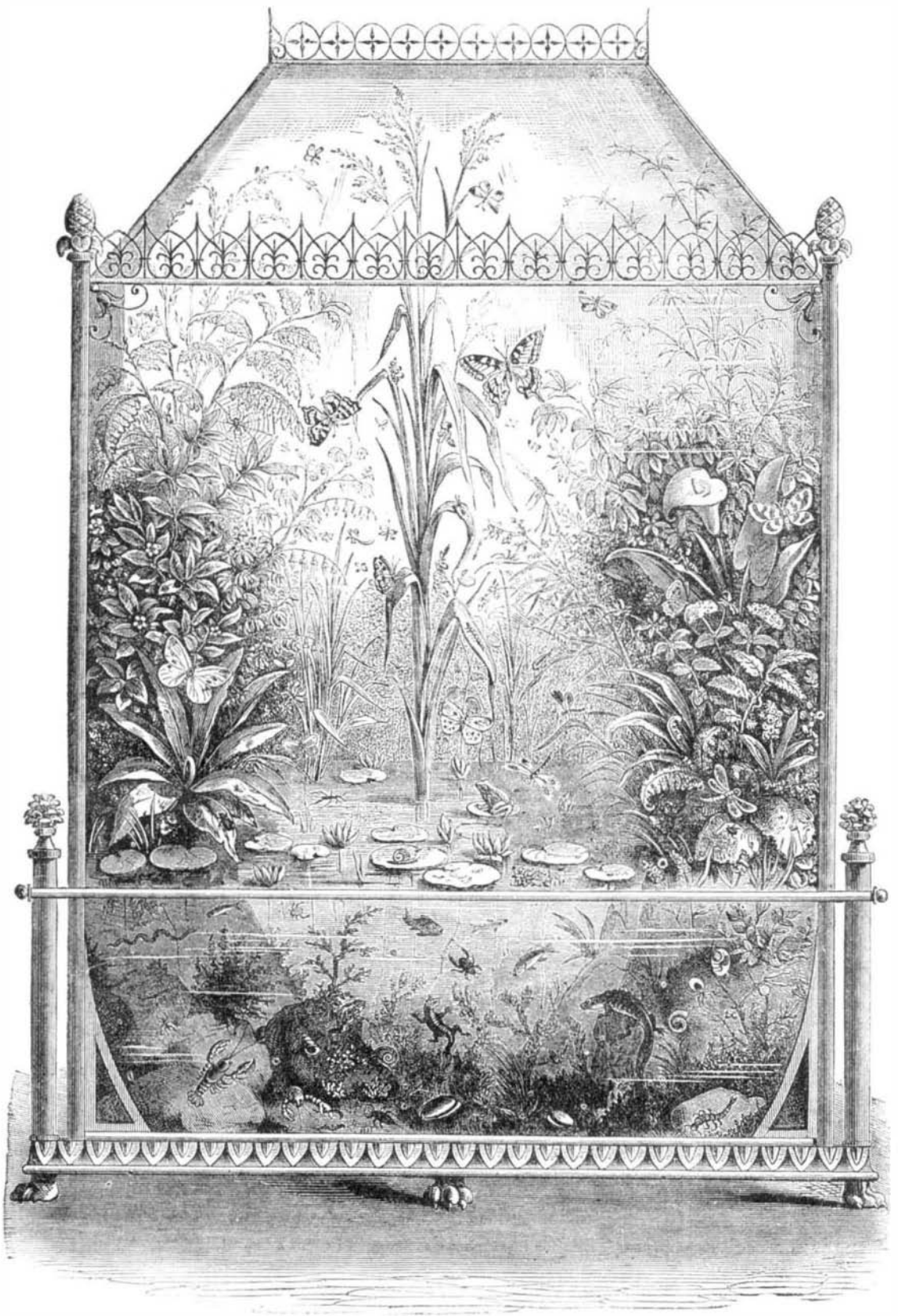
COMBINED AQUARIUM AND PLANT CASE.

We illustrate herewith one of the most beautiful accessories to indoor decoration and the cultivation of taste for natural beauty that has ever been brought under our notice. It is a plant case combined with an aquarium, and must be regarded as a happy thought of its designer (a correspondent of the London *Garden*), as, of all forms of vegetable life, aquatics or sub-aquatics are best suited for indoor gardening in towns. If the best results are to be obtained, a commencement should be made by arranging suitable rock work; the kind of plants with which they should be furnished and the best material in which to grow them should then be selected. For cases like that now represented, hundreds of rare and beautiful plants are suitable, and also plants neither rare nor costly, but yet not less interesting. Many grasses, sedges, cyperus, and ferns grow well in such cases if elevated an inch or two above the water level. For submerged vegetation we have valisneria, anacharis, charas, the pigmy-blossomed water lily, the hawthorn-scented *aponogeton distachyon*, fresh green disk-shaped sheath-rooted duckweed, *pontederia crassipes*, the hollow petioles of which are swollen and filled with air, and many other equally interesting plants, all of easy culture.

In the hands of an experienced cultivator, many rare plants would thrive as well in a case like this as in a cool plant stove; and then sarracenias, cephalotus, dionæa, droseras, and even one or two of the true pitcher plants, as *nepenthes phyllamphora*, or *nepenthes gracilis*, might be added, notwithstanding their reputed carnivorous tendencies. Given a few lumps of fibrous peat and a handful of fresh living sphagnum (moss), and even the gorgeous crimson-winged disa might be induced to display its rich colors and fresh, glossy foliage. Plant life, too, may be interestingly associated with animal life. In the water may be lizards, golden and silvery carp, brown-speckled and green frogs, and a whole colony of water beetles and snails; while flitting about overhead, among the plants, may be butterflies of many hues, and a few of the most showy kinds of moths. "Are we, then, to capture such insects on the wing and introduce them? No, they must be bred in their new home, and this simplifies the whole affair, for specimens of all the more showy butterflies may be bought at almost any naturalist's, in the chrysalis state, for at the most a few pence each; and these, if placed in a little box (without a lid) of dry earth, and introduced to the plant case, will come out in due season, like other butterflies, and will delight us with their elegant forms and brilliant coloring. Even the common white speckled garden spider, added to such a case, tends to give it life and interest. This aquarium is divided into two parts; the lower one, as will be seen, for water, fish, and true aquatics; the upper one for sub-aquatics and other plants."



COMBINED AQUARIUM AND PLANT CASE.

New Process for Rendering Wood Incombustible.

An English clergyman, the Rev. Dr. Jones, has distinguished himself by inventing a process for rendering wood incombustible, for which he has obtained a patent. The wood is at the same time made impervious to dry rot and decay, so that two important ends are attained at once. Most of the old methods of preserving wood only render it more liable to fire, as was shown not long ago in the burning of the landing stage at Liverpool. Dr. Jones subjects the wood to a pickling process, in a solution of tungstate of soda and water of the specific gravity of 1·2. The tungstate is made by the addition of tungstate of lime to hydrochloric acid and salt, and it produces in the process as much chloride of lime as will pay all working expenses. The tungstate of soda, from experiments that have been made publicly and privately during the last three years, is proved to render soft woods, such as white and yellow pine, as hard as oak or teak, and it will also restore wood that has been affected by dry rot to the original condition of durability. The London *Daily News* gives the following account of some experiments recently made at Godstone to test the value of the new process:

The experiments made were three in number, and the tests were undoubtedly very severe. Two small pyramids of sticks were made, one of prepared and the other of unprepared wood. These were then well saturated with paraffin and ignited. In the case of the prepared wood, the paraffin soon burnt itself out without communicating the flames to the wood, which was only slightly charred. The other heap burnt fiercely, and in half an hour was reduced to ashes. The next experiment was made with two wooden huts, one of which had been prepared, while the other, built of ordinary Scotch fir, had not. A strong fire sufficient to ignite the houses was made in each, and the effect was about the same as in the preceding experiment. A chest containing a parchment document had been treated by the process, and was thrown into the flames when at their hight, and was taken out some time afterwards, charred indeed as to the outside, but practically uninjured in any other respect. The inside was quite cool, and the wax seals upon the document were intact. Perhaps the most important trial was that which took place with gunpowder. A government gunpowder keg which had been rendered fireproof was used for this experiment. A paper packet containing about two ounces of gunpowder was put in the bottom of the keg, and a sheet of brown paper impregnated with the tungstate was pasted over it and dried. The keg, which was open at the top, was turned upside down, and surrounded by shavings, which were lighted. A fire of petroleum and shavings was kept burning on the top for about a quarter of an hour, without producing the slightest effect on the keg. To make the trial still more complete the keg was reversed again, and lighted shavings were thrown in upon the gunpowder, protected only by a sheet of brown paper. The paper stood the test admirably, and the solution rejected the fire so thoroughly that the paper did not even show a sign of charring. The gunpowder was then taken out and exploded. The properties of his invention, Dr. Jones states, would give the navy the advantage of being always sound in hull and free from any danger of fire, whether from accident or from shot and shell. It would also be a great saving to the nation in preventing the necessity of continually docking and repairing ships.

Car Wheels.

At a recent meeting of the Car Builders' Association, the subject of discussion was "Car Wheels—the Best Method of Fitting, Flange Wear and Causes, Mileage, and Breakage."

Mr. Garey said he had been requested to ask why old wheels could not be remelted and recast. He thought there should be some process by which old wheels could be made available as material for new ones; yet wheelmakers objected to taking old ones to be used a second time in manufacture.

Mr. Jonathan Scoville remarked that, if old wheels were uniform in quality and sufficiently soft, there would probably be no objection to their use as material for new ones. But they are, in fact, never uniform, and, as a general thing, they are hard and, when melted, get still harder. In an average lot of old or returned wheels, for every hundred fit for remelting, there were three hundred that were not fit.

Mr. W. W. Snow, of the Ramapo Car Wheel Works, said that nearly all wheels are supposed to be made of charcoal iron. If these wheels, when used a second time, were remelted with charcoal, he thought they would not deteriorate; but as anthracite coal was generally used in melting, and as this contained more or less sulphur, the iron becomes impregnated with it, and the quality is impaired in proportion. He had observed that, after the sulphur was once in the iron, there was an increased tendency to absorb more of it, and that the second and third melting, and perhaps the fourth, produced nothing but common anthracite iron, unless soft charcoal iron were mixed with it at each melting.

Mr. W. R. Davenport, of the Erie Car Works, asked whether some other disposition could not be made of old wheels than putting them into new ones. Old wheels, mixed with pig iron in a puddling furnace, will give splendid results in rolled bar iron. Every railway company uses enough merchant bar iron to consume every old wheel that they have to sell. Then why should wheelmakers be expected to take old wheels when they can be sold to the rolling mills, where they can be used to advantage, and the quality of the iron improved?

Mr. Snow said his company had supplied parties with a certain number annually, who put them into plate iron, and the testimony was that such plate iron was the best of any in the market. The old wheels are first puddled, of course, and go through the regular process, which necessitates an increase in the cost of plate iron, and it would be the same with bar iron; consequently, if railroad companies give us the wheels to put into new iron, they must expect to pay more for the iron produced. That the iron is better there is no question, according to the testimony of the best iron makers in the country.

CAR WHEEL FITTING.

Mr. W. R. Chamberlain, of the Boston and Albany Railroad, said their wheels were bored out at a $\frac{3}{64}$ inch taper, and the axles turned the same and fitted under a thirty tun pressure.

Mr. Adams said that most wheel fitters try to adapt the pressure to the strength of the wheel: that is, if 40,000 lbs. are applied and it is found the wheel will not bear it, the pressure is reduced to ten or fifteen tuns. There are wheels that will stand 75,000 or 80,000 lbs., and not show any signs of fracture, while others will fracture at 25,000 or 30,000 lbs.; but of course this does not affect the question of what would be right. The wheels at the Boston and Albany road shops were fitted at about 50,000 lbs., and they had very few loose ones.

Mr. Adams had noticed that the axles of many cars had abrupt square shoulders of $\frac{1}{8}$ or $\frac{1}{16}$ of an inch, immediately back of the hub. Did not such shoulders make the axles weaker than it would to run them straight back?

Mr. Snow was of the opinion that it would be better to

have no shoulder at all. If there were one, especially on a rolled axle, vibration would almost invariably cease at that point. In a hammered axle, perhaps not so much so. Iron would granulate from vibration, and this was one reason why hammered axles were considered so much better than rolled ones; and he believed that if they were turned down in the middle, better results would be realized from rolled axles.

Mr. L. Garey said the road with which he was connected some eighteen years ago had a good many broken axles, and on examination many of them were found to be turned with a shoulder at the inner end of the hub, while many of them had a slight check at the shoulder. He then had them made without shoulders, and in no instance had they broken at that point, which, to his mind, was conclusive against shoulders at the point he had named. As to tapered wheel fits, he disapproved of them, especially for broad tread wheels running over different gages.

Mr. Chamberlain thought that 99 wheels out of 100 were bored with a tapered hole "after we had done our best," and that a strain was put on the outside end instead of uniformly along the bore. A wheel pressed on at a $\frac{3}{16}$ taper with a thirty-tun pressure will require seventy tuns to press it off again. A great many more loose wheels that were straight came over the Boston and Albany road than there were tapered.

REJECTING DOUBTFUL WHEELS.

Mr. Lobdell, a son of the proprietor of the Lobdell Car Wheel Works, of Wilmington, Del., read a paper written by his father, giving some of the results of his 40 years experience as a car wheel maker. He pressed on his wheels at a pressure of from 30 to 40 tuns, and had never had any complaints of loose wheels. Flange wear was produced by several causes, among which were mistakes in gaging and marking the wheels, and differences in the hardening of the chill. Fewer accidents were caused by broken wheels than by broken rails or other material, because more care was generally bestowed on their manufacture, and they were more thoroughly tested. His practice had been to break up all wheels that were at all doubtful, preferring to break up a hundred rather than run the risk of one doubtful one. Breakage in service resulted from inherent defects in patterns, or from reduction in weight in order to lessen the cost. The defects in the chill, he thought, were not due to the particular kind of iron used, but rather to the manner in which the ore had been smelted, or to want of care. He had got perfect wheels from hematite, magnetic, specular, and other ores, and also from mixtures of ores. All chilled wheels were liable to blotches or blisters, which of late have become more common, especially on tender wheels and others of small diameter. These blemishes, although unsightly, are not dangerous. Some specimens of wheels were exhibited by Mr. Lobdell, which had been broken through the blisters on the tread, showing that the blisters were only surface defects, and that the iron was sound underneath. One of these wheels (28 inch), made of hematite ore, had run 70,000 miles under a 32-tun engine whose speed was 40 miles an hour.

MILEAGE OF CAR WHEELS.

Mr. Washburn, of the Washburn Car Wheel Company, of Worcester, Mass., said that for the last four or five years he had been making wheels of steel, and had not been able to get a satisfactory comparative statement as to the merits of steel and iron. The iron wheels, of all makers varied very greatly. Steel wheels if perfect, he thought, would eventually take the place of iron, and their mileage would exceed that of iron, six or perhaps eight to one, and would average 250,000 or 300,000 miles; while a chilled wheel had to be a good one to average 40,000 miles. A steel wheel costing $50 would have to run from 100,000 to 125,000 miles to be as cheap as an iron wheel that would run 40,000, but probably the average of the latter would not exceed 30,000. He thought a steel wheel would run from 100,000 to 150,000 miles without turning, and would stand turning two or three times before it was worn out. He had wheels now that had run 300,000 miles and were still good.

Mr. Davenport said it had been supposed to be impossible to keep the mileage of anything but engines, but the Lake Shore road had found a way of keeping the mileage of passenger, baggage, mail, and express cars. Each conductor between Buffalo and Chicago reported what cars he took from the beginning of his trip and what cars he left at the end, and there was no difficulty in this way in getting at the mileage. The report on 1st of April last showed that the wheels removed during the previous six months had averaged over 57,000 miles, and the smallest average he believed was 54,000. These were 33 inch wheels that had run under heavy cars at a high speed. The Lake Shore, he admitted, was not as hard a road for wheels as some others. With respect to iron wheels, he had some in mind that had run 200,000 miles and were good yet. He had the means of determining the data himself. Iron wheels will make a large mileage as well as steel wheels; they are not exhausted at 40,000 miles. There may be on some roads bad wheels that make small mileage. He had nothing to say against steel wheels, but he wanted iron ones to have a fair chance. They are capable of being greatly improved, as well as steel.

Mr. Snow said the Ramapo Works sold their wheels to the Pullman Car Company on a mileage basis of 50,000 miles, receiving credit for any excess and standing the loss for those that fell short, and it was a long time since they had paid any losses. He mentioned this merely for the information of those who thought chilled wheels would not make over 40,000 miles. The lowest average for the last six months was about 59,000. He believed wheel makers could do much to improve the quality of their wheels by attention to details.—*National Car Builder.*

Useful Recipes for the Shop, the Household, and the Farm.

Save the scales of the forge (oxide of iron) for use in annealing hard cast iron or steel.

The best way to avoid water pipes freezing and bursting is to have a cock in the cellar, by which the water can be turned off from the entire house.

Rubber rings, slipped over bottles in packing, ensure safety against breakage.

Protosulphate of iron in powder, rubbed up with raw linseed oil, is an antidote for external poisoning by cyanide of potassium.

Leather can be made hard by saturation in a solution of shellac in alcohol.

In taking up belts, the time used in carefully cutting the belt square is always time saved.

Before washing almost any colored fabrics, soak them in water, to each gallon of which a spoonful of oxgall has been added. A teacupful of lye in a pail of water is said to improve the color of black goods. A strong tea of common hay will improve the color of French linens. Vinegar in the rinsing water for pink and green, will brighten those colors; and soda answers the same end for both purple and blue.

To make silk which has been wrinkled appear like new, sponge on the surface with a weak solution of gum arabic or white glue, and iron on the wrong side.

The advantage in tensile strength, when holes are drilled in steel rather than punched, is calculated to be 25·5 per cent.

To test the quality of wool, take a lock from the sheep's back and place it on a measured inch. If the spirals count from 30 to 33 in the space of an inch, it equals the finest Electoral or Saxony wool grown. The diminution of the number of folds to the inch shows the inferiority.

An excellent bronze for small castings may be made by fusing together 95 parts of copper by weight and 36 parts of tin.

Paraffin is the best material for protecting polished steel or iron from rust.

Put hard sand instead of ashes on slippery sidewalks.

The parings of a bushel of apples are said to yield a quart of cider, by the aid of a hand press.

A French meter is about fifty times the diameter of a five cent piece. The same coin weighs exactly five grammes.

A cracked bell which gives a jarring sound may be improved by sawing or filing the ruptured edges so that they are not brought together by the vibration of the blow.

Photographers who use large quantities of nitrate of silver should allow all the excess of silver, acetic acid, and other matters from the plates undergoing development to run into stone jars containing fragments of zinc. By that means the metallic silver may be collected; it should then be digested with dilute sulphuric acid, washed, and dried in an oven, so that quite a large saving may result.

Lead 9 parts, antimony 2 parts, and bismuth 1 part is an alloy which expands on cooling, and which will be found useful in filling small defects in iron castings, etc.

It is said that charcoal will fatten fowls and at the same time give the meat improved tenderness and flavor. Pulverize and mix with the food. A turkey requires about a gill a day.

Lampblack and butter are used to prepare ribbons in hand stamps.

The following is a convenient table for sign painters, or others who have occasion to make lettering. Supposing the hight of the capital letters to be ten, the widths are as follows: B, F, P, ten: A, C, D, E, G, H, K, N, O, Q, R, T, V, X, and Y, eleven: I, five: J, eight: S and L, nine: M and W, seventeen: Z and &, twelve: Numerals: 1 equals five: 2, 3, 5, 7, 8, nine: 4, eleven: 6, 9, 0, ten. Lower case letters (hight six and a half): Width: a, b, d, k, p, q, x, and z, seven and a half: c, e, o, s, seven: f, i, j, l, t, three: g, h, n, u, eight: m, thirteen: r, v, y, six: w, ten.

Glycerin is an excellent coating for the interior of plaster molds.

A strong solution of sulphate of magnesia gives a beautiful quality to whitewash.

Glass can be drilled with a tool moistened with dilute sulphuric acid. This last is better than turpentine.

To wash calico without fading, infuse 3 gills of salt in 4 quarts of water. Put in the calico while the solution is hot, and leave until the latter is cold. It is said that in this way the colors are rendered permanent and will not fade by subsequent washing.

Rancid butter, pork, and lard casks may be purified by burning straw or shavings in them.

White lead rubbed up with linseed oil to the consistence of paste is an excellent application for burns.

Gelatin mixed with glycerin is liquid while hot, but an elastic solid when cold. Useful for hermetically sealing bottles.

To clean cider barrels, pour in lime water, and then insert a trace chain through the bung hole, remembering to fasten a strong cord on the chain so as to pull it out again. Shake the barrel until all the mold inside is rubbed off. Rinse with water, and finally pour in a little whisky.

A piece of paraffin candle about the size of a nut, dissolved in lard oil at 140° Fah., the mixture applied once a month, will keep boots waterproof.

Adding to the width of a belt and of the faces of the pulleys increases immensely the power of conveying force. A wide belt is always better than a narrow one strained to its utmost capacity.

Black cement for bottle corks consists of pitch hardened by the addition of resin and brickdust.

One ounce each of muriate of soda, cream of tartar, and alum, boiled in a gallon of water, gives plate a beautiful whiteness. Dip the article in the mixture, remove, and rub dry.

Soap and water is the best material for cleaning jewelry.

Awnings may be made waterproof by plunging first in a solution containing 20 percent soap, and afterwards in another solution containing the same percentage of copper. Wash afterwards.

A handful of quicklime, mixed in four ounces of linseed oil and boiled to a good thickness, makes, when spread on plates and hardened, a glue which can be used in the ordinary way, but which will resist fire.

A good walnut stain for wood is composed of water, 1 quart; washing soda, 1½ ounces; Vandyke brown, 2½ ounces; bichromate of potash, ¼ ounce. Boil for ten minutes and apply with a brush, either hot or cold.

A piece of alum as big as a hickory nut will render clear a pail of muddy water. Dissolve the alum, stir, and allow the impurities to settle.

The length of the double whiffletree and the neck yoke for a sleigh should be just as long as the sleigh is wide from the center of one runner to the other.

Amalgam Fillings for Teeth.

J. E. E., of Pa., writes as follows: "Having noticed in the SCIENTIFIC AMERICAN several articles on fillings for teeth, I will state a case of my own. In 1854, twenty years ago, in the city of San Francisco, Cal., I had several teeth filled by a dentist. Two of them (front teeth) were rotted nearly half away and fully to the center of each tooth; so that the nerves were exposed, rendering the operation quite painful. The dentist was not quite certain that the teeth could be saved, so he filled them with tinfoil, saying at the time: "If the teeth do not trouble you you can have the tin filling removed, and have them refilled with gold foil." But the tinfoil still remains in them, apparently as perfect as on the day it was put there. I never have received the least trouble from the teeth. One advantage in tin over gold is that it, being nearer the color of the teeth, is less conspicuous, and I believe that it is in every way as good as, if not better than, gold."

Brains.

"No sound working brain," says Oliver Wendell Holmes, "without enough good blood to build it, repair it, and furnish the materials for those molecular changes which are the conditions essential to all nervous actions, intellectual and volitional, as well as those of lower grade. No good blood without a proper amount of proper food and air to furnish materials, and healthy organs to reduce a sufficient quantity of these materials to a state fit to enter the circulation. No healthy organs, strictly speaking, except from healthy parents, and developed and maintained by proper stimuli, nourishment, and use. No healthy parents—no help for it. We are, of course, applying the term healthy to the brain, as signifying much more than freedom from disease. A healthy brain should show, by the outward signs of clear, easily working intelligence, well balanced faculties, and commanding will, that its several organs, if such there be, or its several modes of action, if it works as a whole, are properly developed and adjusted by themselves and in relation to each other."

Raising Almonds in California.

Mr. Olmsted, of Carpenteria, says the Santa Barbara *Index*, has finished picking his crop of almonds. He will have from his orchard this season over five tuns of the Languedoc or soft shell almonds. Mr. Olmsted's orchard is only four years old, and of course is not yet in full bearing. His trees bore a few nuts when two years old. The third year, the average yield to the tree was about five pounds. Two rows in the orchard, covering ground equivalent to two acres, that received great care in planting and special culture, produced 2,000 pounds of dried almonds. This yield, at the wholesale San Francisco market price for the soft shell almond, will give Mr. Olmsted about $230 per acre, after paying all expenses of the year's culture, gathering, sacking, and marketing. Mr. Olmsted keeps the ground clear, cultivating nothing between the trees, nor allowing weeds to grow up to rob them. The trees should be at least twenty feet apart each way.

An Accident in a Lumber District.

On a hillside in Kingston, Tenn., a farmer was cutting logs, and his two little boys were playing near by. The logs, as fast as worked into lengths and trimmed of branches, were blocked with stones or chips to keep them from rolling off down the slope. One of the heaviest became loosened, and began to move, slowly at first, and faster as it gained momentum. The father saw that the younger of the boys was playing, unmindful of the danger, exactly in the path of the immense rolling log, but too far away to be saved by him. He shouted, and the little fellow looked up. The log was then about a hundred feet distant, and increasing rapidly in speed. The boy, dazed by fright, ran straight forward instead of escaping to one side, as he might easily have done. He fled as fast as he could, but the log soon overtook him, rolling over his body and crushing him to death.

To true a corundum wheel, adjust it in the lathe and revolve it very fast, holding a piece of corundum stone against the surface. It is said the piece will melt and unite with the wheel, making the periphery perfectly true.

A well tempered bar spring will lose much of its elastic strength by filing off a very thin scale from the surface.