For the Scientific American.

Axioms to be observed in making Copal Varnishes.

The more minutely the gum is run, the greater the quantity and stronger the produce. The more regular and longer the boiling of the oil and gum together, the freer the varnish will work. When the mixture of oil and gum is too suddenly brought to string by strong heat, the varnish will require more than a just proportion of turpentine to thin it, whereby its oily and gummy quality is reduced, which renders it less durable, and it will not flow so well in laying on. The greater the proportion of oil used in varnishes, the less liable are they to crack, because tougher and softer. By increasing the proportion of gum, the thicker will be the stratum of varnish, the firmer it will set and the quicker dry. When varnishes are perfectly new and must be applied before they are of sufficient age, they should be left thicker than if kept a proper time before using.—African copal possesses the best qualities of elasticity and transparency. Too much driers in varnish render it unfit for clear and delicate colors. Copperas does not combine with, but only hardens varnish. Turpentine improves by age and varnish by being kept in a warm place. All copal and oil varnishes should be kept some time after they are made before they are used.

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Composition for Welding Cast Steel.

Take ten parts of borax and one part of sal ammoniac; grind them together and fuse them in a metal pot over a clear fire taking care to continue the heat until all spume has disappeared from the surface. When the liquid appeais clear, the composition is ready to be poured out to cool and concrete, when it is ground to a fine powder and is ready for use. To use this composition the steel is put into the fire and raised to a bright refrangible is then dipped among the welding powder and again placed in the fire until it attains the same degree of heat as before, when it is ready to be placed under the hammer.

Method of Bringing out Sculpture upon Alabaster.

This process is founded upon the property which alabaster or sulphate of lime has of being slowly eaten out by cold water, so that the polish is destroyed.

In the first place the sculptures in relief, and all the parts intended to be preserved, are covered with a varnish, insoluble in water composed of wax dissolved in oil of turpentine, mixed with white lead, or rather with a turpentine varnish, to which white lead and a little animal oil has been added to prevent the varnish from hardening and adhering too strongly to the alabaster. This is applied with a soft paint brush, moistened with oil of turpentine, into which it must be dipped every time that varnish is taken. The reserved parts being thus covered, suffer the vessel or ornament to dry for some hours, and then place it in a vessel filled with cold water, and leave it there for 48 hours, or longer if it is thought necessary The varnish is then removed with a fine sponge dipped in varnish of turpentine, and the vessel dried with a soft, and very dry rag. When the vessel is thus cleared of its varnish, and dried, pass over it a new soft brush, dipped in finely powdered plaster. This powder fills the pores of the plaster, which have been attacked by the water, and renders it flat, which brings out the transparent parts of the alabaster in relief.

To clean ornaments and sculptures in alabaster:—wash out any grease spots with oil of turpentine, then put the piece in water, and suffer it to remain until it is freed from its impurities. When you take it out, rub it with a very dry paint brush: let it dry, and pass over it powdered plaster. In this way the piece will be perfectly washed, and will look as though it had just come from the hand of the carver.

To Ornament Picture Glasses With Gold.

The glass must be first washed perfectly clean and dried: then moisten it by breathing on it, or wet it with the tongue, and immediately lay on a leaf of gold, and brush it down smooth. When this is dry, draw any letters or flowers on the gold with Brunswick blacking (a solution of gum asphaltum in spirits of turpentine,) and when dry, the superfluous gold may be brushed off with cotton, leaving the figures entire. Afterwards the whole may be covered with blacking, or painted in any color, while the gold figures will appear to advantage on the opposite side of the glass. This work may be elegantly shaded by scratching through the gold with a steel instrument, (in the end of which many sharp points are formed,) previous to laying on the blacking. Oil paints of any kind may be substituted in the place of blacking, but will not dry so quick.

Phenomena of Light.

The different colored rays of light are not equally luminous—that is to say, do not impress our eyes with equal brilliancy. A piece of finely printed paper placed in yellow light can be read at a much greater distance than in any other color, and from this the light declines on either hand, and gradually fades away in the violet and the red. The light of the sun is accompanied by heat. Dr. Herschel found that by interposing pieces of different colored glass between the sun and a thermometer, that the temperature of the latter was differently affected by different colored glasses. The heat is least in the violet and continually increases as we descend through the colors, the red being the hottest of them all. Late discoveries have shown that every ray of light can produce specific changes in compound bodies. Thus, it is the yellow ray which controls the growth of plants, and makes their leaves turn green; the blue ray which brings about a peculiar decomposition of the iodides and chlorides of silver, bodies which are used in photogenic drawing.—Those substances which phosphoresce after exposure to the sun are differently affected at the different rays—the more refrangible producing their glow, and the less extinguishing them.

Horses.

A horse travels 1200 feet at a walk, in 4½ minutes; at a trot in two minutes; at a gallop in 1 minute.

He occupies in the ranks a front of 40 inches, and a depth of 19 feet; in a stall 3½ to 4½ feet front; and at picket, 3 feet by 9.

Average weight of horses 1000 lbs. each

A horse carrying a soldier and his equipments (say 225 lbs.) travels 25 miles in a day (8 hours.)

A draught horse can draw 1600 lbs. a day. weight of wagon included.

In a horse mill, a horse moves at the rate of 4 feet in a second. The diameter of the track should not be less than 25 feet.

The strength of a horse is equal to that of five men.

The expense of conveying goods at 3 miles an hour per horse teams being 1, the expense at 4½ miles will be 1.33, and so on, the expense being doubled when the speed is 5 1-8 miles per hour.

New use of Waste Steam.

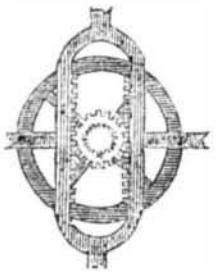
A manufacturer who has a steam engine which discharges much waste steam, conceived the idea of using it to raise pine apples. The steam was introduced under the roots of the plants, and the heat and moisture united, acted so powerfully that the pine apples soon ripened; while the body of the plant being exposed all day to the open air, assumes a healthy and agreeable taste, which renders the fruit far superior to those which have been ripened in hot houses.

Utility of Blue Glass for Hot Houses.

In vegetable growth the blue rays are the most active, the red ones the least so. Hence the benefit of employing glass stained blue or green for the roofs of hot houses.

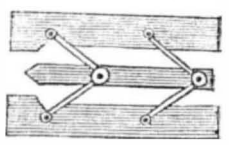
MECHANICAL MOVEMENTS.

Continuous Circular Motion.



In this figure the ratchet wheel is fixed on the shaft seen in the centre; but the spur wheel to which a clip is attached, runs loose on the same shaft, so that its rotary motion will only act in one direction, namely, when the click holds on the ratchet. At the back of the spur wheel is another similarly arranged, with a click, and ratchet wheel, and geering into the opposite rack, which is not on the same plane. Thus, the alternate traverse of the perpendicular rack-piece will produce continuous circular motion in the shaft which carries the wheels.

Parallel Rule.



Draughtsmen have frequently to use an instrument as a guide to draw parallel lines. The one in most common use for that purpose, is two rules joined together by the same joints as are represented in the above engraving The above instrument is superior to the double rule, for the drawing of a greater number of parallel lines, inasmuch as when the joints are closed, the instrument occupies scarcely any more space than the double rule, yet it can guide to double the number of lines without being shifted.

To prevent the ravages of Moths.

The ravages of the woolen moth may be prevented by the use of any of the following substances; tobacco, camphor, and perhaps the most agreeable for wearing apparel, a mixture of one ounce of cloves, one ounce of rhubarb, and one ounce of cedar shavings, tied up in a bag, and kept in a box or drawer. If the substance be dry, scatter it in the folds of the cloth, carpet, blankets, or furs: if liquid scatter it freely in the boxes, or on the cloth or wrapper, laid over and around it.

Hints to Lovers of Flowers.

A most beautiful and easily attained show of evergreens may be had by a very simple plan, which has been found to answer remarkably well on a small scale. If geranium branches taken from luxuriant and healthy trees just before the winter sets in, be cut as for slips, and immersed in soap water, they will, after drooping for a few days, shed their leaves, put forth fresh ones, and continue in the finest vigor all winter. By placing a number of bottles thus filled, in a flower basket, with moss to conceal the bottles, a show of evergreens is easily insured for the whole season. They require no fresh water.

Etching.

Heat the large blade of your pocket knife, and rub it with a piece of beeswax, so as to give it a thin coating When cool take a large needle and scratch letters through the wax. Drop on them two drops of water, and one of nitric acid, and in one minute the letters will be quite deeply etched in the steel.

Cheap Roof.

If a shingle roof is covered with cotton cloth, and then painted, and sand laid upon the top of the paint and all suffered to dry, a roof will be made thereby to last twice as long as without the said covering Cheap boards, will answer as well as shingles and the cloth will keep the roof perfectly tight from leaking.

The weight of platinum, the heaviest known body in nature, is 435,000 times greater, bulk for bulk, than that of hydrogen gas, the lightest known body in nature.

Corn Cob.

It is believed by many, that there is very little nutriment in corn cobs; but as one proof to the contrary, we will adduce the following. A farmer in Virginia, a few years since, afraid his corn crop would not be sufficient to last through the winter, determined to try, and did winter his horses on corn cobs alone, pounded in a common hominy mortar with his own hands. They received no other substance except long forage, as hay and fodder. Upon this they did their work and were in very good condition.—*C. N. Bement.*

Among the evidences of the nutriment contained in the corn cob, the experiment, by distillation, of Mr. Minor of Virginia, showed that five bushels of cobs contained four gallons of spirit. He also found other nutritive matter than the saccharine, as mucilage and oils.

Vegetable Flights.

The distribution of vegetable species is secured by a variety of means. In some instances the seeds are furnished with light silky plumes, or wings, which flutter in the air, and are transported afar by the winds—others, by means of a viscous, hard, impermeable envelope, float on rivers, and descend their courses without suffering the least change, or losing their germinating power There are seeds again of a sufficiently coherent texture, to resist the digestive action of the stomach of animals that eat fruits that contain them, and which are consequently found deposited at great distances from the plant that produced them.

New Fruit.

A new fruit has been introduced at Charleston, S. C. from Japan. It is an evergreen, and bears flowers of a delightful almond-like fragrance, twice a year Last summer, the fruit in small quantity came to maturity in July This year it bore more luxuriantly, and the fruit is now ripe. It is of a rich orange color, about the size and shape of the nectarine, although a little more elongated.

Bottling Asparagus.

A very delicate dish is procured by placing a glass bottle over an asparagus head just as it breaks the ground. The plant rapidly fills the bottle, which is then broken and a large head, tender, delicate, and compact as a cauliflower, is secured.