### Stained Glass.

When certain metallic oxides or chlorides ground up with proper fluxes, are painted upon glass, their colors fuse into its surface at a moderate heat, and make durable pictures, which are frequently employed in ornamenting the windows of churches as well as of other public and private building. The colors of stained glass are all transparent, and are therefore to be viewed only by transmitted light. Many metallic pigments which afford a fine effect when applied cold on canvas or paper, are so changed by vitreous fusion as to be quite inapplicable to painting in stained glass.

The glass proper for receiving, these vitrefying pigments, should be colorless, uniform, and difficult of fusion; for which reason, crown glass, made with little alkali, or with kelp is preferred. When the design is too large to be contained on a single pane, several are fitted together, and fixed in a bed of soft cement while painting, and then taken asunder to be separately subjected to the fire. In arranging the glass pieces, care must be taken to distribute the joinings so that the lead frame-work may interfere as little as possible with the effect.

A design must be drawn upon paper, and placed beneath the plate of glass; though the artist cannot regulate his tints directly by his palette, but by specimens of the colors producible from his palette pigments after they are fired. The upper side of the glass being sponged over with gum-water, affords, when dry, a surface proper for receiving the colors, without the risk of their running irregularly, as they would be apt to do, on the slippery glass. The artist first draws on the plate, with a fine pencil, all the traces which mark the great outlines and shades of the figures. This is usually done in black, or, at least, some strong color, such as brown, blue, green or red. In laying, on these, the painter is guided by the same principles as the engraver, when he produces the effect of light and shade by dots, lines, or hatches; and he employs that color to produce the shades, which will harmonize best with the color which is to be afterwards applied; but, for the deeper shades, black is in general used. When this is finished, the whole picture will be represented in lines or hatches similar to an engraving finished up to the highest effect possible; and afterwards, when it is dry, the vitrifying colors are laid on by means of larger hair pencils; their selection being regulated by the burnt specimen tints. When he finds it necessary to lay two colors adjoining, which are apt to run together in the kiln, he must apply one of them to the back of the glass. But the few principle colors to be presently mentioned, are all fast colors, which do not run, except the yellow, which must, therefore be laid on the opposite side. After coloring, the artist proceeds to bring out the lighter effects by taking off the color in the proper place, with a goose-quill cut like a pen without a slit. By working this upon the glass, he removes the color where lights should be the strongest; such as the hair, eyes, the reflection of bright surfaces and light parts of draperies. The blank pen may be employed either to make the lights by lines, or hatches, and dots, as is most suitable to the subject.

By the metallic preparations now laid upon it, the glass is made ready for being fired, in order to fix and bring out the proper colors. The furnace or kiln best adapted for this purpose, is similar to that used by enamellers. It consists of a muffle or arch of fire-clay, or pottery, so set over a fire-place and so surrounded by flues, as to receive a very considerable heat within, in the most equable and regular manner; otherwise some parts of the glass will be melted; while, on others, the superficial film of colors will remain unvitrified. The mouth of the muffle, and the entry for introducing fuel to the fire, should be on opposite sides, to prevent as much as possible the admission of dust into the muffle, whose mouth should be closed with double-folding-doors of iron, furnished with small peep-holes, to allow the artist to watch the progress of staining, and to withdraw small trial slips of glass, painted with the principal tints used in the picture.

The muffle must be made of very refractory fire-clay, flat at its bottom, and only five or six inches high, with such an arched top as to make the roof strong, and so close on all sides as to exclude entirely the smoke and flame. On the bottom of the muffle a smooth bed of sifted lime, freed from water, about half an inch thick, must be prepared for receiving the pane of glass. Sometimes several plates of glass are laid over each other with a layer of dry pulverulent lime between each. The fire is now lighted, and most gradually raised, lest the glass should be broken; and after it has attained to its full heat, it must be kept up for three or four hours, more or less, according to the indications of the trial slips; the yellow color being principally watched, as it is found to be the best criterion of the state of the others. When the colors are properly burnt in, the fire is suffered to die away, so as to anneal the glass.

For the Scientific American.

### Silvering and Gilding by Powdered Tin.

A quantity of pure tin is melted and poured into a box, which is then violently shaken, the metal assumes when cold the form of a very fine gray powder. This is sifted to separate any coarse particles, and is mixed with melted glue. When it is to be applied it should be reduced by the addition of water to the consistence of thin cream and is laid on with a soft brush like paint. It appears when dry like a coat of gray water color, but when its gone over with an agate burnisher, it exhibits a bright surface of polished tin. If the glue is too strong the burnisher has no effect, and if too weak the tin crumbles off under the burnisher A coating of white or gold colored oil varnish or lacquer, is immediately laid over it, according as it may be intended to imitate silvering or gilding. This kind of gilding is often used for covering wood, leather, iron or other articles in constant wear. It is very ornamental and resists the effects the weather.

For the Scientific American.

### Simple way to make Oxygen Gas.

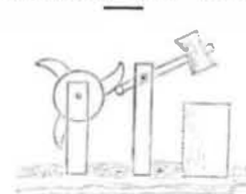
Heating equal weights of peroxide of copper and chlorate of potash is a very good way of obtaining oxygen, but any heavy metallic body will just do as well as the peroxide of copper if it is not susceptible of much further oxidisation. The iron scales that are to be had in such abundance in every blacksmith's shop, is the cheapest substance to obtain oxygen from that can be found. Grind the scales in an old coffee mill and use the powder, heating it red hot in a retort and oxygen is plentifully obtained. The writer has frequent use for a small quantity of oxygen and he finds that he can procure it with the above substance and an old gun barrel, at little or no expense and with far less trouble than heating manganese. S. L. R.

### Economy in Candles.

If you are without a rush-light, and would burn a candle all night, unless you use the following precaution, it is ten to one an ordinary one will gutter away in an hour or two, sometimes to the endangering of the house:—This may be avoided by placing as much common salt, finely powdered, as will reach from the tallow to the bottom of the black part of the wick of a partly burned candle, when, if the same be lit, it will burn very slowly yielding sufficient light for a bedchamber; the salt will gradually sink as the tallow is consumed, the melted tallow being drawn through the salt and consumed in the wick.—*Ex.*

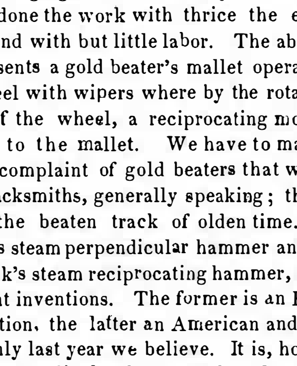
The above we have seen and tried and must pronounce it to be fallacious. Any person can try the experiment easily, and become satisfied of its worthlessness. The wicks for candles should be steeped a short time in strong lime water and then perfectly dried, is an excellent plan for wicks. Wicks should always be smooth without knots, and well-bleached

### MECHANICAL MOVEMENTS.



The principle of what is called the trip hammer has long been known. It is simply a hammer suspended by the handle upon an axis and the extreme end lifted by wipers on a wheel, making the head of the hammer strike any article to be forged upon an anvil. The trip hammer, when convenient to any blacksmith's shop there is a fall of water, should never be neglected. We have been often surprised to see some blacksmiths convenient to a fine waterfall where a small wheel could be used at little expense, toiling and sweating away year in and year out at heavy forging when a small trip hammer could have done the work with thrice the expedition and with but little labor. The above cut represents a gold beater's mallet operated by a wheel with wipers where by the rotary motion of the wheel, a reciprocating motion is given to the mallet. We have to make the same complaint of gold beaters that we have of blacksmiths, generally speaking; theirs is still the beaten track of olden time. Nesmith's steam perpendicular hammer and Lewis Kirk's steam reciprocating hammer, are excellent inventions. The former is an English invention, the latter an American and patented only last year we believe. It is, however, the perpendicular hammer that alone would answer for gold beating; the least blow off the square would not answer.

### Couplings.



There are many methods of coupling one part of machinery with another. Bands are employed to couple drums, and the circular sliding rack is the general plan used in the gearing and ungearing of shafts. The above cut represents another plan which is not so common. The revolution of the one wheel is transferred to the loom wheel on the same shaft by bringing the pins on the loom wheel in contact with the opening made for them in the other wheel, by means of the lever. We saw not long since a good modification of the above, for which a patent was granted, about two years ago.

### The Automaton Duck of Vaucanson.

This celebrated machine, of which some marvellous, and as many regarded them, incredible stories are told, has been brought to light, and was exhibited last year in this city, where we heheld it performing its marvellous feats.

Nothing can be more authentic than the accounts of the automaton we are about to describe. We have ourselves been an eye witness, and could have sworn that the duck was a living animal. In the space of ten minutes we saw it drink, eat, dabble in the water, stretch its wings, shake its feathers, and do a number of things, all in a manner peculiar to that bird. This duck seemed to live and move—the illusion was complete.

And yet it was only a machine, made up of counterpoises, a cylinder, levers, and stops which were put in motion by means of air tubes. It was the very machine made by Vaucanson, and constructed by him in 1738, and which was then seen by all Paris. It was for a long time in the hands of Dumoulin, who exhibited it in Russia and Austria; in 1781, we hear of it at Berlin, in the possession of a counseller, named Beireis. After his death the machine was forgotten, taken to pieces, and left for thirty years in a garret, where it was much injured. At length it fell into the hands of a philosophical instrument maker, belonging to Berlin, who made vain endeavors to put it together again. A skilful mechanician belonging to Hamburg, George Tietz, fortunately learned these facts and obtained the remains of the beautiful machine. By means of great care, perseverence and skill, this Tietz has succeeded in restoring the duck, and has even added some new movements to it; but he has been obliged to make nearly the whole anew. He showed us and we beheld them with respect, the venerable pieces, which date back to the period of Vaucanson and which had been wrought by his own hand. Of the original little was left. In all instances the wood and pastebord have been replaced by steel and copper. The duck had been presented by him in a skeleton form, in order that the mechanism might be better understood, and combinations better appreciated. M. Tietz has clothed his duck with feathers, and thus rendered its resemblance to the animal more perfect.

This duck can digest his food: that is to say, he goes through the process of eating and digesting, to all appearances like any other duck.

### Phosphoric Phenomena.

You must previously prepare the following phosphorus:—Calcine common oyster shells, by burning them in the fire for half an hour; then reduce them to powder; of the clearest of which take three parts, and of flowers of sulphur one part; put the mixture into a crucible, about an inch and a half deep. Let it burn in a strong fire for rather better than an hour; and when it is cool, turn it out and break it in pieces; and, taking it into a dark place, scrape off the parts that shine brightest, which, if good, will be a very white powder.

Then construct a circular board, of three or four feet diameter, on the centre of which draw in gum water, or any adhesive liquid, a half moon of three or four inches diameter, and a number of stars round it, at different distances, and of various magnitudes.

Strew the phosphorous over the figures, to the thickness of about a quarter of an inch, laying one coat over the other. Place this board behind a curtain; and when you draw the curtain up or back, discharge one electrifying jar over each figure, at the distance of about an inch, and they will become illuminated, exhibiting a very striking resemblance of the moon and stars; and will continue to shine for about half an hour, their splendor becoming gradually more faint.

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