Communications.

Manufacture of Tobacco.

To the Editor of the Scientific American:

Your answer to J. W. F., who asked how the raw taste of tobacco can be removed, is a wilful insult both to the tobacco user and to the manufacturer. He has a reputation to preserve as well as the sugar refiner, or the baker, or any other man. In the manufacturing of chewing tobacco the leaf is taken out and carefully examined, and all dirt removed; then it is put in large bins, where it is sprinkled with a sirup made of best brown sugar and licorice; after it becomes partly dry, it is made into rolls, then taken to press.

If G. W. F. wishes to manufacture his own chewing tobacco, let him first get some green hickory or sugar maple, cut into small logs, say two or three feet long and from five to eight inches diameter, then with a large auger bore holes three parts through. Make a stick of hard wood to fit the hole easy; leave it a little longer than the depth of the hole. This stick is to be used for a rammer. Wash your tobacco clean, let it dry or nearly so, remove stems and all bad portions, stuff it into your logs hard; the tighter it is rammed the better. When nearly full make a plug and drive it in so tight that it will keep out all outside moisture. Pile up your logs in the woodshed or some place where they will not be exposed to the weather or the wet ground. After stuffing your logs let them rest for about two weeks, then examine for the ones that show a tendency to split. Take the ax and cut open. If you open only one log at a time, as you need the tobacco, it will keep good for years. If you keep the air from it the last plug will be better than the first. The wood sap will give it a pleasant flavor. If you wish to make it sweeter, make a sirup of 1 lb. sugar to ¼ lb. licorice, boiled in two or three gallons of water. Sprinkle lightly and toss well.

Mansfield, Pa. ALEX. THOMPSON.

Bees and Hives.

To the Editor of the Scientific American:

Since the appearance of my communication in SCIENTIFIC AMERICAN of April 21, many of your readers have written me for more definite information in reference to certain points connected with bee-keeping, and with your permission I will answer through the columns of the SCIENTIFIC AMERICAN. The information asked comes under the following heads:

First, The distance bees will go to collect honey.

Second, Is it necessary to provide food for the bees?

Third, A more particular description of the hive I use.

Fourth, How to prevent loss in winter.

Fifth, How to prevent the ravages of the moth.

First, then, as to the distance bees will go to collect honey. There has been much speculation in reference to this point, and many conflicting opinions advanced. As I was the first to obtain the Italian bee in this section (none of this variety, at that time, within twenty miles of mine), I decided to investigate thoroughly, during the honey season, and the result was I found the Italian bees seven miles from their hives, collecting honey. The great difference in color of the Italians from the native bees rendered it a very easy matter to trace them. I think the native bees, being smaller, do not go as far for honey as the Italians. It is not so easy, however, to determine, as there are some of the native bees in every section, which renders it very difficult to trace, from any one apiary; but from what evidence I have been able to obtain bearing upon this point, I think it safe to say the natives go five miles at least to collect honey. There are many amusing traits in the habits or instincts of bees. If a hundred hives are ranged side by side with the entrances not more than two feet apart, and the bees leave such hives in quest of honey, they return by thousands every hour, yet not one fails to enter its own hive if unmolested. But if the hives are changed so that bees enter other than their own hives, they are immediately slain and cast out of the hive. There are traits in the nature of bees which seem to be akin to reason as manifested in the human family.

It is not absolutely necessary to furnish food for bees. The myriads of flowers in forest and field afford honey in great abundance. Some of the principal sources of honey are clover, buckwheat, basswood, fruit flowers, red raspberry, catnip, etc. Yet under my system of management I find it profitable to furnish my bees with nearly all the food they require for their own use. I have constructed a feeder on entirely new principles, so I can put each stock in its own hive, and so that all the bees of the hive can have access to it, and not a bee from any other hive reach it. The food I prepare for them costs only about seven cents per pound, and meets all the wants of the bees as well as honey collected from flowers. By this arrangement I furnish nearly all the food my bees require for their own use, and thus secure as surplus all the honey the bees gather from flowers throughout the season, which is a great increase over the amount otherwise obtained. As the bees consume a great deal of honey in rearing their young, constructing combs, and for their own daily wants the year round, with my arrangement I have had a swarm of bees take from the feeder, in one hour, over a gallon of food, and store it in combs in the hive.

It is hardly possible for me to describe the hive I use, on paper, with sufficient accuracy as to give a correct idea of all its parts; it must be seen to be fully understood. I will, however, give a general description of some of its leading points, and here let me say that I have no objection to any one using it who wishes to do so, and if I possessed sufficient skill I would describe it so that every bee keeper could construct one for his own use. The central portion has six movable comb frames suspended on rabbetings on the ends; this section will hold about 40 lbs. of honey, and is for the permanent occupancy of the bees; here they build their combs, in the movable frames, here they rear their young and store up sufficient food for their own use. At the sides and top are arranged thirty small glass boxes, in which the bees store their surplus honey. Each box holds about 4½ lbs., and gives the honey in the best possible shape for market. The boxes are so placed in connection with the hive that in entering them the bees are not obliged to pass through any partitions, but pass directly to the boxes. These boxes when filled are removed, and empty ones substituted in their places. They are so arranged as to be removed separately or collectively. A ventilator is arranged for winter use, so that the bees winter in perfect safety on their summer stands. In connection with straw packing, I consider the use of this ventilator renders bees safe in any climate.

As to the bee moth, a strong stock of bees is never injured by this pest; bee keepers who keep their bees strong and in a healthy condition will find no trouble from this source. Stocks must first become weak and diseased from some cause before they will be injured by the bee moth.

Bee keeping is a very profitable occupation when managed on correct scientific principles. Great progress has been made within the past twenty years. I know of scme bee keepers in New York State that keep upwards of 300 stocks, and some years sell more than seven thousand dollars worth of honey.

West Gorham, Me. MRS. L. E. COTTON.

Architectural Science Class.

ELEMENTARY REPLIES.

QUESTION.—*Describe different materials used by painters. Describe ingredients of color.*—The materials used by painters are paints, oils, driers, stains, varnishes, etc. Colors or paints may be divided into five classes, according to their principal ingredients. Lead paints, most commonly used, have white lead or carbonate of lead as a basis. This material is ground up in oil in a stiff paste. Linseed oil, with litharge or other driers, and sometimes turpentine, are added to it to form the paint ready for use. The required tint is obtained by adding to this the proper coloring pigment. The exact proportion of ingredients is regulated by the nature of the work, climate, etc. Red lead enters into the composition of the priming coat because it is a good "drier," and sets "hard." Linseed oil is used as a medium for applying the paint; it fills up the wood pores, and acts as a preservative. Turpentine makes the paint easier to work, and more liquid, but it plays no part in the preservation of the wood, as the greater part evaporates. Driers are mediums to cause the contained oil to dry and set quickly. Various materials are used, as litharge, sugar of lead, etc. Zinc paints have zinc oxide as a basis. Silicate paints are manufactured from almost pure silica, which is not acted upon by any metal or acid—in fact, is almost indestructible. This kind possesses the advantages of great durability, has no galvanic action when applied to iron, as in the case of lead paint, and does not tarnish by the action of gases. Colors are made same as the lead paints, and are mixed in the same way. Oxide of iron paint acts as a good preservative for ironwork. Bituminous paints are used for a similar purpose, and for rough carpentry. Stains are mixtures used to darken wood to the color of the imitated wood. Varnishes are of various kinds—copal, etc.—and are used to preserve the paint, and give a gloss to the finishing coat.

QUESTION.—*Describe the process of common painting wood and ironwork.*—Woodwork is prepared for painting by brushing over all resinous knots with a thin coating of knotting (a compound of shellac dissolved in naphtha) or gold size, to confine the resin, and prevent it running under the paint. The priming is then laid on, any plain color, well worked into the pores of the wood, with and across the grain; when this is dry, the stopping is done. All nail and brad holes, etc., must be well filled up with putty, and lightly rubbed off with glass paper. The second and following coats are applied with more care, brushed with the grain, and the work covered equally everywhere, showing no tool marks or running edges. If the last coat is to be light, the second and third should be similar in color, and if it is to be finished dark, dark color must be used for the previous coat. Ironwork should be cleared free of all rust, oil, or grease before painting. A good first coat is color made up with red lead; the other coats may be similar to that used for wood. Iron being almost non-absorbent, three coats are sufficient for new work, unless in very exposed situations, and for the same reason, care must be taken, especially in ornamental work, not to fill up the fine lines of leafwork, etc., by using too much paint, as the character of the work would thereby be injured. It is not so much a thick coat as a thorough one that is the best protection.

QUESTION.—*In coloring walls what precautions should be used?*—The walls should be thoroughly dry. In coloring walls the coats should be carefully laid on and smoothly, each coat being rubbed slightly with sand paper before applying the next. The "flatting" or finishing coat should be made a few shades lighter than the pattern, as it darkens in drying. Japanner's gold size, if used, should be applied quickly, as the turps evaporates quickly, leaving an indelible glossy surface. A certain time should be allowed between the coats, the drying of the same depending upon the quantity of driers used, the weather, and temperature of the apartment. To expedite the work, new walls are generally "distempered" when not dry enough to receive the permanent decorations. Distempering is a kind of painting with color prepared with size or some other glutinous substance. In distempering, the walls must be dry and free from damp; if not, at the completion will be shown all the defects. Two or three coats should be applied, in order to obtain an even color.

ADVANCED REPLIES.

QUESTION.—*Explain the theory of coloring.*—The accepted theory is that there are certain colors that cannot be produced by any combination of other colors. They are termed primaries, because all other colors can be obtained by mixing them in certain proportions. The primary colors are red, blue, and yellow. Some authorities substitute green for yellow. Secondary colors are derived from mixtures of the primary colors in pairs—as violet from red and blue, orange from red and yellow, and green from yellow and blue. Tertiary colors are produced from secondaries—as citrine from orange and green, etc. White and black are usually considered neutrals. To secure "harmony of colors" they must be equalized to the varying proportions shown in the solar spectrum—the three primaries being used either in their purity or compounded. The eye being constructed to see white light, when looking on a colored surface, it is best pleased by a contrast. Contrasting colors to harmonize should be mutual complementaries of each other—making up the full complement of colors contained in the solar rays. The complement of any primary—say, red—will be the secondary compounded from the other two primaries—as green from blue and yellow—red will thus harmonize with green, blue with orange, and yellow with violet. The best proportion for mixing primaries, so as to harmonize, is; red, 5; blue, 8; and yellow, 3. The latter is the most vivid, and should obtain a prominent position. Blue is least vivid and retiring, and should be kept in the background—red to be used as an intermediate color.

QUESTION.—*Describe the proper mode of painting wall surfaces.*—To paint wall surfaces properly often five coats are necessary; but if the plaster be not very absorbent four will be sufficient. If the work is required without gloss the last coat is mixed with turpentine only, which is called flatting; if the work be not flatted the finishing coat is two of turpentine to one of oil. For the priming coat boiled oil should be used, then the three coats of white lead and oil, or more if required; generally the first coats should be some shades darker than the finishing coat. The proper drier to be used for walls is sugar of lead, and in painting wall surfaces great care should be used in selecting the very best quality of oils and white lead—the older the oil the better.

QUESTION.—*What is the best paint for ironwork?*—The best paint for ironwork is either the oxide of iron paint, known as the Torbay paint, or the silicate oxide paint, both consisting of oxide of iron and silicious matter, to which any color may be added and applied in the usual way. They can be applied even after the surface has commenced to rust, as from their nature they amalgamate freely with the rust, forming an impervious coating adhering well to the surface, and yet sufficiently elastic to prevent cracking when the iron expands or contracts under variations of temperature. Bituminous or tar mixtures, thinned with linseed oil, are well adapted for ironwork, especially when they can be applied hot, or to the heated surface of the metal, so as to insure a firm adhesion by entering the pores. A mixture of silicate oxide with tar also forms a good durable coating on iron. When ironwork is to be painted with ordinary lead paint red lead should be used. The adhesion of such a coating on ironwork can seldom be depended on in consequence of the non-porous surface. This is further prevented by the galvanic action that sets in between the iron and lead. Galvanizing, or coating the surface with a preparation of zinc, is also frequently resorted to as a preservative. With all such coatings the surface must be perfectly clean and free from rust. It is advisable, so as to prevent rusting, that all ironwork should be coated with some preservative soon after it leaves the mould, forge, or mill.—*Building News.*

Converting Iron into Steel without Melting.

The known processes for transforming iron into steel (refining by the oxygen of the air, or the Bessemer method, or Reaumur's method, improved by Siemens, Martin, and others), ingenious as they are, do not and cannot give but imperfect intermediate compositions between the castings of true iron and steel. Although of undoubted utility and low in price, these products are not applicable to any of the manufactures requiring fine steel. To overcome these defects, and to give to the metals the requisite qualities, Messrs. Kraft & Julien-Sauve Fils, of Paris, subject them for some hours to a red heat in a retort filled with carbonaceous matter, over which is slowly passed a current of azote of carbonic oxide, and of various carbonated hydrogens. They introduce wood, vegetable charcoal, peat, coke, or any kind of vegetable materials, very dry, and heated to a temperature of about 50°, into a hydrocarbon oil of any kind (such as the heavy oil of schist), which is also heated to the same temperature. This latter is absorbed in the proportion of from 12 to 15 per cent, and they form with bars of Bessemer metal, Martin metal, or any other product arising from the refining of cast metal, as above mentioned, alternate layers, the whole being enclosed in a vessel, similar to a gas retort and of desired form, and heat gradually to a red heat.

By these means the excess of oxygen that is contained by the vegetable materials in presence of the vaporized hydrocarbons is transformed into carbonic oxide, and their azote into ammonia, in such wise that the metals under treatment are immersed in a gaseous medium, which is allowed to be the best for the purpose of converting them into fine steel.

Now, as it may occur that before this absolute conversion the productive source of the gas may be exhausted by distillation, they provide against this inconvenience by passing through the apparatus a current of carbonic acid or carbonic oxide mixed or not with azote. When they obtain this gaseous mixture from the products of the combustion of the furnace which serves to heat the apparatus, they separate from it its free oxygen, and change it to carbonic oxide by causing it to pass over carbonaceous matter heated to red heat before it is passed to the metals. In the Siemens, Ponsard, Muller, and other retorts, the principle of which consists in the gasification of combustibles, they give a mixture of the gases, which they employ equally to the heating of the apparatus as to the transformation of the metal to steel. The gas which escapes from these furnaces also serves for this double purpose. When, on the contrary, they obtain this gaseous medium by direct calcination of limestone, or the mixture of this with other carbons, the gaseous products (carbonic acid and carbonic oxide) are passed directly into the apparatus containing the layers of charcoal and metal. They obtain at the same time from the lime, which they may convert into pyrolignite of lime, the little pyroligneous acid which separates equally from the wood as from the hydrocarburetted peat during the heating to red heat, and which they take care to collect as is ordinarily done in the distillation of wood.

It will be understood that the mixed gases produced and composed in and that have passed through the apparatus may on their passage therefrom be collected in a gasometer to be again used for the same purpose, or passed under the furnace of the apparatus, where they will be utilized as combustibles. If the products prepared according to their process are melted, cast steel of the finest quality will be obtained, and by these means they may obtain without melting steel of the first quality for the manufacture of files and other articles from Bessemer metal, Martin metal, and generally from all metals which are obtained from castings, either by refining with the oxygen of the air, or by refining by reaction. In addition to the steel they obtain simultaneous and at will, from the lime, the ammonia, and the pyroligneous acid, tarry hydrocarbons, which they use over again, and wood or peat charcoal of denser quality than that used originally, not only fit for domestic purposes, but for use in metallurgy.

If cast iron particularly acted upon, and if this cast metal heated to red heat is exposed in a retort to a current of carbonic acid alone or mixed with air, it will be transformed into steel, and the gas will become carbonic oxide, which in passing into another retort charged with Bessemer metal at red heat will effect the conversion of this metal into fine steel, and will itself be converted into carbonic acid. Thus the carbonic acid (CO_2) raised to the casting its excess of carbon (C) is transformed into carbonic oxide (2CO); this passing over the iron of the Bessemer metal and the like will give up the carbon (C), and will return to the state of carbonic acid (CO_2). From this a given volume of carbonic acid gas being given enclosed in a gasometer they may, by passing this gas in the retorts heated to red heat and charged, the first with cast iron, the second with Bessemer metal, the third with cast iron, and the fourth with Bessemer metal, and thus in succession (provided that the series commencing with cast iron terminates with one or two retorts charged with Bessemer metal) transform the whole of the metal into steel, and on collecting the gas in a second gasometer the same operation may be recommenced, and so on indefinitely. If the passage of the gas takes place in a converter charged with melted cast iron, the transformation of the casting is more regularly and easily done, and with less loss of iron.

A FIRE ESCAPE ACCIDENT.

A distressing accident occurred at the Astor House, New York, just across the way from this office, recently, through the breaking of a fire escape while the owner and exhibitor of the same was endeavoring to lower himself from a lofty window. The apparatus known as the Kenyon Fire Escape consists of a wire rope $\frac{3}{16}$ inch in diameter, one end of which is secured within the room. The other end is wound on a drum, which is provided with brakes and arranged in connection with a stout belt, so that by regulating the brakes the wearer of the belt can cause the wire slowly to unwind and thus may lower himself in safety. The exhibitor, Mr. S. E. Hardman, of Providence, R. I., attempted to do this, but some part of the apparatus became inoperative; and in endeavoring to fix it, he brought some sudden strain on his rope so that it broke at the point where it turned over the sharp edge of the window sill, causing the unfortunate man to fall headlong to the pavement beneath, killing him instantly.

The failure of the wire rope simply indicates that it must have been of poor quality. Had a single wire of steel or even iron been used, the tensile strength would have far exceeded any strain which one person descending could have put on it. As it is, probably deterioration of the metal, coupled with the abrasion by the sharp stone edge of the window sill, determined the break. The casualty only goes to show another source of danger which should be provided for by making lowering ropes not only abundantly strong but also by applying to them means of protect ing them from accidental injuries. In general, however, we do not think the portable fire escape problem is by any means solved yet. There is still an excellent opportunity for inventors to devise some system which shall be absolutely safe and certain in its action, and at the same time shall require nothing or nearly nothing to be performed by the presumably thoroughly frightened person whose life it is designed to protect.

Artificial Gems.

What we popularly call paste is technically known as strass; this is also the French word for the same substance (from M. Strass, its reputed inventor). Paste, then, is a material with which diamonds are imitated, and by mixing up with it metallic oxides of various kinds, colors in great variety are imparted to the paste, by which it serves as a representative of the various colored gems. Strass is prepared, according to the method of M. Donault, who has attained great proficiency in this art, from silica, potash, borax, and oxide of lead, and sometimes arsenic. Rock crystal and flint consist almost entirely of silica; but as flint generally contains a little iron, the silica obtained from it is liable to have a tinge of color, which is detrimental to the fidelity of the imitation; rock crystal is therefore employed.

The crucible in which the materials are melted claims particular attention, since, if the substance of which it is formed contains metallic particles, color would be imparted to the strass. Hard porcelain and Hessian clay are the best materials for this purpose. When the crucibles are supplied with the proper quantity of ingredients, they are placed in a porcelain furnace, where they are exposed to a steady heat for twenty-four hours, and then allowed to cool very slowly, so that a kind of annealing goes on. By this means is produced a strass, or paste, which, after passing through the hands of the lapidary, who gives it the form necessary for "setting," presents us with an imitation of the diamond.

Having once produced strass which imitates diamond, all the other gems may be imitated, by mixing with strass various metallic oxides and other substances, according to the color which it is desired to produce. Herein is manifested great diversity of opinions, different experimenters advocating different modes of procedure and different ingredients. One experimenter recommends the following ingredients: To imitate topaz, add glass of antimony, precipitate of Cassius, and oxide of iron, to the white strass; for ruby, add oxide of manganese; for emerald, oxides of copper, iron, and chromium, and acetate of copper; for sapphire, oxide of cobalt; for amethyst, oxides of manganese and cobalt, and precipitate of Cassius; for beryl, glass of antimony and oxide of cobalt; for garnet, glass of antimony, precipitate of Cassius, and oxide of manganese.

M. Donault has given directions somewhat different from the above; but we need not particularise them, as it would carry us into too minute details. We may, however, mention that he produces the imitative rubies by a particular treatment of the composition employed for topaz. This composition is 1,000 parts of strass to 40 of glass of antimony and 1 of purple of Cassius; at a certain stage of its preparation it affords an opaque mass, translucent at the edges, and affording thin laminæ of a red color. A part of this opaque topaz matter, added to 8 parts of strass melted in a Hessian crucible, and left 30 hours in a potter's furnace, affords a beautiful yellowish crystal. If this crystal be remelted by means of a blowpipe, it produces a strass nearly equal to the finest Oriental rubies. The art of producing imitative gems, ingenious as it is, is necessarily a confined one; for as soon as faithful copies of certain jewels are obtained, the object of the art is attained. The object is to deceive the eye; for, as M. Dumas remarks, "the most perfect description of strass, if it imitate no particular and identical gem, has no value, because it deceives nobody." There is a less perfect but a curious mode of producing artificial gems, with what are called doublets, by a process of cementation. The artificial gem consists, in this case, of two pieces of white transparent glass, or of crystal, which is cut into two pieces, conjointly so shaped that both together present the external form of the gem about to be imitated. A transparent cement is then formed of Venice turpentine and mastic melted up together in certain proportions, and to the mixture is added a portion of some coloring matter, according to the nature of the gem. Carmine, crimson lake, Prussian blue, verdigris, dragon's blood, Spanish annatto, etc., are employed, either separately or mixed one with another, until the required tint is imparted to the gummy mixture.—*British Trade Journal.*

The Manufacture of Mosaics.

The modern process of making mosaics now commonly followed at Rome is this: A plate, generally of metal, of the required size is first surrounded by a margin rising about three quarters of an inch from the surface. A mastic cement, composed of powdered stone, lime, and linseed oil, is then spread over as a coating, perhaps a quarter of an inch in thickness. When set, this is again covered with plaster of Paris rising to a level with the margin; upon which is traced a very careful outline of the picture to be copied, and just so much as will admit of the insertion of the small pieces of smalto or glass is removed from time to time with a fine chisel. The workman then selects from the trays, in which are kept thousands of varieties of color, a piece of the tint which he wants and carefully brings it to the necessary shape. The piece is then moistened with a little cement and bedded in its proper situation: the process being repeated until the picture is finished; when the whole, being ground down to an even face and polished, becomes an imperishable work of art. The process is the same for making the small mosaics so much employed at the present day for boxes, covers, or articles of jewelry; and this work is sometimes upon almost a microscopic scale.

The Florentine mosaic, which is chiefly used for the decoration of altars and tombs, or for cabinets, tops of tables, coffers and the like, is composed of precious materials in small slices or veneers; and by taking advantage of the natural tints and shades which characterize the marble, the agate or the jasper, very admirable effects may be produced in imitation of fruit, flowers, or ornaments. The use of this kind of mosaic is extremely restricted, on account of the great value and expense not only of the materials, but of the labor which is spent upon them. None but the hardest stones are used; every separate piece must be backed by thicker slices of slate or marble to obtain additional strength; and every minute portion must be ground until it exactly corresponds with the pattern previously cut.

Formic Acid as an Antiseptic.

The number of antiseptics is now so considerable that it seems almost hazardous to wish to increase it. Each new antiseptic that appears is extolled as the only saviour, and page after page of testimonials proves its excellence and infallibility. As the people may easily be distracted if every "discoverer" pours forth the abundance of his paternal joy over his offspring, which is frequently far from ripe, it is easy to see that the series of experiments made without prejudice by disinterested persons are of great value. In these experiments, made and published recently by Bidwell and others, they overlook, says G. Feyerabendt, one substance which for certain purposes cannot be replaced by any other, namely, formic acid. He does not lay claim to priority, for Dammer, in his excellent dictionary, mentions its antiseptic properties, nor is he a manufacturer of the article; so he does not speak in his own interest, but in that of the subject.

In acid solutions, formic acid far surpasses carbolic acid, and is especially adapted to the preservation of fruit syrups. Experiments made by Feyerabendt in his own household for two years have, without exception, been crowned with success. He has two jars of pickles made with vinegar and sugar from the year 1875, that have only been covered with a loose glass cover, yet they have preserved their freshness and show no trace of mould or decay. The taste of formic acid is pure, acid, and pleasant, the price low, and its use very simple. He has employed from $\frac{1}{4}$ to $\frac{1}{2}$ per cent of it in vinegar, fruit juice, glue, ink, etc., and is convinced that even smaller quantities will answer the purpose.

He especially seeks to excite the attention of housekeepers, and feels confident that they will be satisfied with the results and introduce formic acid as a good and true friend in pantry and kitchen.

Ordinary formic acid is made by heating together to 110° C. equal parts of dry oxalic acid and glycerin, until no carbonic acid is evolved. The pure concentrated acid is obtained by decomposing the formate of lead by sulphuretted hydrogen, and might contain lead.

The Oregon Silver Mud.

Professor Silliman of New Haven informs us that the alleged argentiferous mud of Wasco county, Oregon, an account of which we recently copied from the *San Francisco Examiner*, is a fraudulent production. As regards the form in which the silver was added, Professor Silliman says that the metal in the sample analyzed by him was spongy, in a gray powder, and generally in the condition in which silver appears when reduced by zinc. An authentic example from the locality, obtained by a trustworthy correspondent of Professor Silliman, yielded no silver whatever.

Coloring Zinc Roofs.

Among recent German inventions is a simple process, depending on the use of acetate of lead, by which every kind of color is applicable to sheets of zinc. By mixing black lead, for instance, with the salt, a very agreeable light brown hue is obtained. It is by this process that the cupola of the synagogue at Nuremberg has been painted. A sufficient length of time has already elapsed, it is said, to show that the atmosphere has had no influence on the zinc sheeting of the roof, thus showing the practical value of the process in such cases. By the addition of other coloring matters, light or dark shades of yellow or gray may be produced.

A Large Steam Pump.

Messrs. Cramp and Sons have now completed, with the exception of the boilers, the immense steam pumping engine which is intended for the Frankford Water Works, Philadelphia. The entire machinery will be ready to go into operation by October 1. This engine was built at the contract price of $46,000, and has a pumping capacity of 10,000,000 gallons per day. It is a double cylinder engine, the smaller cylinder being 40 inches and the other 60 inches in diameter. The pumps are 21 inches in diameter, and five feet stroke. The Frankford reservoir has a capacity of 36,000,000 gallons, to which have been run a 30 inch pumping main and 20 inch distributing main. There will be three boilers, two of which will furnish steam for 500 horse power. The third boiler will be held in reserve for emergencies.