SCIENTIFIC AND MECHANICAL.

A WRITER in the *Country Gentleman* says that coal tar is often named as a preservative of wood, and the comment is correct if those who advise would add that, in using, it must have the acid in it destroyed by mingling fresh quicklime with it. Half a bushel of lime, freshly dissolved and mingled with a barrel of tar, has kept posts, saturated with it and planted in clay ground, perfect over 20 years.

ARTIFICIAL IVORY.—French journals announce two new processes for the manufacture of artificial ivory. The first consists in dissolving two parts of pure india-rubber, in thirty-six parts of chloroform, and saturating the solution with pure ammoniacal gas. The chloroform is then distilled at a temperature of 160 deg. Fah.: and the residue, mixed with phosphate of lime or carbonate of zinc, is pressed into moulds and dried. When phosphate of lime is used, the product is said to possess in a remarkable degree the peculiar composition of natural ivory. The second process involves the use of papier maché and gelatine combined. Billiard balls of this substance cost about one-third of the price of genuine ivory balls, and are claimed to be quite as hard and elastic as the latter. They may be thrown from high elevations upon pavements without injury, and will withstand heavy blows with the hammer. The composition is known as Paris marble, and may be used for raised ornamentation of ceilings, or prepared so as to imitate fine varieties of marble.

OIL GOLD SIZE.—Take of gum animi and asphaltum each 1 oz., of red lead, litharge of gold, and umber each 1½ oz. Reduce the coarser of these to a powder, mix, and put them with a pound of linseed oil into a pipkin; boil, gently stirring with a stick till about as thick as tar, strain through flannel, put in a closely stoppered bottle ready for use.

Another.—This made by grinding stone ochre with a drying oil (linseed). It may be made by pouring oil from dryers, and may be hastened or retarded in drying to suit the gilder.

Another is made by grinding good stone or Oxford ochre very fine in old flat linseed oil; when ground as stiff as possible, it ought to be kept for several years before it is used. The longer it is kept the better it becomes, as it requires a rich mellow fatness. When about to use it mix it up with a little good fat boiled oil to a proper consistence, neither too stiff or too fluid.

FRAME GILDING.—Get a smooth surface by rubbing with pumice stone and sand-paper. Lay upon this a few coats of parchment or isinglass size (letting one dry before the other is put on), mixing with the last coat some gilders' whiting and yellow ochre. When this is dry, and has been rubbed smooth, a small piece of the frame is to be moist, and the gold leaf laid on directly. Proceed in this manner until the frame is covered.

DRILLING BAND SAW.—Heat a pair of tongs till almost red hot, and put the saw between till the steel turns blue; then punch a hole through with a punch the required size.

Another.—Soften it by making it red hot and letting it cool, and drill with an ordinary drill in the usual way, then harden it by making it red hot and dip it in cold water, then rub it with a piece of pumice stone; watch it till it burns a light blue, then cool it.

TO STAIN WOOD TO REPRESENT EBONY.—Boil ½ lb. of logwood chips in 2 quarts of water, add 1 oz. of pearlash, and use hot with a brush. Afterwards take 2 quarts of the logwood decoction, ½ oz. of verdigris, ½ oz. of copperas; strain, and add ½ lb. of iron rust. Brush the work well with this, and go over it afterwards with oil.

A NEW SAFETY LAMP.—A paper on "Landau's new Safety-lamp for Use in Mines" was lately read at a meeting of the North Staffordshire Mining Institute. The chief peculiarity of the invention resides in the feature that the admission of gas extinguishes the flame, so that it cannot under any circumstances be exploded by the lamp. The whole of the air supply that feeds the flame must pass through an air-chamber in a limited space at the bottom of the lamp, and as soon as the impure air, such as hydrogen, carburetted hydrogen, &c., fills up to that limited space, the passage of the needful supply of oxygen to feed the flame is choked thereby, and the flame is necessarily extinguished for want of air. Experiments made to demonstrate this claim were quite successful. It was further claimed that the lamp could not be affected by the strongest current of pure air, but were less successful. But while the latter experiment did not show the Landau lamp to be inferior to others, the former were regarded as decided points of superiority in construction.

LIQUID WATERPROOF SHOE POLISH.—The following is said to be a good formula for the purpose: Dissolve 1 oz. of india rubber in 1 pint of oil of turpentine by the aid of a water bath, preventing loss; dissolve 15 ozs. of pure bees-wax, 2 ozs. of Burgundy pitch, and 1 oz. of gum olibanum in 4 pints of oil of turpentine; then rub 2 ozs. of the finest lamp-black with 1 pint of oil of turpentine, to a smooth mixture, and mix the three solutions. Add now ½ pint of copal varnish and afterwards 5 pints of lime water in quantities of 4 ozs. at a time, stirring after each addition, and continuing the stirring after the whole of it is added for sometime afterwards. The mixture must always be well stirred up before any is taken out for use.

THE President, Mr. R. M. Bancroft, and members of the Civil and Mechanical Engineers' Society, when visiting Kirkaldy's testing and experimental works the other day, were shown a cast iron bar which had been sent to him to test, as a sample that had been treated with mysterious chemical mixtures, which were said to increase its tensile strength over fifty per cent. But as Mr. Kirkaldy's rule is always to break the specimen, or else his machine, he found it contained, upon being fractured, a centre core of wrought iron about two inches in diameter, and six small ones of the same metal spaced around it. He thus exposed the secret.

A NEW GUNPOWDER.—When a grain of gunpowder is fired in the gun, the first gas that is evolved starts the projectile; and as the latter travels, the combustion area of the powder is constantly augmented until, by the time the flame reaches the interior of the grain, the small remainder of the same is incompetent to evolve by its combustion gas enough to compensate for the increased area over which it must act. Hence that nucleus of the grain serves no useful purpose, and certainly affords no acceleration to the shot: but in the new "compensating" powder, which Captain Charles A. L. Totten, U.S.A., has devised, this nucleus is made to render an accelerating force through being formed of gun-cotton, which, exploding in an increased area, exerts little strain on the gun, and checks the tendency of the gas to lose its tension, thus compensating for the increasing space in rear of the projectile. Not only does the inventor claim for this compound explosive high impulsive power, but he states that the waste of large grained powder, which is blown out of the gun with the grain still burning, often reaches 60 per cent. of the charge, and that this is saved by the addition of the gun-cotton nucleus. In general, he affirms that the combined gun-cotton and powder is lighter, and four and a-half times more effective, charge for charge, than gunpowder. If this can be substantiated by experiment, there can be little question but that the new explosive will be of the greatest value in modern large artillery, in which gunpowder has been proved too weak to project the immense shot and shell with proper effective velocity. Captain Totten finds, by test, that no chemical change attributable to the mutual action of gunpowder and gun-cotton occurs in his powder. The gun-cotton nucleus is spherical, and half an inch in diameter, the powder envelope raising the diameter to one inch. No special machinery has yet been invented for its manufacture. —*Scientific American.*

A NEW ELECTRIC FIRE-ALARM.—A new electric fire-alarm, devised by M. Gaulne, of Paris, was described at a recent session of the Belgian Society of Civil Engineers. A metal box, fixed to the wall or ceiling of the room, has two metal columns which receive the conducting wires from below, and to which are attached two sensitive plates, the upper ends of which meet near the summit of the box at an acute angle when brought together. Each plate is made partly of steel and partly of an expansible metal, the steel being on the inside and extending to the end of the plate, the expansible metal being the shorter. The effect of heat on these plates is to cause the outer metal to expand; and the steel ends being brought in contact, connection is established between the wires, and a bell is sounded. Besides serving as a fire-alarm, the invention is intended to act as an ordinary call-bell, and to this end a vertical rod, spring supported, has at its upper extremity an index which, when the rod is drawn down by a cord similar to a bell-pull on its lower ends, rubs against the sensitive plates, and thus establishes the current. The degree of expansion of the outer metal of the plates being known, it is only necessary to approximate the ends more or less closely to cause contact to occur at any thermometric point and the bell to sound. A needle attached to one plate moves over a dial marked with degrees and fractions. This plate is moved toward, or allowed to spring from, the other by means of a regulation screw, and thus the needle may be adjusted at any degree.