Useful Information.

Marbled Paper.

This, much used by bookbinders, is produced in a very curious way. The name is not exactly suitable, seeing that few of the specimens are imitations of real marble; but it has gradually become applied to sheets of paper of which one surface is made to imitate any kind of stone or wood. Small brown spots on a light ground, marble veining on a shaded ground, curled patterns and wavy patterns, all are produced in great diversity. The colors are of the usual kind, such as Naples yellow, yellow lake, orpiment, verigris, rose, pink, red lead, carmine, *terra di sienna*, Dutch pink, indigo, Prussian blue, verditer, umber, ivory black, etc.; they are ground up very fine with prepared wax and water and a few drops of alcohol. A solution of gum is made of gum tragacanth, alum, gall, and water, and placed in a trough or shallow flat vessel. Color is thrown on the surface of this gum water, usually by striking a brush against a stick, so as to produce a shower of sprinkles. Pigments of different tints and different thicknesses or degrees of consistency are thrown on; some spread more than others, and thus a diversity of patterns is produced. Sometimes the color is thrown on by means of a pencil of very long bristles; it is diversified by means of a rod, held upright and carried along amongst the colors in a wavy or spiral course; and it is further cut up into tortuous lines by passing a kind of comb along it. All this takes place on the surface of the gum solution in the vat. When the vat is prepared, a sheet of paper is lain down flat on the solution, care being taken that every part of the surface shall be wetted; the paper takes up a layer of paint, fancifully disposed in a pattern or device, and is hung up to dry. In order that one color may not be blended or confused with another, they are ground up with different liquids, some watery, some gummy, some oily. The imitatio s of marble, gray and red granite, and fancy woods, are certainly not very faithful; but the paper is lively in appearance, and remains clean and bright a long time when polished. This polishing is effected by moistening the colored surface of the paper with a little soap, and rubbing it with a piece of smooth marble, an ivory knob, a glass ball, or an agate burnisher. Beautiful products have been produced within the last few years under the name of iridescent and opalescent paper. Like the commoner kinds, these receive colored devices on one surface; but great delicacy and care are called for in the processes to produce the exquisite play of light and shade which suggests the names given to these varieties.—*Practical Magazine.*

Solvent Powers of Water.

Water is a physical rather than a chemical agent in bleaching and dying; it is the vehicle which carries the chemical substance to the cloth to be operated upon, or which removes the matters necessary to be removed from it. When a substance is mixed with water, it may either be dissolved by it, and disappear, as salt does; or, it may remain in suspension, as chalk does. Nothing is considered to be actually dissolved in water if it can settle out again, or if it will not pass with the water through a filter made of paper or calico; thus, to talk of dissolving ground chalk in water, is incorrect; for, if allowed to stand, it would settle out; or, if the mixture were filtered, the water would pass clear, while the chalk would remain upon the calico; but blue vitriol, (sulphate of copper), for example, does really dissolve in water, and the liquor all filters through together; to deprive the water of the blue vitriol would require chemical means different in kind from filtration. Water, therefore, dissolves some substances and not others. Water does not dissolve the same quantity of all soluble substances; of some it can dissolve its own weight, and more; of others a small portion; and of some, extremely little. As a rule, hot water dissolves more than cold; but, upon cooling, the excess mostly falls out as crystals. This point deserves notice; for a liquor, which is of right strength when a little warm, may be too weak when it becomes cold; left in a carboy for example, in a cold place, because the salt crystallizes out; this is the case only with those salts that are but sparingly soluble, as chlorate of potash, cream of tartar, sulphate of potash, etc. The crystallizing is sometimes troublesome in steam colors; which, right enough when freshly made, become filled with small crystals, and rough on the machine; it is felt in the case of an ageing liquor, which contains chlorate of potash as an active agent; which, crystallizing out, leaves the liquor weak and not able to do its work. As a usual thing, the drug room upon a printing or dyeing works should be cool, but there are some liquors better in a moderately warm place; brown vitriol, for example, in winter time, is apt to go solid in the carboys, if kept in an exposed place.—*Am. Tex. Manuf.*

Tests for Alkaloids.—Phosphomolybdiacid has long been used as a test for alkaloids. Phosphotungstic acid has also been recommended for the same purpose, and recently Scheibler has called attention to two new acids prepared by him, the formulæ of which seem somewhat doubtful, but which are excellent tests for alkaloids. The writer has made a few experiments with a solution prepared very easily, by boiling, for a few minutes, common tungstate of soda with half its weight of syrupy phosphoric acid. Quinine gives a distinct milkiness almost immediately in 10,000th dilution, and after 24 hours in 100,000th dilution. Morphine gives the reaction plainly enough in 10,000th dilution, but not in 100,000th. Strychnine gives it quite plainly in 200,000th dilution, as stated by Scheibler. This strychnine precipitate may be used for the chromic acid test, and the morphine and quinine compounds for the ordinary tests for those alkaloids. Bromine water, which can be prepared in a minute, is more handy than chlorine water, and answers just as well, or better, in conjunction with ammonia in the test for quinine; also in the ferrocyanide test. Finckiger has found that it will detect one part of genuine in 20,000 of water. The ferrocyanide test (Vogel's) is not so delicate, detecting the alkaloid in 2,500 parts of water. —*Canad. Phar. Jour.*

Molding Sawdust.—The cement is nothing but glue dissolved in water. In order to prepare the material the sawdust is put in an earthen vessel, boiling water poured on it, stirred up and left to soak for about a week, and again stirring from time to time; then it is boiled until it has attained the consistency of a paste, after which it is put in a coarse cloth and the excess of moisture well squeezed out. This material is then kept ready for use; when wanted a sufficient quantity of thin glue-water is added so as to obtain a paste, which may be pressed into molds, or rubbed into cracks or holes to disguise flaws or other defects in woodwork. When the sawdust of the same wood is used, the work carefully done, well dried and cleaned, the imperfections repaired in this way can scarcely be detected; while the ornaments made differ only in one respect from those made by carving—in not showing the grain of the wood.—*Ex.*

Bursting of Trees and Objects Struck by Lightning.

At a recent meeting of the Manchester Literary and Philosophical Society, Mr. Baxendell suggested that the explosive effect of lightning might be due to the conversion of moisture into steam. At the meeting of that society, Nov. 4th, 1873, Professor Osborne Reynolds, A. M., stated that this suggestion seemed to him so very probable, that he had been induced to try if he could not produce a similar effect experimentally. We give the account of these experiments in his own language.

I first of all tried to burst a thin slip of wood by discharging a jar through it, taking care so to arrange the wood that the discharge should be of the nature of a spark, and not a continuous discharge. This was done by making the wood to form part of a discharging rod, with balls on the ends. This experiment was successful in the first attempt, although the results were on a small scale. It should be mentioned that the wood had been damped with water. This experiment was repeated with larger pieces of wood with various results.

It then occurred to me to try with a glass tube. This I did at first with a very small tube, passing wires from the ends of the tube until they were within half an inch of each other. The small tubes burst both with and without water.

I then used a larger tube (about one-tenth inch bore), using it in a similar manner. The discharge without water produced no effect on this, even when repeated several times, but

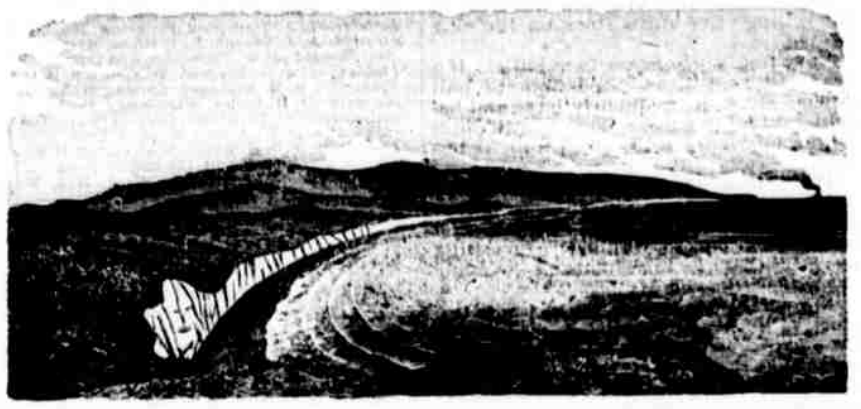

FIG. 1.—The Beach at Gold Bluffs, Looking South.

when the tube was full of water (with the ends open) the first discharge shattered that part of the tube opposite the gap in the wire. This tube was bent in the form of a syphon, and the water stood about one inch beyond the gap in the wire on each side of it.

I then tried a stronger tube which I had been using for insulation. It had a bore of one-eighth of an inch, and was three-eighths of an inch in external diameter. It was capable of sustaining a pressure of probably 10,000, and certainly 5,000 pounds on the square inch; that is to say, a pressure of from two to five tons per square inch. It was about fourteen inches long, and bent in the form of a square-ended syphon. The gap in the wire was about half an inch, and the water extended about one and a half inches on each side of the gap. The ends of the pipe were open, and the jar charged in the same manner as before with about 100 turns of a twelve-inch plate machine. The surface of the jar is about half a square foot, and the discharge, when effected with the common rod, took place through about two inches of air.

This tube was shivered at the first discharge. That part opposite the gap and for some way beyond, is completely broken up into fragments, which present more the appearance of having been crushed by a hammer than of being the fragments of a pipe burst under pressure. Some of the fragments show that the interior of the pipe has been reduced to powder.

These fragments were scattered to some feet on all sides, but there was nothing like an explosion. I held the pipe in my hand at the time of the discharges, and the sensation was that of a dead blow. There was no noise beyond the ordinary crack of the discharge.

The manner in which this pipe was destroyed clearly showed that a larger one might have been broken. But as it was two o'clock and my fire was out, I did not continue the experiments. It is not easy to conceive the precise way in which a pressure of probably more than 1,000 atmospheres could be produced, and transmitted in a pipe of water, the ends of which were open. It might have been caused by the sudden formation of a very minute quantity of steam, or by the expansion of the water; but which ever way it was, its effect was due to its instantaneous character, otherwise there would have been an explosion. When we consider the great strength of this pipe (which might have been used for a gun without bursting), and when we see that it was not only burst, but that the interior of the glass was actually crushed by the pressure, and all this by the discharge of on small jar, we must cease to wonder at the bursting power of a discharge from the clouds.

Improved Button Holder.—The holder consists of two plates of metal which are forked at one end, the space between the prongs being V-shaped. One of these plates has grooves on the inner edges of the prongs, which grooves receive the buttons. This V-shape of the opening adapts the holder for buttons of different diameters. The cloth passes in between the two plates, and is pressed upon the buttons by the prongs of back plate as the two plates are pressed together or toward each other, when the holder is in use, by the fingers of the operator. The button is then sewn on with a needle and thread, in the usual manner. The advantages claimed are that the fingers are not exposed to the needle, and the sewing on is performed with much greater ease.

Sensitive Plants.

A curious action of the leaves of certain plants was first discovered in 1779 by Roth, in Germany, namely, that they behave as if attempting to catch insects by bending over their bodies. Darwin, with his well-known sagacity in taking hold of any fact assisting in establishing the development theory founded by him, makes use of this peculiarity as an argument in favor of the idea that passive plants which have to wait for their food, may have developed into active animals with prehensive mouths, and of which this purely vegetable action is a first attempt of nature in the direction of producing an organism which attempts to eat. After Darwin has enriched our knowledge in this line with many valuable new observations of his own, Bennett comes with new facts, and proves that many plants show this daily while growing in wet moss in our rooms in the summer. But the most important and surprising discovery is that made by Darwin and Bennett both, namely that the leaves of the common round-leaved sundew act differently when different objects are placed upon them. For instance, if a small piece of raw meat be placed upon them in place of a living fly, it will close upon it in the same manner as upon the insect, while in regard to a particle of chalk, or wood, or wool, it will remain motionless, or at least nearly indifferent.

Prof. Asa Gray, while commenting in *Silliman's Journal* upon the paper read by Mr. Bennett before the Bradford meeting of the British Association, says that with us the leaves do much more than curve around the insect or piece of meat; that as well in the Drosera rotundifolia as in the Drosera longifolia the end of the leaf folds over upon the base, and like a shut hand fairly incloses the captured insect or piece of meat.

In order to account for many unexplained habits of supposed unreasonable animals, the word "instinct" was invented, which in fact explains absolutely nothing. Now we see that this so-called instinct is shared by some plants; or have the leaves the organ of taste, so that they can distinguish between the piece of meat and wood? Is there also a consciousness in vegetable organism? or is all matter conscious?—*Manufacturer and Builder.*

Improved Manufacture of Artificial Fuel.

The *Scientific American* says: "The visitor to the coal regions of Pennsylvania, and indeed to all other localities where coal-mining operations are in active and continual progress, will not fail to remark the vast heaps of waste or slack piled in the neighborhood of the mines. It is estimated that, on an average, from forty to fifty per cent. of the entire yield, both of anthracite and bituminous coal, is, through the medium of mining, breaking, screening, and handling, reduced to this remarkable condition, causing loss to the producer and increasing the cost of the staple to the public."

FIG. 2.—Section of Bluff.

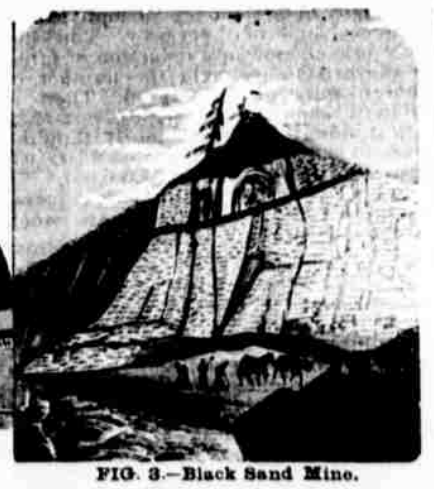

FIG. 3.—Black Sand Mine.

In Fig. 2, A is loam; B, yellow clay; C, yellow gravel; D, sandstone; E, red and yellow gravel; F, sandstone with wood lignite; G, coarse red gravel; H, very fine bluish gravel; I, indurated sand; J, gravel with iron cement; K, sandstone with lignite; L, beach; M, low water mark.

Mr. E. F. Loisean, of Mauch Chunk, Penn., has recently patented a process by which this waste or slack may be made available for fuel. "The composition of the fuel is coal-slack and common yellow clay free from sand, moistened with milk of lime. The manufacture is carried on automatically, the crude materials entering the apparatus at one end and emerging finished and ready for shipment at the other. No labor during the progress of the operation is therefore required, nor does the machine, we are informed, need any attention except to replenish its supply and remove its completed product.

At a recent trial of the fuel under one of the boilers, at the present Fair of the American Institute, we were afforded an opportunity to examine its cohesive quality. The pieces were thrown into a furnace, where very active combustion was in progress; and although allowed to remain there for a considerable period of time, they did not lose their shape or run together. As regards heating power, the inventor considers the same to be equal to the best coal. No unpleasant odor is given off; there is, of course, no slate, and we are assured that clinkering does not take place. The ash, being mixed with clay, is heavy; and hence, where the fuel is used for domestic purposes, does not rise in light clouds, covering carpets, furniture, &c., with dust. The oval shape of the lumps is designed to insure a free draft through the interstices. As to cost, the inventor demonstrates that the material can be supplied at about $1 per ton."

Birds and Cholera.—Can birds scent the cholera infection in the air? Certain well authenticated facts render it not improbable that they can. Recent European journals state that at Munich, where several cases of cholera have occured, the rooks and crows, which before flew about the steeples and through the trees of the public promenades, have all emigrated; and the same thing happened during the cholera seasons of 1836 and 1854. According to Sir Samuel W. Baker, the same phenomena occurred at Mauritius, where the martins, which exist in immense numbers the year round, wholly disappeared during the prevalence of the cholera.

Beach Mining.

Among the many different modes of obtaining the precious metals, the mining operations carried on at Gold Bluffs, where the auriferous sand is gathered from the beach, are something peculiar to California, but outside of the immediate vicinity in which the gold sands are found little seems to be known of the mode of working them.

In 1850 gold was found along the coast line of Klamath county, and the famous Gold Bluff excitement ensued. Since that time the beach mines have been worked at intervals and recently in a systematic manner. Fig. 1 shows a view of the beach at Gold Bluffs. It is found that when the surf breaks square on the beach, it rolls up masses of coarse gravel and black sand, and no gold is visible; but when it cuts the beach at a certain angle, the ocean makes a kind of natural separator, and deposits the rich black sand in spots, from which it can be taken. Thus success in finding the gold depends largely upon the direction of the wind.

Fig. 2 is a sectional view of the bluff, which is similar or nearly so, in stratification all along the auriferous belt. It is evident that the gold is derived from these bluffs, for it can be detected in certain strata, and it has been noticed that after a heavy cave of the banks the beaches are richer and the gold coarser. Attempts have been made to obtain the gold which is believed to be beyond the line of surf, particles of which are said to have been brought up by the leads of vessels, but thus far without success.

In Fig. 3 is presented a view of the mine at the lower end of the bluffs. The sand is gathered and placed in sacks, which are then conveyed by mules to the works, where the washing and amalgamating are performed. The yield varies; but usually the result is found to pay liberally for the labor and expense of collecting, packing and working the sands, and one claim took out $25,000 in one year.

Unestimated.

A gentleman who owns a nice little ranch in San Joaquin valley, and who has always been exact in his accounts, said the other day: "Farming isn't a money making business. Striking an average for several years, I find I have only cleared, above expenses, about $500 a year. A profession or a good trade would pay better."

That farming *is* a money making business would be shown by simply pointing to the number of our wealthy wheat growers, orchardists and stock raisers. These are, it is true, those who farm on a large scale. But they must have commenced more moderately, and it is now beginning to be questioned whether the profits from the big ranches are so great, relatively, as those of small farms thoroughly cultivated. The tendency seems to be as much toward taking in horns and working smaller areas more systematically, as to seek to extend the boundaries. The immense ranchos of early days are splitting up with wonderful rapidity; and this is due rather to an appreciation of the benefits of closer tillage than to any crowding of neighbors. There is plenty of room left.

But the majority are not what are called large farmers. Nearly all make some pretence of keeping regular accounts, and many develop true business ability and habits in this way. In posting their books they are careful to note the cost of land, seed, labor, implements, etc., and the interest on all real property and appurtenances. They scrupulously jot down the exact amounts they receive from the sale of produce and stock, make what they judge to be a reasonable allowance for the subsistence of the family, and then think they are ready to strike a balance—which often turns out disappointingly small. Not in reality, however. There are many returns which invariably escape the ken of the accountant. There are benefits and pleasures too subtle to be expressed in dollars and cents, and many things deemed necessaries in rural life, which are held to be luxuries by city people. But if these do not appear in the ledger, they are none the less felt and enjoyed.

After accusing farmers of an oversight, it would be hazardous indeed to attempt an enumeration of the numberless undetected gains. And we have a warning before us in the confessedly incomplete list of a thoughtful writer in the *Rural Home*, who specifies these points:

1. The rent of his dwelling. If he lived in town, and occupied a tenement suited to his position, provided he retained the same relative position in society, the rent would amount to several hundred dollars a year.

2. The use of his horses and carriages. Every family in easy circumstances expects, of course, to go to church, to visit friends, to attend places of instruction, or amusement, and to visit places of trade, and many of these are too distant for convenient walking for townsmen as well as farmers. The farmer who uses his own team and carriage saves a large bill for livery and omnibus and car fares. This amounts to several hundred dollars a year with families of affluence in cities.

3. Family supplies. We wish every farmer could know the entire value of the food which his family consumes annually, estimated at the prices that townsmen are obliged to pay for similar products. It would go far towards reconciling many discontented farmers to their lot. The single item of wheat flour, at retailer's prices, consumed by an average family, would amount to over a hundred dollars. Then there are cornmeal, buckwheat flour, garden and field vegetables, fruits, milk, cream and butter, eggs and poultry, pork, beef and mutton, lard and tallow, and many other items which help to feed the family and would amount to a considerable sum if purchased.

If a farmer, after balancing his debits and credits, finds but little left to compensate him for his labors, he need not consider that he has labored for nothing. If these unestimated items of income could be properly appraised, we think that they would amount to a very fair salary.

Some one has patented an arrangement of appliances for cleansing metallic plates covered with tin and other metals; the plate is caused by series of rollers, to pass through a casing containing bran or sawdust, on issuing from which any absorbent material which may have adhered is removed by means of brushes suitably arranged. Another gentleman claims improvements in the method of cleaning and polishing tin and other plates. After the plates have been immersed in oil, they are dipped in a hot alkaline water bath, and subsequently passed through a polishing machine, which, by means of rollers supplied with bran, or some other suitable polishing substance, imparts a brilliant finish to the surface.

Tragacanth Mucilage.—The Boston *Journal of Chemistry* adds the following to the many receipts for making mucilage: Take of powdered tragacanth, 1 drachm; glycerine, 6 drachms; water, enough to make in all 10 ounces. Rub the tragacanth in a mortar with the glycerine and then add the water. This will produce a mucilage at once of excellent quality.

Workmanlike Habits.

We have so often urged the great importance and absolute necessity of care in the selection, use and keeping of tools, that perhaps an apology should be made for again returning to the subject. And it is, besides, a delicate topic to approach, with practical men, who will admit almost anything except a want of care in this direction.

There is, perhaps, nothing in which the truth of the old adage, that the best are the cheapest, is more visible than in farm implements. The dearest are not necessarily the best, by any means; but where one gets the real money value in buying tools, it is well, in selecting those which are intended to be used for several seasons, to be sure that the material and workmanship are such as will render them lasting. There are certain things of which it is said that they improve as they grow older. In spite of the disparaging remarks made about old hoes, every farmer who has intelligently observed will bear witness to the increased efficacy of a hoe that has grown venerable in honorable service, not nicked and bent, but worn thin and keen by careful use and repeated sharpenings.

Only a few days ago we had occasion to borrow a pen-knife. It was a knife which had evidently done good work, was from a good maker, and though each of the blades was worn completely out of the original shape, was very sharp and serviceable. It was natural enough to remark to the owner: You are in the habit of using tools? And the reply was that he had an amateur carpenter shop of his own. Now it is a small matter to keep a knife in working order, but the trait proves that a man who does so may be counted on for promptness and neatness in all he undertakes.

Machinery deteriorates, in most cases, more rapidly from disuse and want of care than when in constant employment. For this reason it is considered expensive to allow a quartz mill or a factory to lie idle. When in use the metallic parts are kept from rust and the wood from rotting. There is no reason why equal care should not be taken, when tools are laid aside.

Whether it be in the rainy or in the dry season, agricultural machines and all tools should be placed under cover. The blaze of the sun is almost as prejudicial as soaking from rain-water, but the two alternated will soon show their effect. All farmers know this, but how few take the trouble to put their knowledge into practice. It is one thing to believe, but quite another to prove faith by works. Ploughs, when done with for a time, should be thoroughly cleaned and then treated to a good dose of grease or oil—it does not matter which. Linseed oil applied to wood will render it very hard and tough, and has the peculiarity of forming a kind of impermeable varnish over metal, but is rather too costly for rough use. Crude petroleum is about as cheap as anything, and very effective. When the main labor of planting is over, the harvesters and threshing machines should be put in order for summer's work. Every surface of wood or metal should be looked to, and painted or oiled, as the case may be, and the requirements are. Finally everything that has an edge, from a chisel to a hoe, should be kept as sharp as it can be made. All farmers are in a measure carpenters, and they should borrow from the latter the maxim that there is no greater economy of time and labor than to bestow these in placing and keeping tools in condition. With good tools, good work.

More About Boiling Potatoes.

[From the Pacific Rural Press.]

Editors Press.—I noticed an article in your issue for January 17, 1874, on the subject of boiling potatoes, and being by birth Irish could not, of course, let it pass. Mrs Stowe's method is bad. But that of the *Saturday Evening Post* is still worse, and the writer of the latter article is certainly not Irish, because every Irishman or Irishwoman knows that potatoes steeped in water for ten hours would spoil, were they the best ever grown. I have cooked and have seen potatoes cooked in every form known to the culinary art, and the following is the best method I know of: Take your potatoes from the bin, wash them clean, pare them as thin as you can—but don't wash them after peeling. Now put them in the pot and cover them to the depth of half an inch or so with cold water, throw in some salt and a piece of fat pork. Put on a brisk fire, boil quickly, serve hot—and tell us the result.

M. T. Evans.

Our correspondent is, we think, right, about about the over-soaking. But the writer in the *Post* did not name ten hours as a necessary time—*two* were specified, with the added explanation that ten, by which is simply meant an indefinitely longer time, would answer better for the purpose intended, that is, to get rid of the acrid principle. But in succeeding in this aim the *Post* writer, as our correspondent hints, would lose elsewhere.

Vessel for Transporting Grain in Bulk. Cross-stays are placed about half way between the deck and the bottom of the vessel, and are connected for the support of the sides. Stanchions are placed on each of the cross-stays, supported at right angles with the deck, and have partition boards upon each side, which divide the portion of the hold above the cross-stays into three compartments. The partition boards on the inside of the stanchions extend from the deck about one-third the distance to the stays. Those attached to the outer sides of the stanchions extend from the cross-stays upward a short distance above the lower edges of the inner partition boards, so that the two boards of each set of stanchions lap past each other. The compartments are connected by the spaces between the stanchions, so that the grain may pass over the outside partitions from the outside compartments, and under the inside partitions into the central compartment. This is done as the vessel rolls and is careened. The result is, the central compartment is soon filled after the vessel commences to roll, and the grain in that compartment is retained. By this improvement, shifting of cargo, it is claimed, is so prevented that no damage can occur, and the vessel is navigated as easily as it is when laden with immovable cargo.

New and Important Uses of the Osage Orange.—The osage orange has become a familiar shrub in this and many other States of the Union as a hedge plant; but according to the report of the Agricultural Department, it is now proposed to utilize it for other and very important purposes. A decoction of the wood is said to yield a very beautiful and very permanent yellow dye; and this decoction, carefully evaporated, forms a bright yellow extract called aurantine, which may be used in imparting its color to fabrics. In addition to this coloring-matter, the wood of the osage orange is rich in tannin. Experiments made in Texas represent that hides are tanned quicker with the wood of this tree than with oak bark. The seeds yield a bland, limpid oil resembling olive oil, and which may in general use be substituted for it.

A new packing for stuffing boxes is made of sawdust mixed with talc, plumbago, plumbagine, black-lead, or other like substance. The saw dust must be well sifted, and that from white wood cut with the grain is preferred.