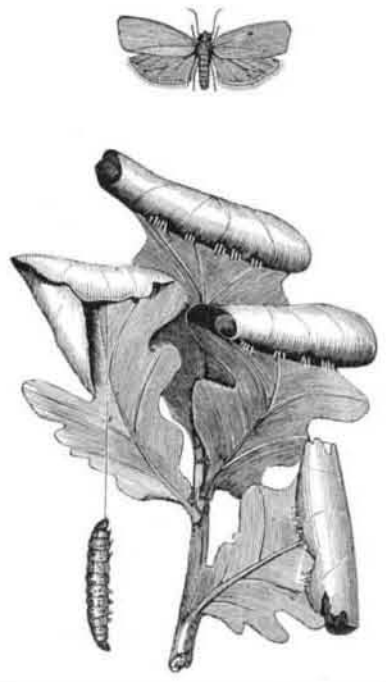
Fatal Shock from Supposed Snake Bite.

That imagination may prove fatal receives fresh proof from the case reported in the *Med. Press*, April 25, 1883, by Dr. C. R. Francis. The patient, awakened from his sleep by something creeping over his naked legs, immediately jumped to the conclusion that it was a cobra, went into a state of collapse, and died, though it was discovered, even before death, that the supposed cobra was a harmless lizard.

GARDEN DESTROYERS.—THE OAK LEAF ROLLER MOTH.

The caterpillars of this pretty little moth are very destructive to the leaves of oak trees, particularly in the south of England, and they occasionally occur in such extraordinary numbers that they entirely divest the trees of their foliage. When this is the case, the trees suffer very much; in some seasons not only are a few trees here and there attacked, but acres and indeed miles of woodland are covered with swarms of this pest.

This insect is by no means very abundant every year, but, as is the case with many insects, for several years they may be positively scarce, and then for some reason, whether the absence of their natural enemies, or particularly favorable weather at a critical period of their existence, or some other



OAK LEAF ROLLER MOTH AND CATERPILLAR AND ROLLED LEAVES.

circumstance is uncertain, they make their appearance in very great numbers for one or more seasons, and then suddenly disappear as mysteriously as they came.

The birds, as usual, help immensely in destroying these caterpillars. The ichneumons and other parasitical flies attack them with great vigor, and on one occasion it was found that more than half the caterpillars were infested by some parasites.

The year before last I received a box full of caterpillars that were found feeding on the oak leaves and stripping the trees; they were in such a state of decomposition when they reached me that it was impossible to say what they all were, but no doubt there were some of these oak leaf roller caterpillars among them; in the box were also a number of hair-worms (a species of Mermis, one of the Gordi), some of which were seven inches in length, and as thick as a piece of twine. As far as I could judge, nearly every one of the caterpillars must have been infested with one of these worms, which had no doubt left their victims at their death.

The moths appear toward the end of June, and lay their eggs on the twigs or buds; the caterpillars are hatched in the following spring when the young leaves are just appearing. They almost at once begin to roll up the leaves into a kind of tube, which forms a protection for them against the weather and their various enemies. This would seem an almost impossible task when we consider the minute size of the caterpillars and the comparative stiffness of the leaves, and that each caterpillar works alone on a separate leaf. Many, if not all, caterpillars are provided with the means of spinning a silken thread, as silkworms do, being furnished with two internal tubes containing a thick gummy fluid (liquid silk, in fact); these two tubes are joined together, and terminate in one very fine one, which projects slightly from the head just below the mouth. When the insect wishes to form a thread, it touches the object to which it is to be attached with the end of this tube and ejects a drop of the fluid; then, drawing back its head or letting itself fall, a fine stream of this sticky fluid is drawn out, which immediately hardens into a strong thread. When the young caterpillar wishes to roll up a leaf, it attaches a thread to the under side of the edge of the leaf, and fastens the other end to the leaf a little way from the edge. The thread in some way becomes tighter, causing the leaf to curl slightly. Some say the caterpillars tighten the thread by pressing it down and reattaching it, or by pressing it down and spinning a fresh and tight thread which holds the leaf in a bent position. I am of opinion that the threads contract as they dry, and my own observations bear out my views. It is quite possible that both theories may be correct; the result is, however, the same. Subsequent threads attached in the same manner cause the leaf to curl more and more; others are then attached to the outside of this roll, which eventually presents the appearance of those shown in the figure. Within this shelter the caterpillar lives in comparative safety, feeding on the internal coils of the roll. If disturbed by the entrance of any enemy at one end of its dwelling, it very quickly makes its exit at the other, letting itself fall, but still attached to the leaf by a thread, by which, when it considers all danger is over, it climbs up and regains its old quarters. When a branch infested by these caterpillars is shaken, large numbers may almost immediately be seen dangling at the end of their lines some feet in length. The caterpillars attain their full size about three weeks after they are hatched; they then become chrysalides within the curled-up leaves; in the course of about a month the moths appear, and after pairing lay their eggs as before mentioned.

The caterpillars are about five-eighths of an inch in length when full grown, and are of a dull green color with brownish spots; they are provided with a pair of legs on the first three, the sixth, seventh, eighth, ninth, and last six joints of the body. The chrysalis is of a very dark brown color. —*G. S. S., in The Garden.*

Hardwoods for House Finishing.

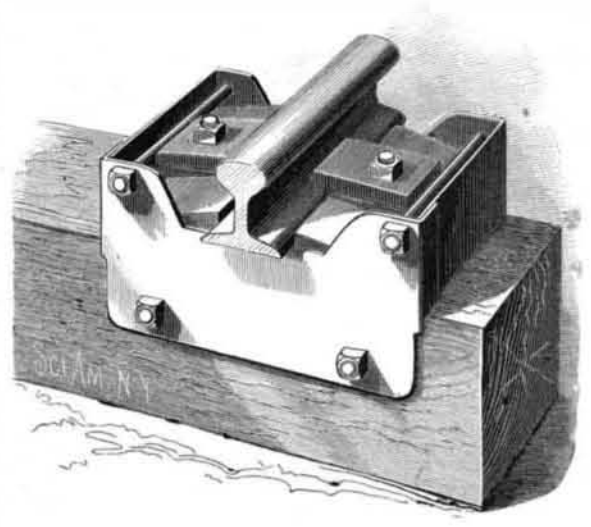
At the West, as well as in our Eastern cities and towns, the consumption of hardwoods for interior finish in buildings is a most important factor in the trade in such lumber. The woods in use by Chicago building contractors, says the *Northwestern Lumberman*, are mainly embodied in the following list: Birch, butternut, calico and white ash, sycamore, white and red oak, cherry, beech, walnut, whitewood, white maple, yellow pine, mahogany, Manila, prima vera, and coffee wood. Sycamore, white oak, and beech are the principal woods that are used quarter-sawed. On account of the growing scarcity of cherry, and the high prices charged for good lumber, other woods are sought after that will answer as a substitute, affording a similarly rich grain. Cherry is imitated with gum, and quarter-sawed beech is named as the lumber likely to take its place to some extent. Calico ash is obtained principally in Indiana and Michigan. White maple is a designation applied to the sap of the ordinary maple, which is sought after for finishing purposes. Mahogany has latterly been used to quite an extent in fancy buildings. Very often from six to a dozen different kinds of lumber are used in finishing an aristocratic residence, the plan being to have every room finished in a different wood. Walnut is less used for finishing, because of its high price, and the developing tendency to employ light shades in wood, to produce a cheerful and refreshing effect, rather than one of somber elegance. Calico ash costs about $35; quarter-sawed sycamore, $50; quarter-sawed white oak, $60; quarter-sawed beech, $50; white maple, $35; Manila, $150; and mahogany from 10 to 20 cents a foot.

IMPROVED RAILWAY RAIL CHAIR.

The rail chair shown in the engraving consists essentially of an iron bed plate, upon which the rail is securely clamped, an India-rubber block between the bed plate and tie, and a strong inclosing box bolted to the tie.

The advantage of this combination will be apparent to every engineer. The bed plate receives and retains the rail, and is itself securely held by clamps secured by bolts passing through the tie.

The rubber block upon which the plate rests takes up the vibrations, so that no pounding or shock is communicated to the structure beneath. The iron box containing the rubber block prevents the rubber from spreading out under con-



WODISKA'S RAILWAY RAIL CHAIR.

tinued use, and holds all of the parts securely in position. This construction will effect a great saving of rails and ties. It will also be of immense benefit to rolling stock. It will prevent the destruction of bridges and elevated railway structures by taking up the jar and vibration produced in the track by the rolling stock, and, finally, it certainly commends itself to public favor, as it will in a great measure, if not entirely, stop the noise and jarring of elevated railways now so much complained of, and will prevent in a great measure the abrasion that produces metallic dust, which is the cause of so much iron rust on the line of the elevated railways.

This invention might be applied with advantage to the New York and Brooklyn bridge, as it would protect the structure against the bad effects of jarring by the cars.

Incombustible Paints.

Waterglass is being extensively used in the production of a paint which in addition to its durability is also a protection against fire, and as a floor paint it is especially recommended.

The surface of the floor having been well cleaned, any crevices or cracks between the boards are next luted with a thick mixture of waterglass and pulverized chalk or gypsum; then, by means of a stiff brush, a coating of waterglass, of sirup like consistency, is spread over the floor, and to this succeeds a second coating of the same, mixed with the desired color—the latter a mineral color, as the alkalies of the waterglass commonly decompose vegetable colors. This coating having become dry, other layers of the waterglass are given until the floor acquires a fine lustrous appearance. In order to insure a polished brightness, the surface is ground off a little, oiled, and thoroughly dried. A number of patents have been granted for incombustible paints in this country, and among the foreigners who have experimented with different ingredients for accomplishing this end, MM. Vilde and Schambeck propose the following mixture for rendering wood work incombustible:

Pulverized glass	20
Pulverized porcelain	20
Pulverized stone	20
Calcined lime	10
Silicate of soda	30
	100

The solid elements must be reduced to as fine a state as possible and sifted, and then mixed intimately with the soluble glass, thus forming a glutinous mass which may be employed as it is for painting, or may be mixed with various colors.

The addition of the lime gives a certain unctuosity to the mass for painting, while the combining of this lime with a portion of the silicic acid of the soluble glass promotes the intimate mixture of the other substances.

Although the mixture given above is recommended as being the best, the proportions of the various elements may be changed according to circumstances, except that of the soluble glass, which must remain constant. Some of the substances may also be replaced by others; but it is advisable to retain the lime. Instead of silicate of soda, the soluble glass of potash may be employed, but the former is cheaper.

The paint is laid on with a brush, in the ordinary manner and as evenly as possible, on the surface to be protected. The first coat sets immediately, and the second may be applied from six to twelve hours afterward—two coats being sufficient. This composition may also be employed with advantage for protecting iron bridges, sleepers, etc., from oxidation.

Chinese Poisons.

The commonest poisons are said to be opium, arsenic, and certain noxious essences derived from herbs. But besides these, other things are taken by suicides and given by murderers to cause death. In some of the Southern provinces there exists a particular kind of silk worm, known as the Golden silk worm, which is reared by miscreants to serve either purpose as occasion may require. Quicksilver, which is also used with fatal effect, is either swallowed, or, like the "juice of cursed hebenon" which sent Hamlet's father to his account, is poured into the ear. The torture necessarily censequent on this last method of using it must be so excessive that it may safely be assumed that it finds favor only with murderers. Swallowing gold, on the other hand, seems to be the favorite way of seeking death with wealthy suicides It has been held by some writers that the expression "swallowing gold" is but a metaphorical phrase meaning "swallowing poison," just as when a notable culprit is ordered to strangle himself he is said to have had "a silken cord" sent to him. But the "Coroner's Manual" puts it beyond question that gold is actually swallowed, and it prescribes the remedies which should be adopted to effect a cure. Gold not being a poison, death is the result either of suffocation or laceration of the intestines. When suffocation is imminent, draughts of strained rice water, we are told, should be given to wash the gold downward, and when this object has been attained, the flesh of partridges, among other things, should be eaten by the patient to "soften the gold" and thus prevent its doing injury. Silver is also taken in the same way. But though wealthy Chinamen thus find a pleasure in seeking extinction by means of the precious metals, they have never gone the length of pounding diamonds to get rid of either themselves or their enemies, after the manner of Indian potentates.—*Nature.*

Vulcanized Fiber.

The *Ironmonger* (London) speaks in the highest terms of a new vulcanized fiber for lubricating purposes, which it describes as follows:

The fiber is made in two qualities—hard and flexible. The hard, which may be turned in the lathe, takes a very good thread, and may be highly polished, is supplied in three colors, black, red, and white, in imitation respectively of ebonite, vulcanite, and ivory. It is used extensively for journal-bearings and bushes in light cotton-mills; for railway track bolt washers, the London and Brighton Railway, among other companies, using them for this purpose; and for pneumatic carriers, the General Post Office authorities employing them as such in place of leather and gutta-percha. For use in connection with electrical apparatus it is of great value, and a number of electric light companies are using it exclusively for the insulation parts of lamps and for certain parts of dynamo machines, as it will stand great heat, and is in other respects a better insulator and cheaper than either of the other substances usually employed. Another of the many uses to which the hard quality is put is that of ferruling the condenser tubes in marine engines. Such tubes are generally joined with wood ferrules, which, after being in use a little time, are liable, owing to expansion and subsequent contraction, to fall off. The vulcanized fiber ferrule obviates this drawback. It expands like the wood, but does not go back again; consequently it retains a firm hold on the ends of the tubes. The fact that grease does not affect the fiber is a great advantage. The soft fiber is an excellent substitute for leather, rubber, gutta-percha, etc. Its ability to withstand the action of hot and cold water, acids, and grease renders it of particular value to brassfounders, plumbers, engineers, etc., and it is in extensive demand for making into clacks for sewer and other pumps, plumbers' and carriage builders' washers, etc. As illustrating its wearing and imperishable qualities, it may be mentioned that an axle box washer removed from an omnibus after nine months' use was found little the worse for wear, and without a crack on its surface.

Natural Gas Fuels.

Years ago, in their eagerness to tap from the earth its hidden treasures of oil, drillers generally expressed disgust when nothing but gas rewarded their efforts. Later, some enterprising men began to turn their attention to this great source of caloric, and, one by one, a number of iron and glass manufactories in Pennsylvania carried the gas into their mills. The *Engineering and Mining Journal* says they have not made much bluster over what they were doing, and have quietly pocketed the increased profits which their saving of fuel, due to the use of gas, has given them. Of late, however, the subject is attracting considerable attention in a quiet way, and recent developments indicate that the territory which may possibly be able to draw upon the new source of fuel supply is much greater than is generally believed. Gas wells have been opened and are utilized as far west as Detroit, and as far south as West Virginia, and Pittsburg is now getting excited over the extension of the business of the Murraysville well in Westmoreland County. Pipes have been laid down to a number of glass and iron works in the eastern part of the great Smoky City, and a rapid extension of the field of the gaseous fuel is looked forward to. The belief is expressed by men whose opinion is worthy of much consideration, that the number of localities capable of being supplied with gaseous fuel in the States of New York, Pennsylvania, Ohio, West Virginia, and Michigan is much larger than the majority have any conception of, and the permanency of the flow of some of the older wells gives rise to the hope that it is a reliable fuel supply. Its cheapness and cleanliness are, of course, matters which are beyond all doubt. There are indications that during the present year a considerable number of companies will form to sink wells, and a "boom" is looked forward to that may bring forth the usual crop of unsound enterprises.

Water Level for Shafting.

Mr. A. C. Reuss, M.E., writes to the SCIENTIFIC AMERICAN from Allahabad, India, describing his application of the water level to the lining of shafting as preferable to the ordinary method by the use of the spirit level. He says: "For leveling long lines of shafting I use a rubber tube of three-quarters of an inch diameter, and fix on each end of it a water stand glass of the same diameter, or nearly so. The tubing should be long enough to reach from one bearing of the shaft to the second one beyond, and lie on the ground or floor, without kinks or short turns. The tube and glasses should be filled with water sufficient in quantity to reach about half up the height of the glasses, so that the level in both the glasses is visible.

"With this device a line of shafting of from 800 to 1,000 feet may be leveled in an hour, or the bearings for the shaft can be leveled ready for the shaft. Let one man hold one end of the tube—the water glass—to bearing No. 1, and another hold the other glass to bearing No. 3. The man at No. 1 holding his water level at the bottom of the bearing No. 3 levels to it. Then level from No. 1 to No. 2, and from No. 3 to No. 2. This being done, proceed from No. 3 to No. 5, and from No. 2 to No. 4 and so on."

Patent Medicines in Japan.

In respect to the sale of patent medicines, *The Pharmaceutical Gazette* (London) thinks that we might advantageously take a lesson from the Japanese. We learn from the first report of the Central Sanitary Bureau of Japan, just issued, that they have established a public laboratory for the analysis of chemicals and patent medicines. The proprietors of patent medicines are bound to present a sample, with the names and proportion of the ingredients, directions for its use, and explanations of its supposed efficacy. During the year there were no fewer than 11,904 applicants for license to prepare and sell 148,091 patent and secret medicines. Permission for the preparation and sale of 58,638 different kinds was granted, 8,592 were prohibited, 9,918 were ordered to be discountenanced, and 70,943 remained still to be reported on. The majority of those which were authorized to be sold were of no efficacy, and but few were really remedial agents. But the sale of these was not prohibited, as they were not dangerous to the health of the people.

Cement for Leather.

When pieces of leather are to be cemented together, which are not subjected to traction or need not sustain heavy weights, *New Remedies* says that common glue will probably be the best binding substance; for thin leather, ordinary flour paste may also be used.

If the leather is subjected to a moderate strain, the following method may be used: Soak equal parts of glue and of isinglass for ten hours with enough water to cover them, then add about one-fourth part of tannin, and boil until the mixture becomes sticky. The surfaces of the leather must first be roughened with some coarsetool; they are then well rubbed with the above mixture, while warm, and firmly pressed together. After a few hours they will be found united.

Or glue (8 parts) may be soaked with water until soft, the excess poured off, and the vessel then placed on a water bath until the glue melts. One part of glacial acetic acid is then added, and the mixture transferred to small vials. This liquid glue will also stick leather together very firmly.

An Austrian firm manufactures a glue which is said to be made from the entrails (skins?) of cattle, which goes by the name of dermatin, and is reported to be used in England as well as on the Continent. This is said to glue leather together so effectually that the mended place will be as good as new, while it leaves it perfectly flexible.

American Manufactures in New Zealand.

A "New Zealand subscriber" sends a letter on the importance of the British colonies in the South Pacific as a market for American manufactures. The proprietor of a large iron works in England has been making a tour through these possessions with a view of ascertaining, from personal observation, the requirements of customers. Our correspondent advises similar visits by American manufacturers to correct erroneous impressions and get exact information as to the needs of the people. He mentions one lack in woodcutting tools sent to Auckland, and that is their want of adaptedness to the timber, as the New Zealand pines are as hard as American hard woods, and the saws and edge tools sent from America are not strong enough for their work. He says, however, that such American mechanical tools and agricultural implements as find favor are imitated by English manufacturers, who make inferior articles and undersell the American products.

Drilling Glass.

For drilling holes in glass, a common steel drill, well made and well tempered, the *Glassware Review* claims to be the best tool. The steel should be forged at a low temperature, so as to be sure not to burn it, and then tempered as hard as possible in a bath of salt water that has been well boiled: Such a drill will go through glass very rapidly if kept well moistened with turpentine in which some camphor has been dissolved. Dilute sulphuric acids is equally good, if not better. It is stated that at Berlin glass castings for pump barrels, etc., are drilled, planed, and bored like iron ones, and in the same lathes and machines, by aid of sulphuric acid. A little practice with these different plans will enable the operator to cut and work glass as easily as brass or iron.

Trichinæ.

J. E. Morris, M.D., in the *Clinical Brief*, says in regard to trichinæ in swine that it is a well established fact that the real source of infection in swine lies entirely in the rat. A committee of Vienna physicians found in Moravia thirty-seven per cent of rats examined trichinous; in Vienna and its environs ten per cent; and in Lower Austria about four per cent. The well-known voracity of the hog, and its special fondness for meat, cause it to feed upon the flesh and excrements of other animals infested with these parasites, and especially rats and mice. To prevent trichinous swine it is highly important to cut off all the sources of disease in the diet of these animals.

Phosphorescence in Animals.

According to Radziszewsky, the luminous animals like *Pelagia noctiluca*, *Beroe ovatus*, etc., owe this fact toa peculiar fat that they contain. These little animals do not give light when at rest, but when stimulated give a quick flash of monochromatic light resembling lightning. The author separated some of this fat and found it was a thick, pale yellow, neutral liquid, easily saponified by alkali. It gave a flash of light when shaken with caustic potash. The animals themselves have an alkaline reaction.

Orange Peel Fuel.

A gentleman in Manchester claims to have succeeded in applying orange peel to a very useful purpose. Orange peel dried in or on an oven until all the moisture has been expelled becomes readily inflammable, and serves admirably for lighting fires or for resuscitating them when they have nearly gone out. Thoroughly dried orange peel will keep for a long time, and might be collected when the fruit is in season and stored for winter use. Buyers of Florida orange groves should remember the above.