The Preservation of Wood.

The durability of wood—that is, its power of resisting the destructive influences of wind and weather—varies greatly, and depends as much upon the particular kind of wood and the influences to which it is exposed as upon the origin of the wood (timber), its age at the time of felling, and other conditions. Beech wood and oak placed permanently under water may last for centuries. Alder wood lasts only a short time when in a dry situation; but when kept under water, it is a very lasting and substantial wood. Taking into consideration the different kinds and varying properties of wood, and the different uses to which it is applied, we have to consider, as regards its durability, the following particulars: 1. Whether it is more liable to decay by exposure to open air or when placed in damp situations. 2. Whether it is, when left dry, more or less attacked by the ravages of insects which while in a state of larvæ live in and on wood. Pure woody fiber by itself is only very slightly affected by the destructive influences of wind and weather. When we observe that wood decays, that decay arises from the presence of substances in the wood which are foreign to the woody fiber, but are present in the juices of the wood while growing, and consist chiefly of albuminous matter, which when beginning to decay also causes the destruction of the other constituents of the wood; but these changes occur in various kinds of wood only after a shorter or longer lapse of time. Indeed, wood may in some instances last for several centuries and remain thoroughly sound. Thus, the roof of Westminster Hall was built about 1090.

Since resinous wood resists the action of damp and moisture for a long period, it generally lasts a considerable time. Next in respect of durability follow such kinds of wood as are very hard and compact, and contain at the same time some substance which—like tannic acid—to some extent counteracts decay. The behavior of the several woods under water differs greatly. Some woods are after a time converted into a pulpy mass. Other kinds of wood, again, undergo no change at all while under water—as, for instance, oak, alder, and fir. Insects chiefly attack dry wood only. Splint wood is more liable to such attack than hard wood; while splint of oak wood is rather readily attacked by insects, the hard wood (inner or fully developed wood) is seldom so affected. Elm, aspen, and all resinous woods are very seldom attacked by insects. Young wood, which is full of sap and left with the bark on, soon becomes quite worm-eaten, especially so the alder, birch, willow, and beech. The longer or shorter duration of wood depends more or less upon the following: *a*. The conditions of growth. Wood from cold climates is generally more durable than that grown in warm climates. A poor soil produces as a rule a more durable and more compact wood than does a soil rich in humus, and therefore containing also much moisture. *b*. The conditions in which the wood is placed greatly influence its duration. The warmer and moister the climate, the more rapidly decomposition sets in; while a dry, cold climate materially aids the preservation of wood. *c*. The time of felling is of importance. Wood cut down in winter is considered more durable than that felled in summer. In many countries the forest laws enjoin the felling of trees only between November 15 and February 15. Wood employed for building, and not exposed to heat or moisture, is not likely to suffer from the ravages of insects; but if it is placed so that no draughts of fresh air can reach it, to prevent accumulation of products of decomposition, decay soon sets in, and the decaying albuminous substances acting upon the fiber cause it to lose its tenacity and become a friable mass. Under the influence of moisture, fungi are developed upon the surface of the wood. These fungi are severally known as the "house fungi" (Thelephora domestica and Boletus destructor) and the clinging fungus (Merulius vestator). They spread over the wood in a manner very similar to the growth of common fungi on soil. Their growth is greatly aided by moisture and by exclusion of light and fresh air. A chemical means of preventing such growths is found in the application to the wood of acetate of oxide of iron, the acetate being prepared from wood vinegar. Wood is often more injuriously affected when exposed to sea water, when it is attacked by a peculiar kind of insect known as the bore worm (Teredo navalis). This insect is armed with a horned beak capable of piercing the hardest wood to a depth of about a foot. These insects originally belonged to and abound in great numbers in the seas under the tropical clime; but the Teredo navalis is met with on the coasts of Holland and England.—*X., the Garden.*

EXPERIMENTS WITH THE "SCIENTIFIC TOP."

The engraving represents an attachment to the "scientific top," by means of which the beautiful and instructive experiments of König may be readily repeated. The part of the apparatus carried by the top consists of two pieces of ordinary silvered glass (looking-glass), 2½ by 5 inches, secured to opposite sides of a light wooden frame of the same size, and ¾ inch thick, by means of strips of stout black paper attached to the frame and to the edges of the glasses. The upper and lower edges of the wooden frame are bored at the center to receive the rod inserted in the bore of the top spindle. The frame fits the rod loosely, and is revolved by frictional contact with the rod and the upper end of the top spindle. This arrangement allows the mirror to revolve at a comparatively low rate of speed, the resistance of the air causing the mirror frame to slip on the rod.

Fig. 1.—TOP WITH REVOLVING MIRRORS—KÖNIG'S MANOMETRIC FLAMES.

It is necessary thus to provide for the slow rotation of the mirrors, as the flame points would be blended into a continuous band of light by the persistence of vision were the mirrors allowed to revolve as rapidly as the top.

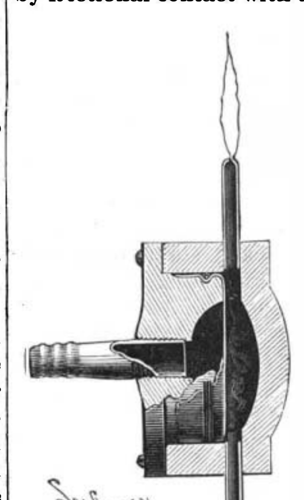

Fig. 2.—SECTION OF DIAPHRAGM CELL.

The device for producing the variable flame is shown in perspective in Fig. 1 and in section in Fig. 2. It consists of a cell formed of two parts, one inserted in the other, and provided with an air chamber, covered by a diaphragm of very thin soft rubber, a gas pipe entering the lower side of the cell at one side of the diaphragm, and a fine gas burner inserted in the cell upon the same side of the diaphragm. A mouthpiece communicates with the air chamber of the cell through a flexible tube, and the gas pipe leading to the cell is connected with the house supply. The gas burner is provided with a narrow shade, which shields the eye of the observer from the direct light of the flame.

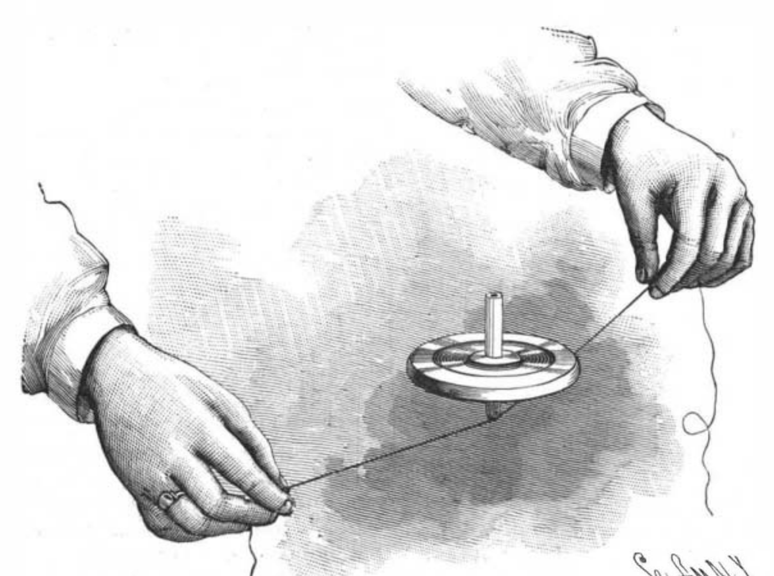

Fig. 3.—TRAVELING TOP.

The top having been set in motion, the mirror is applied and sounds are uttered in the mouthpiece. By viewing the reflection of the flame in the revolving mirror, it will appear as if formed of a regular series of pointed jets, the persistence of the successive images formed on the retina causing them to appear as if produced simultaneously.

The vibrations of the diaphragm due to the sound waves impinging upon it cause the gas to be pushed out of the burner in little puffs, which are not very noticeable when the flame is observed directly, but which are clearly brought out when examined by the revolving mirror.

By employing a double mouthpiece, two sets of flame points of different lengths alternating with each other may be shown. Each vowel sound yields a characteristic series of flame points. A whistle will yield very fine points, while a very low bass note will produce scarcely more than a single point for each half revolution of the mirror.

The traveling top, shown in Fig. 3, exhibits in a striking way the persistence with which a rapidly revolving body maintains its plane of rotation. The top has a spindle, which is reduced in diameter at its lower end, and provided with a sleeve nicely fitted to the small part of the spindle. In a slot in the lower end of the sleeve is pivoted a small sheave, which is adapted to rest upon and run along a string. The top is set in motion by a string in the usual way, the small sheave being placed astride a string at the start. The string may lie loosely on the table at the start, and as soon as the top is spun the string may be taken up by its ends, lifting the top from the table, when the top may be allowed to run along the string from one end to the other.

By swinging the string sidewise, the top will be made to change its position, but it cannot easily be made to change its plane of rotation. G. M. H.

Electric Phosphorescence.

At a recent meeting of the Royal Society, Mr. W. Crookes, the well known physicist, exhibited a series of tubes in which a vacuum had been formed, and which contained precious stones, minerals, and rare earths rendered luminous or phosphorescent by means of an induction coil.

The coil used contained 57 miles of secondary wire, and was capable of giving a 24 inch spark.

One of the tubes contained a large yellow African diamond, weighing 116 carats. Under the electric current the stone was fluorescent. Other Cape diamonds gave a blue light, and some from Brazil gave an orange, yellow, or blue phosphorescence.

Australian diamonds emitted a yellow, blue, or green light; an Indian diamond gave a yellowish light, bordering upon green; rubies gave a red phosphorescence; the topaz was blue, and the sapphire was green. The phosphorescent calcite of Branchville, S. C., which possesses the strange property of becoming luminous (yellow and golden) when heated to white heat, likewise gave a brilliant phosphorescence in the tube.

Mr. Crookes showed likewise a specimen of dolomite from Utah, called "hellfire rock" by the miners, because it emits a strong red light when it is scraped with a knife. This, in the tube, gave a red light.

Dr. Crookes had also a large number of various kinds of minerals. Of these, we shall mention merely the sulphate of yttrium, which gives a yellow light, with discontinuous spectrum, and sulphate of lime, the phosphorescence of which is red, and the spectrum of which consists of three wide bands.—*La Lumiere Electrique.*

Good Prospect for a Swiss Patent Law.

Holland and Switzerland are about the only states in Europe that have no patent laws. It is well known how the first attempt to obtain a popular vote in favor of the patent law for Switzerland failed from being coupled with a vote on the liquor traffic. This was five years ago. Recently, however, the question was again brought before the voters, and this time not accompanied by other issues. The result was a decided victory for those who are striving to protect inventors. The number of persons who declared for an alteration of law, with a view to such protection, was 190,000; those against numbered 56,000. The first step has thus been taken to place Switzerland on the same footing, as regards patent rights, as most other Continental countries. The federal government is now empowered to enact a law under which patents will be granted for all such inventions which can be represented by models, but chemical inventions will be excluded by special wish of those interested in chemical industries.

A DOG bitten by a rattlesnake in Nebraska, instead of dying developed hydrophobia, and bit fourteen head of cattle, all of which died.