The young man's book of amusement

Halifax, 1848

Miscellaneous Experiments

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MISCELLANEOUS EXPERIMENTS.

Illuminated Writing.

It is well known that if any words are written on a wall with solid phosphorus, the writing will appear as if on fire; but it is necessary to give this caution, lest accidents should occur. In using it, let a cup of water be always near you; and do not keep it more than a minute and a half in your hand, for fear the warmth of your hand should set it on fire. When you have written a few words with it, put the phosphorus into the cup of water, and let it stay a little to cool: then take it out, and write with it again.

The Chameleon Spirit.

Put into a decanter, volatile spirit, in which you have dissolved copper filings, and it will produce a fine blue. If the bottle be stopped, the colour will disappear; but when unstopped, it will return. This experiment may be often repeated.

A Ball of Ice.

Introduce a small portion of water into a thin glass ball, and keep it moistened for a considerable length of time by the application of sulphuric ether; and the water will be converted into ice.

Beautiful Metallic Crystals.

Over one ounce of iron filings in a tea-cup, pour a table-spoon full of sulphuric acid, diluted with four times its quantity of water; boil it for a short time, and set it aside to cool, when beautiful crystals of sulphate of iron will be formed.

To change a Blue Liquid to a Red.

Pour a little of the infusion of litmus, or blue cabbage, into a wine-glass, and add to it a single drop of nitric or sulphuric acid, and it will be instantly changed to a beautiful red colour.

To change Red or Blue Liquid, to Green.

Take a little of the liquid mentioned in the above

experiment, either before or after it has been converted to red, and add a few drops of the solution of potash of soda, and upon stirring it, a fine green colour will be produced.

To convert a Colourless Liquid to a Deep Brown.

A drop of nitrate of copper let fall into a glass of water, will not produce any change on the colour of the water, but, if a crystal, or a drop of the solution of prussiate of potash be added, the water will become a dark brown colour.

To produce a deep Blue Colour, by mixing two colourless Liquids.

Let a drop of nitrate of copper fall into a glass, then fill it up with water, it will appear to have no colour, but, upon letting a drop of liquid of ammonia (which is also without colour) fall into the glass, the liquid will become of a beautiful deep blue colour.

To render a Blue-Coloured Liquid, perfectly Colourless.

Take the blue liquid produced by the last experi-

ment, and let a drop or two of nitric acid fall into it, and it will become perfectly colourless.

To make the same liquid assume various Colours.

Mix a little powdered manganese with a little nitre, and throw the mixture into a red-hot crucible, and a compound will be obtained, possessed of the singular property of different colours, according to the quantity of water that is added to it. A small quantity gives a green solution, a greater quantity changes it to blue; more still, to a purple, and a still larger quantity, to a beautiful deep purple. The last experiment may be varied by putting equal quantities of this substance into separate glasses, and pouring hot water on the one, and a portion of cold water on the other. The hot solution will have a beautiful green colour, and the cold one a deep purple.

To convert Green-Coloured Liquid to White.

Pour a little of the solution of nickel into a glass, and add to it a few drops of the infusion of galls, which will convert it to a grayish white colour. If a few drops of ammonia be added to this solution of nickel, it will convert it to a deep blue; in the course of an hour or two it will change to red, and violet; if a drop of sulphuric or nitric acid be added, it will

become green, and by adding a few drops of ammonia it will again become blue.

Luminous Liquor.

Put a little phosphorus, with essence of cloves into a bottle, which must be kept closely stopped. Every time the bottle is unclosed, the liquor will appear luminous. This experiment must be performed in the dark.

Golden Ink.

Take some white gum-arabic, reduce it to an impalpable powder, in a brass mortar ; dissolve it in strong brandy, and add a little common water to render it more liquid. Provide some gold in a shell, which must be detached, in order to reduce it to a powder. When this is done, moisten it with the gummy solution, and stir the whole with a small hair brush, or your finger ; then leave it for a night, that the gold may be better dissolved. If the composition become dry during the night, dilute it with more gum-water, in which a little saffron has been infused ; but take care that the gold solution be sufficiently liquid to flow freely in a pen. When the writing is dry, polish it with a dry tooth.

The Changeable Rose.

Take a common full-blown rose, and having thrown a piece of sulphur finely pounded into a chafing dish with coals, expose the rose to the vapour. By this process the rose will become whitish; but if it be afterwards held some time in water, it will resume its former colour.

To set Fire to a Combustible Body by Reflection.

Place two concave mirrors at about twelve feet distance from each other, and let the axis of each be in the same line. In the focus of one of them place a live coal, and in the focus of the other some gunpowder. With a pair of strong bellows keep blowing the coal, and notwithstanding the distance between them, the powder will presently take fire.

The mirrors may either be made of glass, metal, or pasteboard, gilt.

To cause a Green Lambent Flame to appear, and alternately disappear, at the Mouth of a Flask.

Put a few pieces of phosphorus of the size of a bean into a Florence flask half filled with water, and make the water boil over a lamp: when the water has boiled for a few minutes, the empty part of the flask

becomes filled with dense white vapours; and when the ebullition is suffered to go on, the fumes gradually disappear, and a lambent green flame makes its appearance with an undulatory motion at the orifice of the flask, and continues as long as the water is kept boiling. When the lamp is withdrawn, the phosphorescent flame gradually rushes down, and the internal surface of the vessel exhibits, in a dark place, illuminated clouds rolling over each other. When the heat is again applied to the flask, the flame re-appears, and again vanishes, and descends into the body of the vessel the moment the water ceases to boil; and these appearances may be repeated as long as any water is left in the flask.

Curious Change of Colour.

Put into an ounce phial a slip of copper scraped bright, fill up the phial with liquid ammonia, and cork it air-tight. No apparent change will take place; but if the bottle be left open for some hours, and then be closed, a solution of the colour is affected, which is absolutely colourless, and turns blue on re-opening the bottle, beginning at the surface, and gradually extending downwards through the mass. Again, if this blue solution has not been too long exposed to the air, and fresh pieces of copper be put in, stopping the bottle again, the solution is deprived of all its tinge, and recovers its colour by the admission of air; and this effect may be produced repeatedly.

The Distorting Mirror.

Opticians sometimes grind a glass mirror concave in one direction only, or longitudinally; it is in fact a concave portion of a cylinder, the breadth of which may be considered that of the mirror. A person looking at his face in this mirror, in the direction of its concavity, will see it curiously distorted in a very lengthened appearance; and by turning the cylindrical mirror a quarter round, his visage will appear distorted another way, by an apparent increase in width only. If in a very near situation before it, you put your finger on the right hand side of your nose, it will appear the same in the mirror: but if in a distant situation, somewhat beyond the centre of concavity, you again look at your face in the mirror, your finger will appear to be removed to the other side of your nose.

Exploding Salt.

If a small quantity of powdered charcoal and hyperoxymuriate of potash be rubbed together in a mortar, an explosion will be produced, and the charcoal inflamed. Three parts of this salt, and one of sulphur, rubbed together in a mortar, produce a violent detonation. If struck with a hammer, on an anvil, there is an explosion like the report of a pistol.

When concentrated sulphuric acid is poured upon this salt, there is a considerable explosion; it is

thrown about to a great distance, sometimes with a red flame: and there is exhaled a brown vapour, accompanied with a strong odour.

Method of taking an Impression of Butterflies on Paper.

Clip the wings off the butterfly, lay them on clean, in the form of a butterfly when flying. Spread some thick clean gum-water on another piece of paper, press it on the wings, and it will take them up; lay a piece of white paper over it, and rub it gently with your finger, or the smooth handle of a knife. The bodies are to be drawn in the space which you leave between the wings.

To soften Horn.

To one pound of wood-ashes, add two pounds of quick lime; put them in a quart of water. Let the whole boil till reduced to one-third. Then dip a feather in, and if on drawing it out, the plume should come off, it is a proof that it has boiled enough; if not, let it boil a little longer. When it is settled, filter it off, and in the liquor thus strained, put shavings of horn. Let them soak for three days; and first annointing your hands with oil, work the horn into a mass, and print or mould it into any shape you please.

To make Moulds of Horn.

If you wish to take the impression of any coin, medal, &c. previously anoint it with oil; and lay the horn shavings over it in its softened state. When dry, the impression will be sunk into the horn; and this will serve as a mould to re-produce, either by plaster of Paris, putty, and glue, or isinglass and ground egg-shells, the exact resemblance of the coin or medal.

To observe an Eclipse of the Sun, without Injury to the Eye.

Take a burning glass, or spectacle glass, that magnifies very much; hold it before a book or pasteboard, twice the distance of its focus, and you will see the round body of the sun, and the manner in which the moon passes between the glass and the sun, during the whole eclipse.

To extract the silver out of a Ring that is thick gilded, so that the Gold may remain entire.

Take a silver ring that is thick gilded. Make a little hole through the gold into the silver; then put the ring into aquafortis, in a warm place; it will dissolve the silver, and the gold will remain whole.

The Art of Bronzing.

Bronzing is that process by which figures of plaster of Paris, wood, &c. are made to have the appearance of copper or brass. The method is as follows:

Dissolve copper filings in aquafortis. When the copper has impregnated the acid, pour off the solution, and put into it some pieces of iron, or iron filings. The effect of this will be to sink the powder to the bottom of the acid. Pour off the liquor, and wash the powder in successive quantities of fresh water. When the powder is dry, it is to be rubbed on the figure with a soft cloth, or a piece of leather; but observe, that previously to the application of the bronze powder, a dark blackish sort of green is first to be laid on the figure: and if you wish the powder to adhere stronger, mix it with gum water, lay it on like paint, with a camel's hair brush, or previously trace the parts to be bronzed with gold size, and when nearly dry, rub the powder over it.

To cast Figures in Imitation of Ivory.

Make isinglass and strong brandy into a paste, with powder of egg-shells, very finely ground. You may give it what colour you please; but cast it warm into your mould, which you previously oil over. Leave the figure in the mould till dry, and you will find, on taking it out, that it bears a very strong resemblance to ivory.

To give Plaster Figures the appearance of Marble.

Put into four pounds of clear water, one ounce of pure curd-soap grated, and dissolved in a well glazed earthen vessel. Then add one ounce of white bees'-wax, cut into thin slices; as soon as the whole is incorporated it is fit for use. Having well dried the figure before the fire, suspend it by a twine, and dip it once in the varnish; upon taking it out, the moisture will appear to have been absorbed; in two minutes' time, stir the compost, and dip it a second time, and this generally suffices. Cover it carefully from the dust for a week; then with a soft muslin rag, or cotton wool, rub the figure gently, when a most brilliant gloss will be produced.

Excellent method of taking off Impressions of Leaves, Plants, &c.

Take fine wove paper, which oil well with sweet oil; let it stand a minute or two to soak through, then remove the superfluous oil with a piece of paper, and hang it in the air to dry; when the oil is pretty well dried in, take a lighted candle or lamp, and move the paper slowly over it in an horizontal direction, so as to touch the flame, till it is perfectly black. When you wish to take off impressions of plants, lay your plant carefully on the oiled paper, and a piece of clean paper over it, and rub it with your finger equally in

all parts for about half a minute; then take up your plant, and be careful not to disturb the order of the leaves, and place it on the paper on which you wish to have the impression; cover it with a piece of blotting paper, and rub it with your finger for a short time, and you will have an impression superior to the finest engraving. The same piece of black paper will serve to take off a great number of impressions; so that when you have once gone through the process of blacking it, you may make several impressions in a very short time. The principal excellence of this method is, that the paper receives the impression of the most minute veins and fibres, so that you may obtain the general character of most flowers, superior to any engraving. The impressions may afterwards be coloured according to nature.

Alternate Illusion.

With a convex lens of about an inch focus, look attentively at a silver seal, on which a cypher is engraved. It will at first appear cut in, as to the naked eye: but if you continue to observe it some time, without changing your situation, it will seem to be in relief, and the lights and shades will appear the same as they did before. If you regard it with the same attention still longer, it will again appear to be engraved: and so on alternately.

If you look off the seal for a few moments, when you view it again, instead of seeing it, as at first, engraved, it will appear in relief.

If, while you are turned towards the light, you suddenly incline the seal, while you continue to regard it, those parts that seemed to be engraved will immediately appear in relief: and if, when you are regarding these seemingly prominent parts, you turn yourself so that the light may fall on the right hand, you will see the shadows on the same side from whence the light comes, which will appear not a little extraordinary. In like manner the shadows will appear on the left, if the light fall on that side. If instead of a seal you look at a piece of money, these alterations will not be visible, in whatever situation you place yourself.

Alarum.

Against the wall of a room, near the ceiling, fix a wheel of twelve or eighteen inches diameter; on the rim of which place a number of bells in tune, and if you please, of different sizes. To the axis of this wheel, there should be fixed a fly to regulate its motion; and round the circumference there must be wound a rope, to the end of which is hung a weight.

Near to the wheel let a stand be fixed, on which is an upright piece that holds a balance or moveable lever, on one end of which rests the weight just mentioned, and to the other end must hang an inverted hollow cone, or funnel, the aperture of which is very small. This cone must be graduated on the inside, that the sand put in may answer to the number of hours it is to run. Against the upright piece, on the side next the cone, there must be fixed a check, to

prevent it from descending. This stand, together with the wheel, may be enclosed in a case, and so contrived, as to be moved from one room to another with very little trouble.

It is evident, from the construction of this machine, that when a certain quantity of the sand is run out, the weight will descend, and put the wheel in motion, which motion will continue till the weight comes to the ground. If the wheel be required to continue longer in motion, two or more pullies may be added, over which the rope may run.

Two Experiments to be made with a Concave Mirror, which may be easily tried.

If a fire be made in a large room, and a smooth well-polished mahogany table be placed at a good distance near the wall, before a large concave mirror, so that the light of the fire may be reflected from the mirror to its focus on the table, and you stand by the table, you will see nothing but a long beam of light; but if you stand at some distance as towards the fire, you will see, on the table, an image of the fire, large and erect; if another person, knowing nothing of the matter, enters the room, he will be startled at the appearance, for the table will seem to be on fire, and being near the wainscot, to endanger the whole room. There should be no other light than the fire in the room. If the fire be darkened by a screen, and a large candle be placed at the back of the screen, a

person standing by the candle will see the appearance of a fine large star, or rather planet, on the table, as large as Jupiter or Venus; and if the paper be moved round the candle, the satellite will be seen to go round the planet.

Composition of an Ink similar to China Ink.

Take six parts of isinglass, which are to be dissolved in double their weight of boiling water; in like manner dissolve in two parts of water one part of Spanish liquorice: mix the two liquors warm, and gradually incorporate with them, by means of a wooden spatula, one part of the best ivory black. When this mixture is properly made, it is heated in a water-bath, that the whole of the water may be evaporated. The requisite form is then given to the paste which remains. The colour and goodness of this ink are equal to those of the true China Ink.

To produce a Carmine-Red Flame.

The flame of the spirit of wine may be coloured by the addition of various bodies which the spirit holds in solution. The flame of alcohol is tinged red in the following manner:—Put into a small iron ladle one part of muriate of strontia, and pour over it three or four of alcohol, then set it on fire with a candle,

or a piece of burning paper, it will burn with a bright carmine-red flame, especially if the mixture be heated, by holding the ladle over the flame of a lamp or candle to cause the alcohol to boil rapidly.

To produce an Emerald-Green Flame.

Cause alcohol to burn in a ladle upon nitrate of copper.

To produce an Orange-coloured Flame.

Put muriate of lime, deprived of its water of crystallization into an iron ladle, cover it with spirits of wine, and cause it to burn in the manner stated.

Timber in a Seventy-four Gun Ship.

A seventy-four gun ship will swallow up nearly 3,000 loads of oak timber; a load of oak timber contains fifty cubical feet, and a ton forty feet; so that a seventy-four gun ship takes 2,000 large well-grown timber trees, of perhaps two tons each. The distance recommended for planting trees is thirty feet; but supposing trees to stand at the distance of two rods, (thirty-three feet) each statute acre would contain forty trees; of course the building of a seventy-four

gun ship would clear the timber of fifty acres. Even supposing the trees to stand one rod apart, (a short distance for trees of the magnitude above-mentioned) it would clear twelve acres and a half; no inconsiderable plot of ground. The complaints relative to the decrease of our timber are not to be wondered at under such circumstances; and this calculation points out to landed proprietors the necessity and patriotism of continually planting more trees to supply our future wants.

Subaqueous Exhalation.

Pour a little clear water into a small glass tumbler, and put one or two small pieces of phosphoret of lime into it. In a short time, flashes of fire will dart from the surface of the water, and terminate in ringlets of smoke, which will ascend in regular succession.

Flowers curiously affected by the Sun and the Weather.

The petals of many flowers expand in the sun, but contract all night, or on the approach of rain. After the seeds are fecundated, the petals no longer contract. All the trefoil may serve as a barometer to the husbandman: they always contract their leaves on an impending storm.

To make Luminous Writing in the Dark.

Fix a small piece of solid phosphorus in a quill, and write with it upon paper; if the paper be carried into a dark room, the writing will appear beautifully luminous.

The Sublimated Tree.

Into a large glass jar inverted upon a flat brick tile, and containing near its top a branch of fresh rosemary, or any other such shrub, moistened with water, introduce a flat thick piece of heated iron, on which place some gum benzoin in gross powder. The benzoin, in consequence of the heat, will be separated, and ascend in white fumes, which will at length condense, and form a most beautiful appearance upon the leaves of the vegetable.

Writing on Glass by the Rays of the Sun.

Dissolve chalk in aquafortis to the consistence of milk, and add to that a strong solution of silver.—Keep this liquor in a glass decanter, well stopped, then cut out from a paper the letters you would have appear, and paste the paper on the decanter, which you are to place in the sun, in such a manner that its rays may pass through the spaces cut out of the pa-

per, and fall on the surface of the liquor. The part of the glass through which the rays pass will turn black, and that under the paper will remain white. You must observe not to move the bottle during the time of the operation.

To cause a Report like that of a Gun, with a Tobacco Pipe.

Compose a powder with one ounce of saltpetre, one ounce of cream of tartar, and half an ounce of sulphur, pulverized singly, then mixed. Put a single grain of this powder into a tobacco-pipe, and when it takes fire, it will produce a very loud report without breaking the pipe.

To break a Stone with a blow of the Fist.

Select two stones from three to six inches long, and about half as thick, lay one flat on the ground on which place one end of the other, raising the reverse end to an angle of forty-five degrees, and just over the centre of the stone (with which it must form a T,) supporting it in that position by a piece of thin twig, or stick, one, or one and a half inch long; if the raised stone be now smartly struck about the centre, with the little finger side of the fist, the stick will give way, and the stone will be broken to pieces: the stones must be laid so as not to slip, otherwise the experiment will fail.

Extreme Tenuity.

The thinnest substance ever observed is the aqueous film of the soap bubble previous to its bursting; yet it is capable of reflecting a faint image of a candle, or the sun.

Friction.

Sir H. Davy melted two pieces of ice by their mutual friction, in a room cooled below the freezing temperature.

Preparation of Phosphorized Ether.

Phosphorized ether is prepared, by suffering sulphuric ether to stand, for some weeks, over a considerable quantity of phosphorus in a well stopped phial.

Permanent Expansion of Glass.

It has been ascertained, that after glass has been exposed to a great heat, on cooling, it never regains its original volume.

How to Write in the Dark.

Two planes of ebony, of equal length and breadth, similar to a parallel ruler, and joined at each end by racks, the side of which being graduated to the width of the line intended, will serve as a certain guide, and by use of this instrument, a blind person, or a person in the dark, may write with the greatest accuracy. If ivory tablets or a slate is used, a fine wire drawn with a steel point may be readily felt by the point of the pencil.

To obtain exquisite Skeletons of Small Animals.

Put any small subject, such as a mouse, frog, (if a bird strip it of its feathers,) in a box perforated with a number of holes; let it be properly distended to prevent the parts from collapsing, or being crushed together by the pressure of the earth. Then place the box and its contents in an ant-hole; and in a few days it will have become an exquisitely beautiful and perfect skeleton, by the ants having consumed every part of it except the bones and ligaments.

To measure the Focal Distance of a Globe of Water and of Glass.

Take a hollow globe of glass, or, instead of it, a thin round flask or decanter, and making a moderate

round hole about an inch diameter, in a piece of brown paper, paste it on one side of the belly of the decanter; and having filled it with water, hold the covered side to the sun, that the perpendicular rays may pass through the middle of the water, and the emergent rays will be collected to a focus, whose nearest distance from the decanter will be equal to the semi-diameter of the belly of it; as will appear by receiving the rays upon a paper, held at that distance. That this effect is owing to the water, and not to the glass, will be evident by emptying the decanter; for the light that passes then through the hole, will be as broad as the hole itself, at all distances of the paper from the decanter. If a similar experiment be tried, with a solid globe or ball of glass, the distance of the focus from the nearest part of the ball will be one quarter of its diameter.

Phosphorescence of Wood.

Dr. Carradori, on a paper on the phosphorescence of wood, asserts that phosphoric wood acquires by putrefaction the property of attracting and absorbing light, and of retaining it mechanically. To make it shine, it is sufficient to expose it for some time to the sun. A bit of wood, which the author examined, continued to shine under oil for two whole days. In that situation, says Dr. Carradori, it was not in contact with oxygen gas.

How Light Wood may be made to Lie at the Bottom of Water.

Let two pieces of wood be planed quite flat, so as no water may get between them when they are put together: let one of the pieces be cemented to the bottom of a vessel, and the other piece be laid flat and close upon it, and held down to it by a stick, whilst water is poured into the vessel; then remove the stick, and the upper piece of wood will not arise from the lower one; for, as the upper one is pressed down, both by its own weight, and the weight of all the water over it, whilst the contrary pressure of the water is kept off by the wood under it, it will lie as still as a stone would do in its place. But if it be raised ever so little at any edge, some water will then get under it, which, being acted upon by the water above, will immediately press it upwards: and, as it is lighter than its bulk of water, it will rise, and float upon the surface of the water.

To Imitate the Luminous Appearance of the Lunar Disc.

Introduce a few pieces of phosphorus of the size of a pea, into a hollow glass ball of three or four inches in diameter, and having heated it to cause the phosphorus to catch fire, keep turning the ball round, till half the inner surface is covered with phosphorus.

When the inflammation has ceased, there will be left a whitish crust or lining, which in a dark place shines for some considerable time. Broad spaces will assume by degrees an obscure aspect, while circular spots, frequently interspersed, will yet glow with a vivid lustre.

Easy Method of obtaining Flowers of different Colours from the same Stem.

Scoop out the pith from a small twig of elder, and having split it lengthwise, fill up each of the parts with small seeds that produce flowers of different colours, but that blossom nearly at the same time. Surround them with earth; and then tying together the two bits of wood, plant the whole in a pot filled with earth, properly prepared.

To fix Black Lead Pencil Drawings.

Dissolve a small quantity of isinglass, and dilute it with warm water, till so thin that when spread upon paper, and dry, it shall be free from those sparkling particles which never fail to appear. Take a broad flat camel-hair pencil, set in tin, and fill it plentifully with the solution, and draw it slightly over the work intended to be fixed, once or twice, or according as the size of the picture may require: it must be very carefully done, to prevent

disturbing the sharpness of the pencil work: when dry, it will be found to resist the effect of Indian rubber. It is advantageous to sponge the back of the paper or Bristol-board before applying the solution, in order that the paper may dry level, as it is apt to contract round the edges when only one side is wet. If there be a margin round the drawing, it is not requisite to sponge the back.

To exhibit the Pressure of Fluids at different Depths.

The pressure of fluids at very great depths is finely illustrated by making a well corked empty bottle descend to a great depth, and then pulling it up again: however well corked it may be, the cork is always found in the inside, and the bottle full of water, when pulled up.

Two inodorous Bodies become very pungent and odorous by Mixture.

When equal parts of muriate of ammonia and slaked lime, both substances destitute of odour, are intimately blended together in a mortar, a very pungent gas (ammonia) becomes evolved.

Interesting Experiment for the Microscope.

The embryo grain of wheat, at the time of blossoming, being carefully taken out of the husk, will be found to have a small downy tuft at its extremity, which, when viewed in a microscope, greatly resembles the branches of thorn; spreading archwise, in opposite directions. By expanding a few of the grains, and selecting the most perfect, a very pretty microscopic object will be obtained for preservation.

Experiment to shew the Separation of Bodies by Weight.

Take a bottle with a long neck, and fill part of it with water; take a glass, and pour claret and water into it; reverse the bottle with the bottom upwards, stopping the mouth of it with your finger; then dip the mouth within the glass, and remove the finger, keep the bottle in that position for a time, and the wine will separate from the water, ascend and settle in the top of the bottle, and the water will descend from the bottle and settle in the bottom of the glass, the passage will be apparent to the eye, for you will see the wine, as it were in a small vein, rising through the water.

Let the upper glass be wine and the lower water, there follows no motion at all; this separation of the wine and water appears to be made by weight, the

water being made pensile, and a considerable weight of it in the belly of the bottle, supported by a small pillar of the same liquid in the neck of the bottle, it is this circumstance which sets the motion at work, for wine and water in a vessel will not separate by long standing.

Brilliant Combustion.

If a piece of inflamed phosphorus be plunged in a jar of nitrous acid gas, a very beautiful and brilliant combustion will be the consequence.

Another.

Pour some of Homberg's pyrophorus into a jar containing nitrous gas, a very beautiful stream of fire will be seen to flow at the bottom of the jar.

Curious Optical Deception.

Provide a sufficient number of small equilatera prisms, a few lines only in breadth, and in length equal to the height of the painting which you intend to make, and place them all close to each other on the ground to be occupied by the painting. Then

cut the painting into bands equal to each of the faces of the prisms, and cement them, in order, to the faces of the same side. When this is done, take a painting quite different from the former, and having divided it into bands as before, cement them to the faces of the opposite side. It is hence evident, that when on one side you can see only the faces of the prism turned towards that side, one of the paintings will be seen; and if the picture be looked at on the opposite side, the first will disappear, and the second only will be seen. A painting may even be made, which, when seen in front, and on the sides, shall exhibit three different subjects. For this purpose, the picture of the ground must be cut into bands, and be cemented to that ground in such a manner, that a space shall be left between them, equal to the thickness of a very fine card. On these intervals raise, in a direction perpendicular to the ground, bands of the same card, nearly equal in height to the interval between them; and on the right faces of these pieces of card, cement the parts of a second painting, also cut into bands. In the last place, cement the parts of a third picture, cut in the same manner, on the left faces of the pieces of card. It is evident, that when this picture is viewed in front, at a certain distance, the bottom painting only will be seen; but if you stand on one side, in such a manner that the height of the slips of card conceals from you the bottom, you will see only the picture cemented in detached portions to the faces turned towards that side; if you move on the other side a third painting will be seen.

To exhibit the combustion of Iron-wire in Oxygen Gas.

Take a piece of fine iron wire, and coil it up in a spiral form. Fasten a little flax, or cotton, to one end of it, which must be dipped in sulphur. The other end of the wire is to be fixed to a cork, so that the spiral end may hang straight down. Fill a bottle capable of holding about a quart, with oxygen gas, and set its mouth upwards; then light the sulphur, and introduce the wire into the bottle of gas, suspending it by the cork, which is simply to be laid on the mouth of the bottle. The iron will immediately begin to burn with the most brilliant light, throwing out a number of sparks which fall to the bottom, and generally break it. This may, however, be prevented, by pouring sand into the bottle.

Curious Transcolourations.

If you put a tea-spoonful of a liquor composed of copper infused in acid of vitriol, into a glass, and add two or three table-spoonsful of water to it, there will be no sensible colour produced; but if you add a little volatile alkali to it, and stir it, you will perceive a very beautiful blue colour. Add a little acid of vitriol, the colour will instantly disappear upon stirring it; and by adding a little fixed alkali dissolved, it will return again.

Another.

Put half a tea-spoonful of a liquor composed of iron infused in acid of vitriol, into half a glass of water; and add a few drops of phlogisticated alkali, and a beautiful Prussian blue will appear.

Iron transformed into Silver.

Dissolve mercury in marine acid, and dip a piece of iron into it, or rub the solution over the iron, and it will assume a silver appearance.

It is scarcely necessary to state that these transmutations are only apparent, though to the credulous, it would seem that they were actually transformed.

The Phial of the Four Elements.

Take a phial, six or seven inches long, and about three-quarters of an inch in diameter. In this phial put, first, glass coarsely powdered; secondly, oil of tartar per deliquum; thirdly, tincture of salt of tartar; and lastly, distilled rock oil.

The glass and the various liquors being of different densities, if you shake the phial, and then let it rest a few moments, the three liquors will entirely separate, and each assume its place; thus forming no

indifferent resemblance of the four elements, earth, fire, water, and air: the powdered glass (which should be of some dark colour) representing the earth; the oil of tartar, water; the tincture, air: and the rock oil, fire.

The Æolipiles.

The æolipile is a small hollow globe of brass, or other metal, in which a slender neck or pipe is inserted. This ball, when made red hot, is cast into a vessel of water, which will rush into its cavity, then almost void of air. The ball being then set on the fire, the water, by the rarefaction of the internal air, will be forced out in steam by fits, with great violence, and with a strange noise.

If to the necks of two or more of these balls, there be fitted those balls that are used by fowlers and hunters, and the balls placed on the fire, the steam rushing from them will make such a horrible noise, that it will astonish any person who is ignorant of the contrivance.

The Wheel Barometer in the form of a Syphon.

A small float of iron or glass rests on the exterior surface of the mercury, suspended by a slender thread, passed round a small wheel, or cylindrical axis, that carries the index. By this construction, the varia-

tion of the height of the mercurial column is reduced to half the ordinary measure, yet the circumference traversed by the needle is greatly augmented.

Ideal Spectrum.

I was surprised, and agreeably amused, (says Dr. Darwin,) with the following experiment. I covered a paper about four inches square with yellow, and with a pen filled with a blue colour wrote upon the middle of it the word BANKS in capitals, and sitting with my back to the sun, fixed my eyes for a minute exactly on the centre of the letter N in the middle of the word; after closing my eyes, and shading them somewhat with my hand, the word was distinctly seen in the spectrum in yellow letters on a blue field; and then, on opening my eyes on a yellowish wall at twenty feet distance, the magnified name of BANKS appeared written on the wall in golden characters.

Cohesion of Water.

If a glass be filled to the brim with water, and several small articles, as counters for instance, dropped in, what is the reason the water does not run over the brim of the glass?

It is the natural quality of all dry substances to

resist water in a small degree; hence the top of the glass being dry, the counters not being so great as to overcome the resistance, and slipped in with a steady hand, the water will rise above the dry edge, without running over, till so many are put in as to cause the weight of the heaped up part to overcome the repulsion of the dry edge. The truth of this may be proved by dipping your finger in the water, and wetting the edge of the cup with it, upon which all the water which is above the rim of the cup will run over.

Botanical Experiment.

A singular and ingenious method of multiplying the tongue-leaved eucomis, or futillary, is described in Professor Hedgwig's collection of memoirs and observations on subjects of Botany and Economy. This futillary is called by Lamarck, *Basile a epi couronne.* When this beautiful plant of the lily kind is in full flower and vigour, the flowers, leaves, and the upper part of the bulb must be cut, and wrapped up in several folds of sized writing paper, so that the whole be exactly covered. They are then to be moderately compressed between two pieces of board: and at the end of some months several small bulbs will be seen formed at the lower extremity. I cultivate, (says C. Willeret, who has made known the above conversation,) this charming unilobed plant in the National Botanic Garden, at

Nancy. It requires to be kept during winter in the hot-house.

To exhibit the Pressure of the Atmosphere.

Procure two hollow hemispheres of Brass, (A & B Fig. 19,) to one of which let there be a pipe annexed having a stop cock C. the pipe terminating in a screw so as to fit the plate of the air pump; bring the other hemispheres in contact, with a wet leather between them, and having exhausted the air from the inside, turn the stop-cock C, take the whole from the pump and screw on the handle; and then try if you can separate them. You will find that there is a tremendous pressure to overcome, a pressure which if the diameter of the cups were only four inches, would be equal to 180 pounds weight.

Artificial Mahogany.

The following method of giving any species of wood of a close grain the appearance of mahogany in texture, density, and polish, is said to be practised in France with such success, that the best judges are incapable of distinguishing between the imitation and mahogany. The surface is first planed smooth, and the wood is then rubbed with a solution of nitrous acid. One ounce and a half of dragon's blood, dissolved in a pint of spirits of wine, and one third of an

ounce of carbonate of soda, are then to be mixed together and filtered, and the liquid in this thin state is to be laid on with a brush. This process is repeated, and in a short interval afterwards the wood possesses the external appearance we have described. When the polish diminishes in brilliancy, it may be restored by the use of a little cold-drawn linseed oil.

To make any Linen appear like Diaper.

When the cloths have been washed, spread upon a table, after being a little damped, then, having at hand a solution of alum in rose-water, dip into it a loose-haired painter's brush, and holding it upwards, discharge its contents gradually, by hitting its handle against a poker, held crosswise as high as one's head. If paper figures, or chimney ornaments, be laid upon the cloth, they will intercept the descent of the solution upon the cloth, and thus produce their own figures in a kind of relief.

Chimney Ornaments made of Variegated Eggs.

The eggs should be those of the wild goose or swan, as being of thicker shell, and more absorbent than those of some other feathered animals. Round one of these, let there be twined a yard or more of bright-coloured narrow ribband, rather traversely or lozenge-wise, a

like quantity of quite another colour; then another and another, until the whole egg is nearly covered. Wrap it in a cloth, and boil three or four hours, and you shall have the impression of the ribbands upon the egg, in a kind of plaid pattern. They will last many years.

Pearls.

The Chinese are reported to have constructed natural pearls (if the antithetical term may be used) by means of oysters; and we see no reason why the same way may not be adopted in our country; if indeed, as has been shrewdly suspected, the practice does not already prevail secretly. Buffon had long ago suggested, and (in 1773) when this information reached Europe, that the puncturing of oysters, while yet alive, might produce pearls, and we know that they were often found in this shell-fish on our own coasts. But two characters belonged to *the naturalist*: he was a visionary—a fabulist also; and he left us in the dark, as to the secret of *puncturing*, which the industry and discrimination of the present day has fully developed. *The process*, which is worthy of trial, whenever it can be put in execution, consists in taking the oysters alive, and having perforated holes with a wire or awl, so as not to hurt vitality, a small iron wire is to be introduced, having knobs at a small distance from each other, formed probably of knots tied in the wire. The oysters are

then to be replaced in their beds, and by the time the *season* comes round again, a concretion of pearly matter will be found to have covered the knobs of wire, which will become more perfect and larger the longer the oysters are suffered to remain.

The coasts of Dorsetshire, where the oyster-shells arrive at a great size, and the south-west coasts of Ireland, offer the fairest harvests to this new pearl-fishery.

To make Pomatum of Water and Wax.

Water and wax are two substances that do not readily unite together; therefore, to those who witness the following process, without knowing the cause, it will have the appearance of something marvellous. Into a new glazed earthen pot, put six ounces of river water and two ounces of white wax, in which you must previously conceal a strong dose of salt of tartar. If the whole be then exposed to a considerable degree of heat, it will assume the consistence of pomatum, and may be used as such.

Iron Transformed into Copper.

Dissolve blue vitriol in water, till the water is well impregnated with it; and immerse into the solution small plates of iron, or coarse iron filings. These will be attacked and dissolved by the acid of the vitriol,

while the copper naturally contained in the vitriol will sink, and be deposited in the place of the iron dissolved. If the piece of iron be too large for dissolving, it will be so completely covered with particles of copper, as to resemble that metal itself.

Art of Bronzing Plaster Figures.

Lay the figure over with isinglass-*size*, until it *holds out*, or without any part of its surface becoming dry; then with a brush, such as is termed by painters a 'sash-tool,' go over the whole; taking care to remove, while it is yet soft, any of the size that may lodge on the delicate parts of the figure. When it is dry, take a little very thin oil gold-size, and with as much as just damps the brush, go over the figure with it, allowing no more to remain than causes it to shine: set it aside in a dry place, free from smoke, and in eight-and-forty hours the figure is prepared to receive the bronze.

The *bronze*, which is a powder almost impalpable, may be found at the colour-shops, resembling all the metals, and should be dabbed on with a little cotton-wool. After having thus touched over the whole figure, let it stand another day, and then with a soft, dry brush, rub off all the loose powder, particularly from the *points*, or more prominent parts of the figure: it will then resemble the metal intended, and possess the quality of resisting the weather.

Brass being the metal commonly imitated, the

operator may choose to make it himself. In that case, let him dissolve copper filings in *aqua fortis*. When the acid is well impregnated with the copper, pour off the solution upon some scraps of iron, whereby the powder will be precipitated to the bottom of the liquid: this being now poured off, the powder is to be repeatedly washed in clean water. When dry, it is fit for use.

How to make a Cone, or Pyramid, move upon a Table, without Springs or any other artificial Means.

Roll up a piece of paper, or any other light substance, and put a lady-bird, a beetle, or some such small insect, privately under it; then, as the animal will naturally endeavour to free itself from its captivity, it will move the cone towards the edge of the table, and as soon as it comes there, will immediately return, for fear of falling; and by moving backwards and forwards in this manner, will occasion much diversion to those who are ignorant of the cause.

Impenetrable Winter Cloaks, made of Feathers.

The women of Hudson's Bay prepare cloaks for their husbands of the feathers of birds, which naturally resist all kinds of weather, and are an admirable

defence against *sleet* in particular. They constantly boast that 'the animals have been all killed by their own hands;' and this is indeed necessary to the preservation of the dress, as the feathers which come away in moulting, or through disease, would decay. A coarse linen *shape* is stretched out, and the feathers having the quill part thrust through its meshes, are attached on the wrong side by needle and thread, and then lined with baize. Some sort of pattern, or, patch-work, is generally attempted by arranging the feathers, which may be improved upon by our fair countrywomen, especially with the deeply coloured and variegated tinted plumage of South American, or Brazilian birds.

Method of making Muffs and Tippets from the Plumage and Skins of Birds.

We are indebted to a Frenchman for having brought to perfection this useful and ornamental art. Domestic animals of all the feathered kinds, afford the material of which these articles may be made; but those with rich, variegated colours for gay wear, as they are less liable to decay than the sable coverings of birds of prey, would no doubt be preferred. Above all, those animals should be selected whose plumage lies close and smooth upon their backs—for obvious reasons. Diseased birds, or those killed in moulting time, are to be rejected, as the feathers would drop off at no distant period; but the birds must therefore be killed in full health, and the skin carefully stript

off soon after their death, especially when the weather is hot, otherwise the same effects would be produced from corruption as from disease. When the skin has been freed from its impurities, it is spread upon a small table, the plumage downwards,—the feathers having been previously arranged over each other, according to the natural order. To keep it well stretched, tacks or pins may be driven in, or threads passed round underneath the table.

Next clear away the grease or fleshy parts that remain, and close up the rents, if any; the skin is then covered with a size made of glue, in which a small quantity of common salt and a glass of white wine has been mixed up to bring it to the proper consistency. The skin, thus covered, being exposed to the direct action of the wind, the glue will begin to scale off, and the whole must be scraped away. Should any dampness still remain on the skin, apply the glue again, dry and scrape it as before. When well dried, the skin is to be placed away in a box, in which dried wormwood, (absinthe), aloes, or some other bitter vegetable, is placed. The skins of large, or rank-feeding birds, require vinegar and salt to be dissolved in the glue; and the whole to be passed over with a solution of alum.

A Picture that Changes with the Weather.

Make a green ink, which is termed sympathetic or invisible green, from its being only to be seen when

heated—thus: Dissolve salt of tartar, clear and dry, in a sufficient quantity of river water.

With this ink, take a brush and trace over the trees and fields of a print that represents the dreary aspect of winter, observing the usual rules of perspective, to make some parts deeper than others, according to their distance, leaving the remainder of their natural colours. Then put the print into a frame with a glass, and cover the back with paper that is pasted only at the extremities.

When it becomes desirable the picture should change, a solution of violets or tansies, must be passed over the greens, and the picture be exposed to the warm rays of the sun: all the grass and foliage will then turn to a pleasing green. But if a yellow tint be given to some parts of the print, before the sympathetic ink is drawn upon it, different shades will be produced, and the scene that a minute before represented winter, be changed into spring. Place the picture in the cold, and winter re-appears; but admit the sun, or the heat of fire, it is then driven away once more, and this may be often repeated.

How to Make a Peg that will exactly fit Three different kinds of Holes.

Let one of the holes be circular, the other square, and the third an oval; then it is evident, that any cylindrical body, of a proper size, may be made to pass through the first hole perpendicularly; and if

its length be just equal to its diameter, it may be passed horizontally through the second, or square hole; also, if the breadth of the oval be made equal to the diameter of the base of the cylinder, and its longest diameter of any length whatever, the cylinder, being put in obliquely, will fill it as exactly as any of the former.

Mutual Exchange of different Liquors in two Bottles, without using any other Vessel.

Two bottles having been procured as nearly equal as possible, both in neck and belly, let one be filled with wine, the other with water. Then clap the one that is full of water dexterously upon the other, so that the two necks shall exactly fit each other; and as the water is heavier than the wine, it will naturally descend into the lower bottle, and make the wine ascend into its place; but it must be observed, that the wine, by this experiment, will be considerably altered, both in taste and quality; and, therefore, if this be thought too expensive, the same thing may be done with any other two liquors of different specific gravities.

To extinguish Ladies' Clothes, catching Fire.

We often hear, and read in newspapers, when one of those deplorable accidents has happened, which

generally deprive us of the youthful and most lovely of our kind, dry recommendations, that ladies, whose dresses may catch fire, should *lie down*. This, though undoubtedly the right method of extinguishing a flame, is better illustrated, and imprinted more deeply on our recollection, by the following experiment. Take two pieces of muslin, (the article which usually catches fire), or paper, or any other light ignitible substance, and having set on fire the lower part of both, hold one piece *upright*, as female dresses are worn; it will burn out in about one minute, blazing up to a great height, where the neck and face may be supposed to be burnt. Meantime, fling the other piece of burning muslin on the ground; it will burn slowly, the flame at no time ascending more than an inch or two, and although the burning article might not be moved—as must happen when a living person is enveloped in it—nearly ten minutes would elapse before it would be consumed. In short, it is evident that a *perpendicular* female dress, though fifty feet high, would burn out with a destructive flame in less than a single yard of the same material laid in a *horizontal* position. It results, therefore, from the foregoing experiment, that as soon as a *lady's dress* is discovered to be on fire, she should instantly lie down; and she may then call for assistance, or confidently set about extinguishing the flame herself.

N. B. A current of air always prevails near the floor, particularly between the door and fire-place, and therefore it must be kept in mind, not to run out of the room, nor to open a window, in such cases, as that would be fatal.

A Substitute for Ostrich Feathers.

The extreme scarcity and dearness of this article of funeral pomp, appear to warrant us, in a commercial point of consideration, in seeking after a good substitute, at a seemingly great expense. On the hinder parts of the thighs of the turkey, when white, are those feathers to be found that so nearly resemble the ostrich's as to answer the same purposes, and to deceive tolerable good judges of the commodity. White turkeys, though not very common, are by no means scarce.

The Pressure of the Atmosphere,

Is known to pervade all space. It removes water, and may be so compressed, as to remove the more substantial bodies. Some have even asserted, that, but for it, some parts of this globe would fly off into unmeasurable space, and never return. Its effects on water may be judged by the following experiment: Take a tall drinking glass, at the edges whereof is fastened, by means of sealing-wax, a piece of string made tight, and having in its centre a lighted wax taper. This being balanced, so as to retain its position, when the glass is turned upside down, place its mouth in a vessel filled with water; as the taper consumes the air within the glass, its pressure is withdrawn; but the pressure from without still continuing, will force part of the water up

into the glass to supply the place of the air which the taper has consumed. It must be evident, that nothing but the pressure of the atmosphere could thus cause the water within the glass to rise above its own level.

Artificial Flowers.

Make paste of divers colours, with gum-dragon, well steeped and mixed up with sugar, beating it up with the paste in a mortar. For *red*, take cochineal; for *yellow*, use gamboge, indigo and orris for *blue;* and, for the *green*, the juice of beet leaves, scalded over the fire to take away their crudeness. Mould the parts thus ordered into thin pieces, in *forms* resembling the flowers of roses, tulips, &c. by means of tin moulds, or cut out with the points of knives: finish the whole as nearly together as possible, and dry them on egg-shells, or some such substance. Out of the green paste, cut different shaped leaves, which may be mixed among the flowers, in various situations, so as to make them appear larger or smaller; make the stalks of slips of lemon-peel, or wire covered with green silk, which may be bought ready covered. Garnish the tops of pyramids of sweetmeats, fruits, &c. with those flowers, or make a separate *bouquet* of the leaves alone, to be placed in the centre of a dessert dish. It is usual also to lay such in a basket, or kind of shell, made of fine pastry work of crackling crust, neatly cut and dried for that purpose.

Artificial Fruit, with Stems of the Natural Fruit.

At the proper season of the year, pluck and put by the stalks of the fruit meant to be imitated, if possible with the *stones* thereon. Then get some pretty neat tins made in the form of the fruit meant to be imitated, but capable of being divided into two, and with a hole to admit the stalk. Care must be laken too, that the tins be smooth inside, and that the *joint* be well made.

Then take cow heels and calves feet, and boil it to a jelly; strain it through a sieve, put it into a saucepan, and sweeten it; put in some lemon-peel with perfume, and colour it like the fruit intended to be imitated. Stir up each sort well, give it a boil up, and fill your tins while it is warm, having placed the ends of the stalks (with the stones on) in the most natural way possible. Should the fruit be rather too heavy while wet, the stalks and tins must be suspended, whilst drying, by pieces of thread made fast above to nails in the wall, or on the case or box in which they may be placed to dry.

When the whole jelly may be considered quite cold, and a little consistent, open your tins, and prepare for laying on the bloom. *Powder blue* is that bloom, and beautiful specimens are to be produced by practice, which alone, it will be easily seen, must teach, 1*st*, The mode of placing the tins upon the stalks, so as to dry in the proper position, and without a seam at the joint; 2*nd*, The time and mode of

taking them off again, to say nothing of repairing any defect that may occur. The stalks of other than fruit trees may also suffice, but they should in either case be plucked while in full vigour, or they are apt to break during the manufacture.

How to make a Piece of Metal, or any other Heavy Body, swim upon the surface of the Water, like a Cork.

The specific gravity of water is inferior to that of metals, and consequently water, absolutely speaking, cannot support a globe of iron or lead; but if this ball be flattened, and beat out to a very thin plate, it will, if put softly upon still water, be prevented from sinking, and will swim upon its surface like any light substance. In like manner, if a fine steel needle, which is perfectly dry, be placed gently upon some still water in a vessel, it will float upon the surface without sinking.

But if you would have a metallic body of large dimensions to swim upon water, you must reduce it into a thin concave plate, like a kettle, in which case, as the air it contains, together with the body itself, weighs less than the same bulk of water; it cannot possibly sink, as is evident from large copper boats, or pontoons, by which whole armies are frequently passed over rivers without danger.

And if this concave metallic vessel be placed upon the water with its mouth downwards, it will swim as

before, and the contained air will keep the bottom of it from being wet; for that the water will not rise into any hollow vessel which is immerged into it, may be made evident thus:—Take a glass tumbler, and plunge it in water with its mouth downwards, and you will find when you take it out, that the inside of the vessel is perfectly dry, so that if a live coal was put there, it would not be extinguished.

Patterns for Working Muslin Dresses, &c. may be multiplied by the following easy process.—Termed Stencilling.

Lay the print or drawing, which it is intended to copy over a sheet of paper, and with a pin or fine needle, as the case may require, prick the outlines of the print through both papers; then take the clean paper with the holes in it, and lay it upon the article you wish to have the *design* transferred to, fasten it there tolerably close, and dust it over with finely powdered charcoal, placed in a coarse bag, through the meshes whereof the dust will penetrate, and leave a correct copy of the original. Its adherence may be rendered more sure, by previously moistening the substance that is to receive the pattern, with a thin gum.

The pricked paper will serve again immediately for taking another pattern, and in the case of forming a border, or continuous pattern, care should be taken that the figure at one end begins where the other side leaves off.

By knowing the last Figure of the Product of two Numbers, to tell the other Figures.

If the number 73 be multiplied by each of the numbers in the following arithmetical progression, 3, 6, 9, 12, 15, 18, 21, 24, 27, the products will terminate with the nine digits, in this order, 9, 8, 7, 6, 5, 4, 3, 2, 1; the numbers themselves being as follows, 219, 438, 657, 876, 1095, 1314, 1533, 1752, and 1971.

Let therefore a little bag be provided, consisting of two partitions, into one of which put several tickets, marked with the number 73; and into the other parts, as many tickets numbered 3, 6, 9, 12, 15, 18, 21, 24, and 27.

Then open that part of the bag which contains the number 73, and desire a person to take out one ticket only; after which, dexterously change the opening, and desire another person to take a ticket from the other part.

Let them now multiply their two numbers together, and tell you the last figure of the product, and you will readily determine, from the foregoing series, what the remaining figures must be.

Suppose, for example, the numbers taken out of the bag were 73, and 12; then, as the product of these two numbers, which is 876, has 6 for its last figure, you will readily know that it is the fourth in the series, and that the remaining figures are 87.

A curious Recreation with a Hundred Numbers, usually called the Magical Century.

If the number 11 be multiplied by any one of the nine digits, the two figures of the product will always be alike, as appears from the following example:

11	11	11	11	11	11	11	11	11
1	2	3	4	5	6	7	8	9
—	—	—	—	—	—	—	—	—
11	22	33	44	55	66	77	88	99

Now, if another person and yourself have fifty counters a-piece, and agree never to stake more than ten at a time, you may tell him, that if he will permit you to stake first, you will always undertake to make the even century before him.

In order to do this, you must first stake one, and remember the order of the above series, constantly add to what he stakes as many as will make one more than the numbers 11, 22, 33, &c. of which it is composed, till you come to 99; after which, the other party cannot possibly make the even century himself, or prevent you from making it.

If the person who is your opponent has no knowledge of numbers, you may stake any other number first, under 10, provided you afterwards take care to secure one of the last terms, 56, 67, 78, &c. or you may even let him stake first, provided you take care afterwards to secure one of these numbers.

This recreation may be performed with other num-

bers; but, in order to succeed, you must divide the number to be attained, by a number which is a unit greater than what you can stake each time: and the remainder will then be the number you must first stake. Suppose, for example, the number to be attained is 52, (making use of a pack of cards instead of counters,) and that you are never to add more than six; then dividing 52 by 7, the remainder which is 3, will be the number you must stake first; and whatever the other stakes, you must add as much to it as will make it equal to 7, the number by which you divided; and so on.

Two Dice being thrown, to find the Number of Points on each Die, without seeing them.

After any person has thrown two dice, upon a table, bid him double the number of points on one of them, and add 5 to it; then let him multiply this sum by 5, and add the number of points on the other die to it. This being done, desire him to tell you the sum, and having thrown out of it 25, the remainder will be a number consisting of two figures, the first of which, to the left, is the number of points on the first die, and the second figure, to the right, the number on the other.

Suppose, for example, that the number of points of the first die which comes up, is 2, and that of the other 3; then if to 4, the double of the points of the first, there be added 5, and the sum which is 9, be

multiplied by 5, the product will be 45; to which if we add 3, the number of the points on the other die, it will make 48. Then if 25 be thrown out of this number, the remainder is 23; the first figure of which 2, is the number of points of the first die, and the second figure, 3, the number of the other.

Varnish for Silk, which renders it impervious to Water or Air.

Take of linseed oil, and add to it for every pint two ounces of sugar of lead, and three ounces of litharge; boil until these ingredients are dissolved. Then, to a half pint of the drying oil, (as we will now consider it,) add a pound of bird-lime, and in an iron pot of a gallon measure, let it boil gently over a slow charcoal fire, until the bird-lime ceases to make a crackling noise. Then pour upon it two pints and a half of drying oil, and boil it about an hour longer, stirring it often with an iron or wooden *spatula*. As the varnish, in boiling, swells much, the pot should then be removed from the fire, and be again replaced when the swelling subsides. While boiling, it should be occasionally examined, in order to ascertain whether it has boiled enough: for this purpose, take some of the varnish upon the blade of a large knife, and after rubbing the blade of another knife upon it, separate the knives; and when, on their separation, the varnish begins to form threads between the two knives, it has boiled enough, and should be removed

from the fire. When it is almost cold, add nearly about an equal quantity of spirits of turpentine; mix both well together, and let the mass rest till the next day. Then having warmed it a little, strain and bottle it; if too thick, add more spirits of turpentine.

N. B. This varnish should be laid upon the silk when perfectly dry, in a lukewarm state; a thin coat of it upon one side, and, about twelve hours after, two other coats should be laid on, one on each side; and in twenty-four hours the silk may be used.

Method of Preserving Sea Plants.

These grow on the rocks from which the sea occasionally recedes; they are termed *fuci*, and when dried and preserved, are exceedingly beautiful; the *curious*, therefore, and especially those who prosecute the study of botany, must be anxious to know the best method of preserving them, without destroying their colour and beauty. The following is recommended by M. Mauduyt:—Take a sheet of paper, or rather of pasteboard, and cover it with varnish on both sides, and having rowed in a boat to the rock where the fuci abounds, plunge your varnished paper into the water, and detaching the fuci, receive it upon the paper, agitate the paper gently in the water, that the plant may be properly spread over it, and lift them up together softly out of the water, then fix down with pins the strong stalks, that they may not be displaced, and leave the plant lying upon

the varnished paper, to dry in the open air: when it is fully dry, the different parts will retain their position, and the plant may be preserved within the leaves of a book. If you wish to free it from the slime and salt which adheres to it, it may be washed gently in fresh water, after being removed from the rock on which it grew.

An easy and expeditious Method of providing a Substitute for Indian Ink.

Boil parchment slips, or cuttings of glove leather, in water, till it forms a *size*, which, when cold, becomes of the consistence of jelly; then, having blackened an earthen plate, by holding it over the flame of a candle, mix up with a camel hair pencil, the fine lamp black thus obtained, with some of the above *size*, while the plate is still warm. This black requires no grinding, and produces an ink of the very same colour, which works as freely with the pencil, and is as perfectly transparent as the best Indian Ink. It likewise possesses the advantage of furnishing artists with a substitute for that article, which may be prepared in situations, where it might be difficult to obtain the ink itself.

The Almond Trick.

Get three almonds, or any other eatables, and hav-

ing placed them upon the table a short distance apart, put a hat over each. Tell the company that you will eat the three almonds, and, having done so, will bring them under whichever hat they please. When you have swallowed each separately, request one of the spectators to point out the hat under which they shall all be. When choice has been made of one of the hats, put it upon your head, and ask the company if you have not fulfilled your promise.

The Three Knives.

Wager any sum with a person that you will give him three knives to hide, one after the other, and will tell him where he deposits the *last*. He will doubtless stipulate that he shall be permitted to hide them out of the room. This you readily agree to, and on presenting him with the first and second knives, he will go out and carefully deposit them in some secret hole or corner. During his absence, put the third knife into the fire, so that it will be moderately heated by the time he is prepared to receive it. As soon as he takes hold of it, he will very naturally deposit it upon the floor, with sundry ejaculations incidental to the touching any thing too hot to hold. You then say, "There it is, you have deposited the *last* upon the floor, and I have won the wager." This trick generally causes much laughter.

The Glass of Wine under the Hat.

Place a glass of wine upon a table, and, having put a hat over it, offer to lay any of the company a wager, that you will drink the wine without raising up the hat. When your wager is accepted, particularly request that no person will touch the hat; then get underneath the table, and commence sucking and smacking your lips as though you were swallowing the wine with considerable gusto. After a minute or two has elapsed, come from under the table, and say to the person who accepted your wager, "Now, sir." His credulity will immediately induce him to raise up the hat, in order to ascertain if the wine be drunk. Immediately he does so, take up the glass, and having swallowed its contents, say, "You have lost, sir, I have drunk the wine without lifting up the hat." This trick generally excites much laughter against the simpleton who thus dupes himself.

Beautiful Golden Yellow Dye, for Silks, Cotton, &c.

This fine lively and durable yellow dye, has recently been discovered by M. Lasteyrie, who thus describes the process by which it is obtained from the shaggy spunk, or boletus hirsutus of Linnæus, a species of mushroom or fungus, growing chiefly on apple or walnut trees. This vegetable substance is

replete with colouring matter, which must be expressed by pounding in a mortar; after which the liquid thus acquired is to be boiled about a quarter of an hour. Six pints of water may be well tinged for dyeing by a single ounce of the expressed fluid. This being strained, the silk, cotton, &c. intended to be dyed, must be immersed and boiled in it for about fifteen or twenty minutes, when fine silk in particular, if it be afterwards passed through soft soap water, will appear of a bright golden hue, equal in lustre to that of the silk hitherto imported from China at a great expense, for imitating gold embroidery. In short, every sort of stuff retains a fine yellow colour; but it is, of course, less bright on linen and cotton. Nor is the use of this vegetable substance confined to dyeing, since it has been ascertained, that the yellow extract which it yields is applicable to the purposes of painting both in oil and in water colours.

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To Prepare a Hortus Siccus.

This is a Latin term, signifying "dry garden," inasmuch as specimens of all sorts of plants may be thus preserved, in order to have recourse to them upon future occasions, when botany is pursued as a science in-doors. The value of such a collection is evident, since a thousand minutiæ may be preserved in the well dried specimens of plants, which the most accurate engraver would have omitted.

Among the different methods adopted by botanists

for obtaining a hortus siccus, the following suggested by the ingenious Mr. Whately, appears to be the most practicable.

He directs those who intend to follow his plan, previously to procure—1. A strong oak box of the same size and shape as those employed for packing up tin plates—2. A quantity of fine sifted sand, sufficient to fill the box—3. A considerable number of pieces of pliant paper, from one to four inches square; and, 4. Some small flat leaden weights, and a few small bound books.

The plant is first to be cleared from the soil as well as the decayed leaves, and then laid on the inside of one of the leaves of a sheet of common cap paper; the upper leaves and flowers are next to be covered, when expanded, by pieces of the prepared paper, and one or two of the leaden weights placed on them. The remainder of the plant is now to be treated in a similar manner.

The weights ought next to be gently removed, and the other leaf of the sheet of paper folded over the opposite one, so as to contain the loose pieces of paper and plants between them; a book or two is now to be applied to the outside of the paper, till the intended number of plants is thus prepared, when a box is to be filled with sand to the depth of an inch, one of the plants put in, and covered with sand sufficient to prevent the form of the plant from varying. —The other plants may then be placed in succession, and likewise covered with a layer of sand, one inch thick between each, after which, the whole is to be gently pressed down in a greater or less degree, ac-

cording to the tenderness or firmness of the plants. The box is next to be carefully placed before a fire, one side being occasionally a little raised, as may be most convenient, the sides being alternately presented to the fire two or three times in the day, or the whole may be put into an oven gently heated; in the course of two or three days the plants will be perfectly dry, when the sand ought to be taken out and put into another box, the plants should likewise be removed to a sheet of writing paper.

Easy Method of Gilding Steel.

Immerse a piece of highly polished steel, in a solution of nitro-muriatic gold, which will leave a coat of gold upon the steel, which must be immersed in water the moment it is gilt. The adhesion and appearance of the gold are considerably improved by the use of the burnisher. All kinds of figures may be delineated on highly polished steel instruments, by applying a fine brush or pen dipped in the above solution.

Water-Proof Cloth.

An able practical chemist of Glasgow has discovered a simple and most efficacious method of rendering woollen, silk, or cotton cloth, completely water-proof. The mode adopted is to dissolve caout-

chouc (Indian rubber) in mineral oil, which is procured in abundance at the gas works: by a brush to put five or six coatings of this mixture on one side of the cloth or silk, on which another piece of cloth is laid, and the whole passed between two rollers. The adhesion is most complete; so much so, that it is easier to tear the cloth than to separate either piece from the caoutchouc.

Neptune's Fire.

Pour a little clean water into a small glass tumbler, and put one or two pieces of phosphoret of lime into it. In a short time flashes of fire will dart from the surface of the water, and terminate in ringlets of smoke, ascending in regular succession.

Composition of Tutanag, or Chinese White Copper.

This celebrated alloy has been analyzed by Dr. Fyfe, who gives the following as its composition:—

Copper	40	4
Zinc	25	4
Nickel	31	6
Iron	2	6
	100	0

The Incombustible Handkerchief.

Mix the whites of eggs and alum together; then smear a handkerchief with it, all over. Wash it in salt and water, and when dry, fire will not consume it.

To Freeze Water by Heat.

This trick can only be performed in the winter. Set a quart mug upon a stool before the fire, throwing a little water upon the stool first. Then put a handful of snow into the pot, having privately conveyed into it a handful of salt. Stir it for about ten minutes, and the congelation will be effected.

The Magic Spider.

Take a piece of burnt cork, as big as a pea, and cut it to the shape of a spider; make its legs with threads of hemp; put a grain of lead into the cork to give it some weight: then hang this artificial spider by a bit of gray sewing silk (that is not twisted) between two bodies, the one electrified and the other not; or between two bodies endowed with different electricities: it will go and come between these two bodies, and the movement of the legs will be seen as plainly as if it were a living spider.

The Extinguisher and Re-Illuminator.

Make two little figures of wood, or clay, or any other material you please, only taking care there is a small hole at the mouth of each. Put in the mouth of one a few grains of bruised gunpowder, and a little piece of phosphorus in that of the other, taking care that these preparations are made beforehand; then take a lighted wax candle, and present it to the mouth of the figure with the gunpowder, which, taking fire, will put the candle out; then present your candle, having the snuff quite hot, to the other figure; it will light again immediately by means of the phosphorus. You may produce the same effect by two figures, drawn on a wall, with a pencil or piece of charcoal, by applying, with starch or a wafer, a few grains of gunpowder to the mouth of one, and a piece of phosphorus to the mouth of the other.

The Bottle Conjuror.

State to the company that it was proved some years ago, at the Haymarket Theatre, that to crawl into a quart bottle was an impossibility; but the rapid progress made by the march of intellect in these enlightened times has proved that any person *may* crawl into a pint bottle as easily as into his bed. Having thus prefaced your intentions, you get a pint bottle, and place it in the middle of the room; then

go outside the door, and creeping into the room upon all fours, say, "Ladies and gentlemen, this is crawling *in to* the pint bottle!"

The Geological Phial.

In a large sized phial, three parts full of clear water, infuse pure alumine, precipitated by ammonia, till the bottle is nearly filled. Expose the bottle to the cold air in frosty weather; or, at other times, to artificial frost. As soon as the frigorific effect ensues, the alumine will divide all over the surface of the water, and form itself into separate and very regular strata.

To Dye White Gloves a Beautiful Purple.

Boil four ounces of logwood and two ounces of roche alum in three pints of soft water till half wasted. Let it stand to be cold after straining. Let the gloves be nicely mended, then with a brush rub it over them, and when dry repeat it. Twice is sufficient, unless the colour is to be very dark; when dry rub off the loose dye with a coarse cloth; beat up the white of an egg, and with a sponge rub it over the leather. The dye will stain the hands, but wetting them with vinegar will take it off before they are washed.

Amusing Explosion.

There is a tree growing in America, which they call the Devil's tree; its fruit, in a state of maturity, is elastic, and when dried by the heat of the sun, noisily splits, and bursts forth its grains. To this sport of nature, the tree owes its name; for, at the moment of bursting, the effect of a piece of artillery is produced, the noise of which succeeds rapidly, and is heard tolerably far off. If its fruit be transplanted, before it is ripe, to a dry place, or exposed on a chimney-piece to a gentle heat, it will have the same effect, and produce the same phenomenon.

The Floating Needle.

Pour some water in a plate: then drop a needle lightly and carefully upon the surface, and it will float.

The Dancing Ring.

Procure a hollow ring, and fill it with quicksilver by means of a small hole; stop up the hole with clay, and, having heated the ring over a candle, put it down upon the table, and it will dance about until the quicksilver becomes cold.

French Way of Washing fine Lace or Linen.

Take a gallon of furze blossoms and burn them to ashes, then boil them in six quarts of soft water; this water, when fine, you are to use in washing with your suds as occasion requires, and you will have the linen, &c. not only exceeding white, but it is done with half the soap and little trouble.

The Dancing Ball.

Place on the spout of a fountain, an inverted cone of wire net-work; throw into it a light hollow copper ball, two inches and a-half in diameter, which let fall to the narrow part of the cone to reach the spout: it will rise and remain suspended in the air till brought down by the wind, and repeatedly ascend and descend.

To Silver Paper without Silver, after the Chinese manner, very useful in Fancy Work.

Take two scruples of clear glue (Indian glue is the best) one scruple of alum, and half a pint of clear water, simmer the whole over a slow fire till it is nearly two-thirds evaporated, then your sheets of paper being laid on a smooth table, dip a varnishing brush in the preparation, and go quickly over the

paper twice, sift powder of talc through a fine sieve made of gauze, hang it to dry, and when dry, rub off the superfluous talc, which serves again for the same purpose. The talc is to be prepared in the following manner:—Take one pound of Muscovy talc, boil it in fresh water four hours, then take it off the fire, and let it stand in the water two days, wash it well, beat it to pieces in a mortar, and add to it six ounces of alum, which, when reduced to a fine powder, put again into clear water, and just give it a boil, pour off the water, and place the powder in the sun, or a warm place to dry, it will become a hard consistence. This beat in a mortar to an impalpable powder, and it is fit for use; keep it in a bottle to keep the dust from it, which is apt to make it appear dingy.

To make a Candle Burn under Water.

Take a glass, and, fastening a piece of wood across the mouth, stick upon it a piece of lighted candle, and steadily convey the glass to the surface of the water; then push it carefully down, and the candle will be seen burning under the water, and may be brought up again alight. In the same manner, a handkerchief may be immersed without being wetted, if rolled very tightly together. The principal art consists in bringing the mouth of the glass exactly level with the surface of the water, for if it be put the least on one side, the water will rush in, and consequently defeat the object.

Two Cold Liquids produce Fire.

Put a small quantity of aquafortis into a saucer; add a few drops of oil of turpentine, oil of carraways, or any other essential oil, and a flame will instantly be produced.

The three Haloes.

The following experiment, which illustrates in a pleasing manner the actual formation of haloes, has been given by Dr. Brewster:—"Take a saturated solution of alum, and having spread a few drops of it over a plate of glass, it will rapidly crystallize in small flat octohedrons, scarcely visible to the eye. When this plate is held between the observer and the sun, or a candle, with the eye very close to the smooth side of the glass plate, there will be seen three beautiful haloes of light, at different distances from the luminous body. The innermost haloe, which is the whitest, is formed by the images refracted by a pair of faces of the octohedral crystals, not much inclined to each other; the second haloe, which is more coloured, with the blue rays outwards, is formed by a pair of faces more inclined; and the third haloe, which is very large and high coloured, is formed by a still more inclined pair of faces. Each separate crystal forms three images of the luminous

body, placed at points 120 degrees distant from each other, in all the three haloes; and as the numerous small crystals have their refracting faces turned in every possible direction, the whole circumference of the haloes will be completely filled up. The same effects may be obtained with other crystals; and when they have the property of double refraction, each haloe will be either doubled, when the double refraction is considerable, or rendered broader, and otherwise modified in point of colour, when the double refraction is small. The effects may be curiously varied, by crystallizing upon the same plate of glass, crystals of a decided colour, by which means we should have white and coloured haloes succeeding each other.

Application of the Moire Metallique to Tin-Foil.

All leaves of beaten tin are susceptible of crystallizing, because the hammer has only broken, more or less, the tin crystals; and, without any other preparation, they give a larger or smaller grain. It is not the same with laminated tin: the crystals are so exceedingly broken, that on being taken out of the acid-bath, the leaves of tin shew only an oxidized surface, proving that the porosity is not the same as that of beaten leaves. The means employed for moiring tin-plates becomes impracticable on leaves of tin in complete fusion; thus there was no need of employing a blast of air or water. Tin has so strong an attachment to the surface of iron, as to facilitate

crystallization by the different means employed, and under different forms. It was requisite to make these leaves of tin undergo partial fusion, more or less extensive, but not general. Therefore take a leaf of brass, what is called in commerce yellow tinsel (a very fine piece of woven wire would produce the same effect): after it is heated red-hot, to anneal it, nail it on a frame, mounted on four feet, about eight inches long, to stand level on a table. Take a leaf of tin, which extend upon the brass by rubbing it with a brush; afterwards pass a small spirit-lamp under it, in different places, to fuse the tin, which will produce a very fine *moire*. The ground will be in grains, in a natural crystallization. To produce grounds, filled with flowers, take round and flat irons; after having heated them red-hot, and pressed them beneath the foil without friction, the contact will melt the tin to the width of the iron. But care must be taken to withdraw the iron as soon as the tin appears to be melted, and not to replace it but at a certain distance from the part first brought into fusion, in order that the latter may have time to solidify, and not be confounded with the other. Afterwards we may follow the same process between them. By running leaves of tin upon fine cambric, or upon stone, different *moires* may be formed in succession, at pleasure. It now remains only to subject these leaves to the action of the acid, in order to develope the *moire* produced by the heat. For this purpose, pass the composition over the foil with a sponge, or rather dip the foil into the liquid, and draw it out again as soon as it has acquired its bril-

liancy, to rinse it in pure water, and wipe it dry. But in the latter case, care must be taken to coat the back of the foil with varnish, that the acid may not penetrate through it by acting on both sides. The varnish should be composed of Jews' pitch *(asphaltum)* dissolved in oil of turpentine. The nitro-muriatic composition is made of two parts of nitric acid and one part of muriatic acid, diluted with ten parts of water.

To make Crocant or Ornamental Paste, for covering preserved Fruits.

A crocant frame is made of copper, in the form of an egg cut through the middle, and about the size of two quarts: take about half a pound of flour and an ounce of fine grated sugar, which make up in a paste with the yolk of an egg or two, and a little water; roll it out very thin and even; butter the outside of your crocant, and lay the paste over it quite smooth, and with a sharp pointed penknife cut it in what figure you please; but it is only those who understand drawing can do it to perfection, as it ought to be done in coats of arms, flowers, foliage, &c. when done set it in the oven to harden, and make it a cover for preserved fruits of any kind.

You may boil sugar till it be quite tough and ropy, and butter your frame, and with a small twig lay it on the frame in what figure you please: take it off when quite hard, and use it as the other.

To make Wax Candles.

Tie a dozen of wicks on an iron circle, at equal distances, over a large copper vessel, tinned and full of melted wax, pour a ladle full of wax on the tops of the wicks, one after another; what the wick does not take, will drop into the vessel, which must be kept warm by a pan of coals; so poured on till you have your candles as big as you chuse. If you want to have them of a pyramidical form, let the three first ladles be poured on at the top of the wick, the fourth at the height of $\frac{3}{4}$, the fifth at $\frac{1}{2}$, and the sixth at $\frac{1}{4}$; then take them down hot, and lay them aside of each other in a feather bed folded in two, to preserve their warmth and keep the wax soft; then take them down, and roll them one by one on a smooth table, and cut off the thick end as you please.

Electric Spark from Brown Paper.

Thoroughly dry befofe the fire a quarter of a sheet of rather strong brown paper; place it on your thigh, holding it at the edge, while with the cuff of your sleeve on the other hand, you rub it smartly backwards and forwards for about a minute: if the knuckle be then placed near the paper, it will emit a brilliant spark, accompanied by a snapping noise: the prongs of a fork similarly placed, will produce three distinct streams of light. The experiment must, of

course, be performed in the dark, and the trousers and coat be of woollen cloth.

The Magic Book.

Provide an octavo book of plain paper, of whatever thickness you please. Turn over seven leaves from the beginning, and paint a group of flowers; then turn over seven more leaves and paint the same again; and so on, until you have turned the book through to the end. Then paste a slip of paper or parchment to each of the painted leaves. Turn the book over again, and paint upon every sixth leaf a parrot, and then paste strips upon them as you did upon the first, only a little lower down. Proceed in this manner, until you have painted the book full of pictures of various sorts, taking care one side of the leaves is left white paper. Having made the book, when you use it, hold it in your left hand, and set the thumb of your right hand upon the first of the parchment stays; run the book through, and it will appear full of flowers; then stop, and, blowing upon the book, run it through again, with the thumb upon the second slips of parchment, and it will appear full of parrots, and so on. Afterwards reverse the book, and run it through as before, and it will appear to be composed of blank paper.

To draw Beer from a Knife.

To do this, you must have a small piece of sponge, which privately soak in some beer, taking care that the sponge be neither too large or too full of liquor, lest you be discovered. Place this either in the cavity of the right ear, or behind the ear under the hair; then, taking a knife, stick it, with the handle upwards, in a table or stool (but observe that your company is placed opposite you); then bid them look, saying, "Then you see there is no liquid either on this handle, or on the table;" stretch your empty hand towards your ear, saying, "Now, somebody cross my arm," and, speaking some powerful words, as "*Jubio bisco*," you will then have a fair opportunity to take the sponge into your hand from behind your ear. Stretch forth your hand, take up the knife, and squeeze it gently, and afterwards a little harder, which will make the beer run the faster, to the amazement of the company; at the same time saying, "Thus could I do till I had drowned you all." Then sprinkle a little in their faces, which will cause them to shut their eyes, whilst you convey away the sponge.

Method of Painting on Silk or Satin.

First make an outline according to your fancy, then lay on a wash of isinglass with great care, which will

remove the glare and sleekiness of the silk, being necessary to make your colours work freely; melt the isinglass in clear water so as not to be very glutinous, otherwise it would spoil your colours and discolour your silk; observe your lights are to be made by a small tint mixed with flake white, of the colour of the intended flower, just sufficient to make a degree from the colour of the silk; for instance, if a blue flower, a very small quantity of bice or blue verditure mixed with the white, using less of the white in proportion as the shades grow darker, indigo may be used alone in the darkest. Take care never to lay your colours on the silk thick, as then they will be apt to crack, to prevent which it may be proper to mix a little white sugar candy with the gum water. If your flower is so deep as not to admit of a pure white in any part, lay on a priming of white, which being thoroughly dry, proceed to the ground colour of the flower, advancing gradually with the shades as before directed.

To make Fine Blue Sealing Wax.

Take an ounce of mountain blue, or blue ashes, an ounce of fine mastic, the fifth of an ounce of true Venice turpentine; then get a small iron pot or pan well cleaned, and made so as to have a little spout or beak, put the mastic in first, which is to be melted on the fire, taking care that it does not burn: then mix the turpentine with it: this mixture being done,

take the pan from the fire and put the blue ashes in it, then stir it all well with a little stick; take care when you put in the blue ashes that the other ingredients are not too hot, as that would make the colour too black, when all is well mixed, and before it is quite cold, take two pieces of glass, which must be made wet with water, then pour on one of them this composition in order to roll it in sticks under your fingers, which must be wet.

In order to give this wax the necessary polish, pass the sticks over the flame of spirits of wine, which are to be lighted for this purpose.

Method of Teaching Drawing or Writing to Young Persons.

An artist proposes to teach young persons the elements of drawing by making them first practise on a slate; because it may be soon cleaned with a wet cloth or sponge. This method indeed would save the expense of paper, and afford the pupils an opportunity of easily correcting their faults, without being obliged to begin their drawing again entirely.

For my part, I think it would be more advantageous to employ, instead of a slate, a piece of Bohemian glass, which might be made rough on one side, by rubbing it with a pumice-stone, or a flat bit of freestone, or fine sand well moistened. Whatever figures have been drawn on this glass, may be effaced by a wet cloth in the same manner as from a slate; and

besides this advantage, as the glass is transparent, correct copies may be placed below it, which the scholars ought to follow till their hand is properly formed. What is here said of drawing may be applied also to writing.

How to Make a Drawing Desk.

Let a frame be made of a reasonable size, so that a tolerably large piece of crown glass may rest upon it, supported by a ledge at the bottom part; where, by two hinges, it may be fastened to a drawer of the same dimension, which may be divided to serve for pen, ink, and paper, and other small utensils or instruments for drawing. To the top of the frame, fix two stays, by which the frame may be raised higher or lower, as occasion may require.

The manner of using this frame is thus:—lay the print or drawing you intend to copy on the glass, and fasten a sheet of fine white paper, with some wafers or paste, upon it; if you work in the day-time, place the back, after you have raised the frame to a proper height, against the window; but if by night, put a *lamp* behind it, and you will see every stroke of the print or drawing, which with your pen you may copy very accurately, and finish according to the manner you think proper. If it be a solid piece you intend to copy, then place it behind the desk, and having fastened your paper to the frame, put the lamp so as as to produce a strong shade on the object

you have before you to draw, and you will plainly see to trace the outlines with black lead pencil: after which, fill up the shades in the manner it appears *without the desk.*

The Confederate Shilling.

Having previously marked a shilling with a cross, conceal it under some object in the room; then request one of the company to lend you a shilling, and say, "Now I am going to perform a trick with this, and that you may know it again, I will mark it." Take a penknife, and cross it on the same side as the concealed shilling. Ask him if he will know it again, and then knock under the table and say, "Presto, be gone." Convey it secretly up your sleeve, and tell the company it has vanished; but you have an idea where they will find it. Name the place where you concealed the first shilling, which will be immediately discovered, and from the similarity of the mark, will be taken for that which was lent you.

Effect of Heat on the Ruby.

In subjecting rubies to a high degree of heat, Dr. Brewster observed a very singular effect produced by their cooling. At a high temperature, the red ruby becomes green; as the cooling advances, this green

tint gradually fades and becomes brown, and the redness of this brown tint gradually increases till the mineral has recovered its primitive brilliant red colour. A green ruby suffered no change of colour from heat, and a bluish green sapphire became much paler at a high heat, but resumed its original colour by cooling.

To Bleach Prints and Printed Books.

Simple immersion in oxygenated muriatic acid, letting the article remain in it, a longer or shorter space of time, according to the strength of the liquor, will be sufficient to whiten an engraving: if it be required to whiten the paper of a bound book, as it is necessary that all the leaves should be moistened by the acid, care must be taken to open the book well, and to make the boards rest on the edge of the vessel, in such a manner that the paper alone shall be dipped in the liquid; the leaves must be separated from each other, in order that they may be equally moistened on both sides. The liquor assumes a yellow tint, and the paper becomes white in the same proportion; at the end of two or three hours, the book may be taken from the acid liquor, and plunged into pure water with the same care and precaution as recommended in regard to the acid liquor, that the water may touch both sides of each leaf. The water must be renewed every hour, to extract the acid remaining in the paper, and to dissipate the disagreeable smell.

To Remove the Stains of Ink.

The stains of ink, on cloth, paper, or wood, may be removed by all acids; but those acids are to be preferred, which are least likely to injure the texture of the stained substance. The muriatic acid, diluted with five or six times its weight of water, may be applied to the spot, and after a minute or two washed off; repeating the application as often as may be found necessary. Less risk attends the use of vegetable acids. A solution of the oxalic, citric, (acid of lemons,) or tartareous acids, in water, may be applied to the most delicate fabrics without danger of injuring them; and the same solution will discharge writing, but not printing ink. Hence it may be employed in cleaning books, which have been defaced by writing on the margin, without impairing the text.

Dr. Wollaston's Ice Apparatus.

The cold produced by evaporation is under certain circumstances, very great. Spirit of wine, and ether, which readily evaporate, produce considerable cold during that process. Upon this principle, wine-coolers, and similar porous vessels, refrigerate the fluids they contain; and thus, by accelerating the evaporation of water, by exposing it under an exhausted receiver, containing bodies that quickly absorb its vapour, Professor Leslie has contrived to

effect its congelation; the heat required for the conversion of one portion of the water into vapour, being taken from the other portion, which is thus reduced to ice. The instrument invented by Dr. Wollaston, and called by him the cryophorus, acts upon a similar principle. It consists of a glass tube with a bulb at each extremity. One of the bulbs is about half filled with water, and a good vacuum is produced in the other by boiling the water, and sealing the tube whilst full of steam. On immersing the empty bulb in a freezing mixture, the water soon congeals in the other, although the intervening tube be two or three feet long. The vapour in the empty bulb is condensed by the cold, and a fresh quantity of vapour arises successively from the water in the other, by which so much heat is carried off as to cause it to congeal.

Method of Colouring Alum Crystals.

In making these crystals, the colouring should be added to the solution of alum in proportion to the shade which it is desired to produce. Coke, with a piece of lead attached to it, in order to make it sink in the solution, is the best substance for a nucleus; or, if a smooth surface be used, it will be necessary to wind it round with cotton or worsted, otherwise no crystals will adhere to it. *Yellow.*—Muriate of iron. *Blue.*—Solution of indigo in sulphuric acid. *Pale-blue.*—Equal parts of alum and blue vitriol. *Crimson.*—Infusion of madder and cochineal. *Black*

—Japan ink thickened with gum. *Green.*—Equal parts of alum and blue vitriol, with a few drops of muriate of iron. *Milk-white.*—A crystal of alum held over a glass containing ammonia, the vapour of which precipitates the alumina on its surface.

Valuable Transformation.

Pour half an ounce of diluted nitro-muriate of gold into an ale-glass, and immerse in it a piece of very smooth charcoal: expose the glass to the rays of the sun, in a warm place. The charcoal will very soon be covered over with a beautiful golden coat. Take it out with a foreceps, dry it, and enclose it in a glass for shew.

Another.

Put two or three small crystals of nitrate of silver into a crucible, containing the charcoal you intend to silver, red hot; violent detonation and combustion will take place. The charcoal will be beautifully covered with silver when taken out. Enclose it in a glass for show.

Easy Method of Silvering Ivory.

Prepare a diluted solution of nitrate of silver, in

which immerse the figure or slip of ivory, polished, you intend to silver, till it has become of a bright yellow colour; then take it out of the solution, and immerse it into a tumbler of distilled water, in which expose it to the direct rays of the sun; and in two or three days it will become intensely black; but on rubbing it a little the black surface will be changed to a bright metallic one, resembling silver. As the silver wears off, a new coating of revived metal will be found to replace it, if the ivory be well impregnated with the subnitrate of silver.

Beautiful Metallic Crystallization.

Melt a ladle-full of bismuth, and allow it to cool slowly and gently, till a thin crust has formed on the surface; and then by means of a pointed iron, make two small opposite apertures through the crust, and quickly pour out by one the fluid portion, as carefully and with as little motion of the mass as possible, whilst the air enters by the other aperture: there will appear, on removing the upper crust by means of a chisel, when the vessel has become cold, a cup-shape concavity, studded with very brilliant crystals, and more or less regular, according to the magnitude of the quantity of mass employed, the tranquillity and slowness with which it has cooled, and the dexterity with which the fluid portion, at the moment before it commenced to solidify, was decanted from the crystallized part. The same effect will be pro-

duced by fusing the substance in a crucible which has a hole at its bottom, lightly closed by an iron rod or stopper, which is to be drawn out when the mass begins to congeal: by this means the superior portion, which is fluid, is made to run off, and a cake studded over with crystals is obtained.

To Remove a Gold Ring from the Finger when it has become too tight.

Take a little quicksilver, and rub it upon the ring, which will soon be penetrated with it, and become so fragile that it will break without the least exertion.

Experiment in Respiration.

Place a mouse or other small animal, under a jar of chlorine gas; or drop it into one from the aperture at the top of a jar filled with it. The animal will instantly expire.—Immerse a mouse or small bird in a jar of hydrogen gas; the animal will instantly die from suffocation, and the want of respirable nourishment.—If a mouse or sparrow be dropped into a jar of nitrogen gas, it will fall down exhausted, and gasping for breath: extinction of life will immediately follow.—Prepare a jar of nitrous oxide gas, and immerse in it any small animal; at first it will appear lively, but afterwards very uneasy and lan-

guishing, and life will quickly become extinct.—If a mouse or other animal be immersed in a jar of sulphuric acid gas, it will instantly expire. There are few gases more deleterious to animal life than this, and too much care cannot be taken not to breathe an atmosphere charged with it, even in a small degree.—If a mouse be dropped into a jar containing carbonic acid gas, it will expire in two or three seconds. In this way butterflies, &c. may be preserved for cabinets.—Confine a mouse or other small animal in a jar of nitrous gas; life will immediately become extinct.—Immerse a mouse in a jar of atmospheric air; it will at first give no signs of uneasiness; but as its respiration proceeds, and the oxygen is consumed (the atmospheric air in the glass being loaded with carbonic acid gas from the lungs), the animal will gradually become faint, and if kept in much longer, will die.—Let two jars be placed on a table; the one containing oxygen gas, and the other pure atmospheric air. Into each of these let a mouse be dropped. The animal immersed in the oxygen will live four times as long as that in the jar of atmospheric air.

An Infallible Barometer.

Put two drams of pure nitre and half a dram of choride of ammonia, reduced to powder, into two ounces of spirit of wine, or pure alcohol, and place this mixture in a glass tube, ten inches long and

eight inches in diameter, the upper extremity of which must be covered with a piece of skin or bladder, pierced with small holes. If the weather is to be fine, the solid matters remain at the bottom of the tube, and the alcohol is as transparent as usual. If rain is to fall in a short time, some of the solid particles rise and fall in the alcohol, which becomes somewhat thick and troubled. When a storm, tempest, or even a squall is about to come on, all the solid matters rise from the bottom of the tube, and form a crust on the surface of the alcohol, which appears in a state of fermentation. These appearances take place 24 hours before the tempest ensues; and the point of the horizon from which it is to blow, is indicated by the particles gathering most on the side of the tube, opposite to that part whence the wind is to come.

The Green Tint of Plants preserved by Gas.

It has been lately discovered that the gas which is now employed for the purpose of illumination (carbonated hydrogen), and which is almost always present in coal-mines, has the curious property of preserving the green-tints of plants unimpaired after all light has been withdrawn from them; various plants having lately been discovered growing in such situations, whose green colour was quite as perfect as those growing in the light.

To Paint Gold Flowers on Silk.

Paint flowers or other ornaments with a very fine camel-hair pencil dipped in a solution of nitro-muriate of gold, (in the proportion of one part of the nitro-muriate to three of distilled water) on silk, satin, &c. and hold them over a Florence flask, from which hydrogen gas is evolved, during the decomposition of water, by sulphuric acid and iron filings. The painted flowers, &c. in a few minutes, will shine with all the splendour of the purest gold. A coating of this kind will not tarnish on exposure to the air, or in washing.

To Paint Silver Flowers on Silk.

Paint flowers, &c. on white silk, with a camel's hair pencil dipped in a solution of nitrate of silver; immerse this while wet in a jar of sulphurous acid gas, by burning sulphur under a jar of atmospheric air. The penciling will assume a beautiful metallic brilliance.

Crystallization of Tin.

The process is as follows:—Dissolve four ounces of muriate of soda in eight ounces of water, and add two ounces of nitric acid; or eight ounces of water,

two ounces of nitric acid, and three ounces of muriatic acid; or eight ounces of water, two ounces of muriatic, and one ounce of sulphuric acid. Either of these mixtures is to be poured warm upon a sheet of tinned iron, placed upon a vessel of stone ware; it is to be poured on in separate portions, till the sheet is completely watered; it is then to be plunged into water, slightly acidulated, and washed. The operation is completed by drying. By subjecting the iron to different degrees of heat, the variety of the forms is increased; some parts are granular, others are like architectural ruins; others grand natural phenomena of wood, and mountain, and cataract; in fine, there is no shape which the imagination can conceive, that accident may not produce in these exquisite sports of chemical power. The natural result of the crystallization is, to produce a surface of the shade of mother of pearl. The hues of gold, green, blue, &c. are effected by varnishes, laid on in a peculiar manner, and rubbed to the utmost degree of polish by the soft part of the hand.

Pleasing Experiments with Glass Tubes.

A most remarkable phenomenon is produced in glass tubes, placed in certain circumstances. When these are laid before a fire in an horizontal position, having their extremities properly supported, they acquire a rotatory motion round their axis, and also a progressive motion towards the fire, even when their

supports are declining from the fire, so that the tubes will move a little way upwards to the fire. When the progressive motion of the tubes towards the fire is stopped by any obstacle, their rotation still continues. When the tubes are placed in a nearly upright posture, leaning to the right hand, the motion will be from east to west; but if they lean to the left hand, the motion will be from west to east; and the nearer they are placed to the upright posture, the less will the motion be either way. If the tube be placed horizontally on a glass plane, the fragment for instance of coach window glass, instead of moving towards the fire, it will move from it, and about its axis in a contrary direction to what it had done before; nay, it will recede from the fire, and move a little upwards when the plane inclines towards the fire.—These experiments succeed best with tubes about 20 to 22 inches long, which have in each end a pretty strong pin fixed in cork for their axis.

To detect Adulteration in Champagne.

This celebrated wine is indebted for its characteristic properties to the presence of carbonic acid. It produces rapid intoxication, in consequence of the alcohol, which is suspended in, or combined with this gas, being thus applied in a sudden and very divided state to a larger extent of nervous surface: for the same reason its effects are as transitory as it is sudden. The following simple test invented by Doctor

Haknemann, may be relied upon in all cases when an adulteration of lead is suspected:—Expose equal parts of sulphur and powdered oyster-shells to a white heat for fifteen minutes, and, when cold, add an equal quantity of cream of tartar: these are to be put into a strong bottle with common water, to boil for an hour; and the solution is afterwards to be decanted into ounce phials, adding twenty drops of muriatic acid to each. This liqour will precipitate the least possible quantity of lead in the most rapid manner; the muriatic acid being added to prevent a precipitation of iron, which is innoxious, and might accidentally be contained in the wine.

Art of Making the best Writing Ink.

To prepare the best ink, the following ingredients are to be used, viz.:—

4 ounces of good galls,
2 ..... chipped logwood.
2 ..... sulphate of iron,
1½ ..... gum arabic,
½ ..... sulphate of copper,
½ ..... brown sugar.

Boil the galls and logwood in six pints of spring or distilled water, until nearly three pints are evaporated, then strain through a piece of flannel. Powder the salts in a mortar, dissolve the gum in a little warm water, then mix the whole together, and shake it frequently for two or three days; during which

time, exposure to the air will be beneficial. Now decant the liquor into well corked bottles of stone. It is fit for use immediately.

Extemporaneous Preparation of a Saline Draught.

Pulverise one ounce of citric acid, and divide it into twenty-four parts, which are to be put into separate blue papers. Pulverise also one ounce of the sub-carbonate of soda, and divide it into twenty-four like packages, in white paper. When the draught is to be prepared, put the carbonate into a tumbler, half filled with spring or filtered water. When this is completely dissolved, add the acid, which will immediately cause an effervescing discharge of carbonic acid. During this effervescence swallow the draught, which will be found very refreshing in warm weather.

Restoration of Paintings.

The white used in oil-painting, is generally prepared from lead, and forms the basis of many other pigments; and is extremely liable to turn brown or black, when affected by sulphureous vapours. M. Thenard, of Paris, has restored a painting of Raphael's, thus injured, by means of oxygenated water, applied with a pencil, which instantly took out the

spots and restored the white. The fluid was so weak, as to contain not more than five or six times its volume of oxygen, and had no taste.

Looking-Glasses.

Professor Lancellotti, of Naples, has discovered a new composition for the fabrication of looking-glasses, which unites economy to facility of execution. He employs three parts of lead and two of mercury. This composition is then melted on the heated and dry glass: it attaches itself strongly to the surface, and the images or objects are faithfully reflected by it; but care must be taken not to let the oxide which is formed in the fusion of this amalgam remain between the glass and the metallic surface.

Conversion of Rays into Sugar.

Dr. Volgel, Member of the Royal Academy of Sciences, has submitted to a careful examination in the Laboratory of the Academy of Munich, the surprising discovery of Braconnet, of Nancy, of the effects of concentrated sulphuric acid on wood and linen. He has not only fully confirmed this discovery, but also extended his own experiments, with equal success, to other similar vegetable substances, such as old paper, both printed and written upon, and

cut straw. By diluting the sulphuric acid with a due addition of water, sawdust, cut linen, paper, &c. were converted into gum and saccharine matter. It must excite great interest in reflecting minds, to see an indissoluble, tasteless substance, like the filaments of wood, converted, by chemical re-action, into two new bodies, and chemistry thus exercise a power, which, till lately, appeared to belong to nature alone, and in particular to vegetation. For this artificial formation of sugar and gum, now discovered, must not be confounded with the extraction of these two substances from bodies in which they already existed, a process which has been known from time immemorial. What has now been discovered, is a transformation—a metamorphosis, of which the most ingenious chemist had previously no idea; and it affords a new proof of the boundless extent of the domain of practical chemistry.

To Destroy Caterpillars.

A mode of destroying caterpillars, has been discovered by accident. A piece of woollen rag had been blown by the wind into a currant-bush, and when taken out was found covered by these leaf-devouring insects. Pieces of woollen cloth were immediately placed on every bush in the garden, and next day the caterpillars had universally taken to them for shelter. In this way thousands were destroyed every morning.

Cheap Mode of preserving Anatomical Preparations.

It has been usual to employ, for this purpose, spirit of wine, somewhat above proof, and which costs about 18*s.* or 20*s.* per gallon. It has been ascertained by Mr. Cooke, of London, that a saturated solution of muriate of soda (common salt) answers the purpose equally well; and this solution (about three pounds of salt to the gallon) does not cost above 10d. per gallon. Mr. Cooke has received from the Society of Arts, for this discovery, the society's silver medal.

Infallible Antiseptic.

For ensuring the sweetness of fish conveyed by land-carriage, the belly of the fish should be opened, and the internal parts sprinkled with powdered charcoal. The same material will restore impure, or even putrescent water, to a state of perfect freshness.

Quadrature of the Circle.—Simple method of solving this Problem.

Let a sphere be made, likewise a perfect hollow cube, one of the internal sides of which must be equal to the diameter of the sphere; then let the sphere be

placed in the hollow cube, and pour water into the vacant space around the sphere, until the water is exactly level with the edge of the cube, and consequently with the top of the sphere, after which, take the sphere carefully out, and measure the proportion which the depth of water left in the cube bears, to the vacant space lately occupied by the sphere; deduct the quantity of space occupied by the water, from the entire space contained by the cube, and the remainder will be the solid contents of the sphere. In order to find the proportion between the circle and the superficial square, let a cylinder be made of the same diameter as the sphere abovementioned, and equal in height to one of the internal sides of the cube, place the cylinder in the cube, pour water around it, until the water is level with the edge of the cube, then carefully take out the cylinder, find the proportion as previously directed for the sphere; and as the proportion of the cylinder is to the cube, so will the proportion of the circle be to the square.

M. Rieussec's Chronograph.

This chronographihas the form and size of a large pocket chronometer. The dial is moveable, and turns round an axis, passing through its centre perpendicular to its plane. When the chronograph is in motion, the dial turns round once in a minute; and as its circumference bears sixty divisions, the angular motion of one division corresponds to one second of time.

The minutes are marked separately. The chronograph being in motion, the observer who wishes to mark the instant of a phenomenon, presses a stud, and that very instant a pen or metallic point passing through the open summit of a cone, filled with oil-black, and placed opposite to the fixed zero, from which the dial begins to move, marks on the circumference bearing the divisions for seconds, a point which serves to shew with what second and fraction of second the beginning as well as end of the time to be measured corresponded. The play of the mechanism which darts the pen, neither stops nor retards the motion of the rotatory dial; the stud may therefore be pressed several times while the motion continues, thus forming on the division of sixty, a number of black points, each of which will indicate by its position the instant in which it was marked. The pressure on the stud, and the formation of the black point, are simultaneous, and the diameter of this point is such, that one-fourth of the interval between two consecutive divisions may be readily estimated. This estimate will be more exact and easy, the larger the dial. It has succeeded well in measuring the speed in horse-races, machines in motion, running water, &c.

To preserve Fresco Paintings.

Frequent attempts have been made to separate fresco paintings from the walls on which they are executed, in order to rescue them from the destruc-

tive effects of time and weather, but all have been unsuccessful. Antonio Contri, of Ferara, was the first who made a public attempt in the beginning of the 18th century, at Mantua. He succeeded in taking several heads of Giulio Romano from the wall, and transferring them to canvass; but this work required long and difficult preparations, which were besides only calculated for even walls, and for taking off smaller paintings. Later trials in France and other countries, were confined, with more or less success, to transferring paintings, piece by piece, from walls or linen, to new linens, but never to panels. Subsequently, the mode of sawing the paintings from the wall was adopted; this method, however, which was always attended with danger, was only applicable to pictures of a small size. Steffano Barezzi, a native of Milan, has the honour of having been the first to render an essential service to the arts, in transferring to panels, by a most simple, expeditious, and safe process, fresco paintings, of whatsoever size, from the wall, whether level or not, without doing the least damage to the original design. His method consists in laying a piece of prepared linen against the wall, which extracts the painting, in such a manner, that the artist, with a sure and uniform motion, can draw off the linen in a perfect state with the painting, so that the wall itself remains quite white. This linen is then stretched upon a panel, and again drawn from this, so that the painting itself remains fixed upon the panel without sustaining the smallest injury.

Working and joining of Tortoise-shell.

Tortoise-shell and horn become soft in a moderate heat, as that of boiling water, so as to be pressed in a mould, into any form, the shell or horn being previously cut into plates of a proper size. Plumier informs us, in his *Art de Tourner*, that two plates are likewise united into one by heating and pressing them; the edges being thoroughly cleaned, and made to fit close to one another. The tortoise-shell is conveniently heated for this purpose by applying a hot iron above and beneath the juncture, with the interposition of wet cloth to prevent the shell from being scorched by the irons; these irons should be pretty thick, that they may not lose their heat, before the union is effected. Both tortoise-shell and horn may be stained of a variety of colours, by means of the colouring drugs commonly used in dyeing, and by certain metallic solutions.

Substitute for a Copying Machine.

Write with common writing ink, in which lump sugar has been dissolved, in the droportion of four scruples, or a drachm and a half of sugar to one ounce of ink. Moisten copying paper, (a paper which is sold at the stationers at 1*s.* 10*d.* per quire, for the use of copying machines) by passing a wet soft brush over it, then press it gently between soft

cap paper, so as to smoothen it, and absorb the superabundant moisture. Put the paper so moistened upon the writing, and both between cap or other smooth soft paper, placing the whole on the carpet or hearth-rug, one end of which is to be folded over. By standing and treading upon this, an impression will be taken, equal, if not superior, to what would have been taken by a copying machine.

Artificial Jewels.

The base of all these imitations is strass, or white crystal. The materials employed are melted in Hessian crucibles, and a porcelain furnace, or what is preferable, a potter's furnace is afterwards used. The more tranquil and prolonged the fusion is, the more hardness and beauty does the strass acquire.

STRASS.

The following three mixtures give a very fine strass:

Rock Crystal	0,321	0,3170	0,300
Minium	0,490	0,4855	0,565
Potash, pure	0,170	0,1770	0,105
Borax	0,021	0,0200	0,030
Arsenic, oxide of	0,001	0,0005	
	1,000	1,0000	1,000

M. Lancon recommends the following mixture for a pure strass:

Litharge	0,540
White Lead	0,406
White Tartar, or Potash	0,054
	1,000

TOPAZ.

The imitation of topaz is difficult. It passes from the white of strass, to sulphur-yellow, violet, and red purple, according to circumstances which are not determined. The following are two of M. Wieland's recipes :

White Strass	0,95816	0,99
Glass of Antimony	0,04089	
Purple of Cassius	0,00095	
Oxide of Iron		0,01
	1,00000	1,00

These mixtures sometimes yield an opaque mass, translucent at the edges, and of a red colour in thin plates. By mixing it with eight times its weight of strass, and keeping the mixture in fusion for thirty hours in a potter's furnace, the result is a fine yellowish crystal. This crystal re-melted by the blow-pipe, produces the finest imitation of eastern *ruby*.

RUBY.

A ruby less beautiful, and of a different tint, may be made thus :

Strass	0,9755

Oxide of Manganese .. 0,0245

1,0000

EMERALD.

This paste is very easily made; and that which approaches the nearest to the mineral, is the following:

Strass..... 0,98743
Green Oxide of Copper .. 0,01200
Oxide of Chrome..... 0,00057

1,00000

The following is M. Lançon's recipe for emerald:

Strass 0,9905
Acetate of Copper 0,0080
Peroxide of Iron 0,0015

1,0000

PERIDOT.

By augmenting the proportion of oxide of chrome and oxide of copper in the first composition of emerald, and adding oxide of iron, we may vary the green shades, and imitate the peridot and deep coloured emerald.

SAPPHIRE.

The composition for this paste is,

Strass, very white	0,9855
Oxide of Cobalt, very pure	0,0145
	1,0000

This mixture must be put into a Hessian crucible, carefully luted, and remain thirty hours in the fire. If the process be well conducted, the result will be a very hard glass, without bubbles.

AMETHYST.

Very deep amethyst may be obtained with,

Strass	0,9870
Oxide of Manganese	0,0078
Oxide of Cobalt	0,0050
Purple of Cassius	0,0002
	1,0000

M. Lançon uses

Strass	0,9977
Oxide of Manganese	0,0022
Oxide of Cobalt	0,0001
	1,0000

BERYL, OR AQUAMARINE,

Is made with

Strass	0,9926
Glass of Antimony	0,0070

Oxide of Cobalt	0,0004
	1,0000

SYRIAN GARNET.

This paste is used for small jewels, and is made with

Strass	0,6630
Glass of Antimony	0,3320
Purple of Cassius	0,0025
Oxide of Manganese	0,0025
	1,0000

In the fabrication of these pastes, many precautions are necessary, which can only be learned by experience. The materials should, in general, be carefully pulverised. The mixtures should be properly sifted, and the same sieve should not be used for different compositions. In order to obtain the glass well melted, and homogenous, and without striæ or bubbles, materials of great purity must be employed; they must be mixed in a state of extreme tenuity; the best crucibles must be used; the fire must be graduated, and kept equal to the maximum temperature, and the mass must be left in the fire from 24 to 30 hours, and allowed to cool very slowly.

Perpetual Engravings on Steel, and other Metals.

The merit of this invention consists in obtaining, with great facility, from *one* engraving, any required number of plates, all of which are equal to the *original*, and by which millions of impressions may be produced, while by the common process, one engraving produces only a few thousands. The process of multiplying engravings, etchings, or engine work, is as follows: Steel blocks, or plates of sufficient size to receive the intended engraving, having their surfaces softened or decarbonated, and thereby rendered a better material for receiving all kinds of work than copper itself. After the intended engraving has been executed upon the block, it is then hardened by a new process, which prevents injury to the most delicate work. A cylinder of steel previously softened, is then placed in the transferring press, and repeatedly passed over the engraved block, by which the engraving is transferred *in relief*, to the periphery of the cylinder; the press having a vibrating motion equalling that of the cylinder upon its periphery, by which new surfaces of the cylinder are presented, equal to the extent of the engraving. The cylinder is then hardened, and is employed to indent copper or steel plates, with engravings *identically* the same with that upon the *original* block; and this may be repeated *ad infinitum*, as the original engraving will remain, from which other cylinders may be impressed if required. This invention promises to be of great advantage to some of our manufacturers, particularly

that of pottery, which may now be embellished with beautiful engravings, so as to place the successful competition of other nations at a great distance. It is also applied with great advantage to calico printing, by producing entire new patterns upon the cylinders from which they are printed. It would be superfluous to mention the beautiful highly-finished engravings which now adorn our books, rooms, &c.

Engravings of greater size than can be transferred, are executed upon steel plates, which, when hardened, will print 200,000 perfect impressions.

It is to Messrs. Perkins, Fairman, and Heath, that the world is indebted for this valuable invention.

Bees.

Our cruel mode of taking honey by destroying the innocent and beautiful insects that produce it, can no longer be defended by the plea of necessity. A late traveller in the northern part of India, describes the following easy method by which the honey-gatherers there effect their purpose. A hollow tree, or an earthen pot, is built in the wall of a house, or out-house, with apertures externally, through which the bees enter and go out. The internal end of this hive can be opened or shut at pleasure, by various simple contrivances; a sliding door is one. In the centre of the hive there is a valve. When the hive is full, and the honey is to be taken, a great noise is made at the inner extremity. This drives the bees

out; the valve is then closed, and the honey is taken out by the sliding-door. The superior part of our readers will doubtless take a pleasure in communicating this easy mode of avoiding cruelty, to those whom the information might not otherwise reach.

To make Roses blow very late.

First, cut off the tops of the rose-trees immediately after they have done bearing, and then they will flower again in November; but they will not come just on the tops where they have been cut, but on the side shoots. Second, pull off the buds of the roses when they are newly knotted; for then the side branches will bear in the autumn: in both these cases the effect is the same, the sap is restrained for a time, and diverted into new channels. Third, lay the roots bare for some days, about Christmas; by this means the sap is stopped in its progress upwards. Cover the roots again with earth, and it will ascend, but slower and later. Fourth, gird the body or stem of the rose-tree with packthread, and that will restrain the sap from rising through the bark, which is full of sap-vessels, and cause it to leaf and flower late.

Method of Painting Japan Work.

Japan work ought properly to be painted with

colours in varnish; though for the greater dispatch and in some very small works, for the freer use of the pencil, the colours are sometimes tempered in oil, which should previously have a fourth part of its weight of gum animi dissolved in it; or, in default of that, gum sandarach, or gum mastich. When the oil is thus used, it should be well diluted with oil of turpentine, that the colours may lay more evenly and thin, by which means, fewer of the polishing or upper coats of varnishing will be necessary. In some instances, water colours are laid on grounds of gold, in the manner of other paintings, and are best when so used in their proper appearance, without any varnish over them; and they are also sometimes so managed as to have the effect of embossed work. The colours employed in this way, for painting, are best prepared by means of isinglass size, corrected by honey or sugar-candy. The body of which the embossed work is raised, need not, however, be tinged with the exterior colour, but may be best formed of very strong gum water, thickened to a proper consistence by bole armenian and whiting in equal parts, which being laid on the proper figure, and repaired when dry, may be then painted the proper colours, tempered with the isinglass size, or in the usual manner, with shell-lac varnish.

Manner of Varnishing Japan-work.

The finishing of Japan-work lies in the laying on,

and polishing the outer coats of varnish that are necessary, which is generally done with the best common seed lac varnish, which is thus applied:—The work to be varnished should be placed near a fire, and made perfectly dry; then the varnish rubbed over, beginning in the middle and passing to one end, again from the middle passing to the other, avoiding to go twice over the same place in forming one coat; when one coat is dry, lay on another, till you have a sufficient thickness to bear the polish, which must be done by rubbing it with a rag dipped in tripoli, or rotten-stone, finely powdered; but towards the end of the rubbing, a little oil of any kind should be used along with the powder; and when the work appears sufficiently bright and glossy, it should be well rubbed with the oil alone to clear it from the powder, and give it a still brighter lustre. In case of white grounds, fine putty or whiting must be used.

River Spectacles.

This useful instrument is a tube which may be varied in length as occasion requires. The diameter at top, where the eye is applied, is about an inch. There is a gradual enlargement of tube to the centre, where the diameter is ten times that of the other extremity. There is a glass at each end. The tube is intended to examine the bottoms of rivers, lakes, &c. The great reason why we cannot see with the naked eye through the water, is the effect of reflection and refraction at

the moment light falls on the surface. This glass overcomes the difficulty of transporting the sight as it were to the dense centre of the water, where it takes advantage of the light in the water, and it is carried in a straight line, as it is in the air. To make use of this apparatus during the night, lights are placed all round the center of the cylinder, which are shorter as they descend to the base of the tube. These lights throw a strong light around, and enable the inspector to see distinctly the bottom of the river.

Preserving of Birds, &c.

Mr. Temminck, director of the Dutch Museum, has for many years, made use of no other means of saving preserved birds and quadrupeds from the attacks of minute insects, than placing a small wooden basin, containing tallow, in each case, which he finds to be more effectual than either camphor or Russia leather.

Chinese Paints.

The peculiar beauty of Chinese drawings is owing, not to the particular nature of the colouring substances, but merely to their being mixed with glue or size, instead of gum-water, as is the common practice in Europe. In regard to the preparation, two things must be observed; first, that the beauty de-

pends, in a very great measure, upon the fineness of its particles, the finest being always the most beautiful. A Chinese painter employs a man for three or four days to grind a small quantity of vermilion in a porcelain mortar, and it is from this they derive their fine reds. Secondly, it must be considered, that most mineral colours are prepared with acids, alkalies, or other salts, and that a small superabundance of those saline substances generally remains with them, which, after a longer or shorter time, produces considerable alteration in their brilliancy, and often entirely changes their colour. In order to obviate this inconvenience, the paint, after having been levigated, must be repeatedly washed in clean water: distilled water is the fittest. In order to effect this properly, put half an ounce of the paint in a half pint glass phial, and fill the rest of the phial almost entirely with water; shake it well: then let it stand for a while, and the coloured powder will soon fall to the bottom; then pour off the water, by inclining the phial gently, so as not to disturb the sediment, and fill it again with clean water, and so on for five or six times; after which, the colour being gently dried must be ground a little longer, and then it is fit for use. The glue or size to be mixed with the paints is extracted from parchment in the following manner.—Take about four ounces of clean parchment, cut it into bits, and put it to soak in a quart of clean water for about twelve hours; then boil the whole on a gentle fire, and in the beginning take off the scum with a spoon. The vessel must remain always uncovered, and the liquor must be stirred occasionally.

After boiling about an hour, take off the pot from the fire, and strain the liquor while hot, through a coarse sieve. The liquor must be again put over the fire in a clean pot, and gently boiled till half is evaporated: the remainder is then spread very thinly upon panes of glass, which being kept in a warm place for a day or two, the size will dry, and become very hard. When it is wanted for use, put a small quantity of it in a cup of luke-warm water, and dip the hair pencil in it. The properties of this glue, which render it much superior to gum-water, are the following:—It does not deaden, nor otherwise alter the colours with which it is mixed: it does not crack like gum; and it becomes so soon hard, as not only to defend the colours from being affected by smoke and other vapours, but even to bear the surface of the drawing being cleaned by means of a wet sponge.