thereby to the fact that a workman, used to leather belting, treats rubber naturally in the same way. He tightens the latter when it slips, a proceeding which results in breakage or rapid destruction through use at too high a tension. M. Ogier concludes that, in the present state of the leather and rubber industries, the price of installation, useful effect being considered, of leather and rubber belts is about the same, but the cost of maintenance of the latter is small when compared to that necessitated by the use of leather belts of large dimensions.

Electric Lathe Chuck.

In order to obviate the inconvenience and loss of time involved in the ordinary mode of fixing upon a lathe chuck certain special kinds of work, such as thin steel disks or small circular saws, the chuck is converted into a temporary magnet, so that the thin steel articles, when simply placed on the face of the chuck, are held there by the attraction of the magnet; and, when finished, can be readily detached by merely breaking the electric contact and demagnetizing the chuck. The face plate of the magnetic chuck is composed of a central core of soft iron, surrounded by an iron tube, the two being kept apart by an intermediate brass ring; and the tube and core are each surrounded by a coil of insulated copper wire, the ends of which are connected to two brass contact rings that encircle the case containing the entire electro-magnet thus formed. These rings are grooved, and receive the ends of a pair of metal springs connected with the terminal wires of an electric battery, whereby the chuck is converted into an electro-magnet capable of holding firmly on its face the article to be turned or ground. For holding articles of larger diameter, it is found more convenient to use an ordinary face plate, simply divided into halves by a thin brass strip across the center; a horseshoe magnet, consisting of a bent bar of soft iron, with a coil of copper wire round each leg, is fixed behind the face plate, each half of which is thus converted into one of the poles of the magnet. The whole is enclosed in a cylindrical brass casing, and two brass contact rings fixed round this casing are insulated by a ring of ebonite, and are connected with the two terminal wires of the magnet coils. A similar arrangement is also adapted for holding work upon the bed of a planing or drilling machine, in which case the brass contact rings are dispensed with, and any desired number of pairs of the electro-magnetic face plates are combined so as to form an extended surface large enough to carry large pieces of work. For exciting the electro-magnet, any ordinary battery that will produce a continuous current of electricity can be used; but in machine shops, where power can be obtained, it is more convenient to employ a magneto-electric machine—such as Gramme's, for instance—rather than a battery.

The Pyrophone.

At a recent meeting of the Society of Arts, London, a paper, descriptive of M. Kastner's new musical instrument, the pyrophone, was referred to. One of the instruments was in the room, and was experimented upon in the course of the evening. It was composed of a frame enclosing glass tubes, arranged in the form of the pipes of a small organ. In each of the tubes were two jets of gas, which were made to unite and separate by the action of keys, and thereby produced musical sounds. The paper, after describing the sound of the pyrophone, proceeded to explain the principles on which the sounds were produced. A very simple mechanism caused each key to communicate with the supply pipes of the flames in the glass tubes. On pressing the keys the flames separated, and the sound was produced; as soon as the fingers were removed from the keys, the flames joined, and the sound ceased immediately. If two flames of suitable size were introduced into a glass tube, and they were so disposed that they reached one third of the tube's hight, measured from the base, the flames would vibrate in unison. This phenomenon continued as long as the flames remained apart, but the sounds ceased as soon as the flames were united. The chairman, Lieut.-Col. Strange, said that this instrument was the invention of a young man who did not claim merit for it as a musical instrument, but as a scientific experiment, which, he hoped, would be of great value in the musical world.

The engraving of the pyrophone appeared in Vol. XXX, SCIENTIFIC AMERICAN, page 279.

The Morse Telegraph Alphabet.

At a recent meeting of the Scottish Society of Arts, Edinburgh, Dr. Russell, Demonstrator of Anatomy to the University, read a paper on "The Telegraphic Alphabet as a branch of Technical Education in Primary Schools."

In the course of his remarks, the lecturer explained the structure and uses of the Morse or telegraph alphabet, by means of a diagram, advocated its introduction into primary schools, and more especially into those situated along the coast. He then proceeded to mention some of the advantanges possessed by the alphabet as a means of communication. Among these were its extreme simplicity and the ease with which it could be learned by very young children; that it helped to prepare for post office employment and a seafaring life; that it was already known all over the world by experts; and that it could be used with or without any apparatus—an advantage which the lecturer believed was not possessed by any other method of signaling; that it involved no expense; that it formed a good alphabet for the blind; that it developed the sense of time or rhythm; and was important in relation to lighthouses. Dr. Russell further stated that the Morse alphabet had been introduced with marked success into Kilmodan Free Church School and South Hall Public School.

Glues and Cements.

The following article translated from *Des Ingenieurs Taschenbuch*, seems to contain, in a small space, a great deal of valuable information which will probably be acceptable to many of our readers.

GLUES.

1. COMMON GLUE.—The absolute strength of a well glued joint is:

	Pounds per square inch.	
	Across the grain, end to end.	With the grain.
Beech	2 133	1,095
Elm	1,436	1,124
Oak	1,735	568
White wood	1,493	341
Maple	1,422	896

It is customary to use from one sixth to one tenth of the above values, to calculate the resistance which surfaces joined with glue can permanently sustain with safety.

2. WATERPROOF GLUE.—Boil eight parts of common glue with about thirty parts of water, until a strong solution is obtained; add four and a half parts of boiled linseed oil, and let the mixture boil two or three minutes, stirring it constantly. (In these directions, and in those that follow, parts by weight are to be taken).

CEMENTS.

1. WATERPROOF CEMENT FOR CAST IRON PIPES, ETC.—Take equal weights, in dry powder, of burnt lime, Roman cement, pipe clay, and loam, and knead the whole with about one sixth the weight of linseed oil. The addition of more Roman cement improves the quality.

2. CEMENT WHICH RESISTS MOISTURE AND HEAT BUT NOT THE DIRECT APPLICATION OF FIRE, FOR GAS AND STEAM PIPES AND SIMILAR PURPOSES.—Two parts of red lead, five parts of white lead, four parts of pipe clay; fine and dry, and work the whole into a stiff mass with boiled linseed oil.

3. RUST CEMENT FOR WATER AND STEAM PIPES, STEAM BOILERS, ETC.—Make a stiff paste with two parts sal ammoniac, thirty-five parts iron borings, one part sulphur, and water, and drive it into the joint with a chisel; or, to two parts of sal ammoniac and one part flowers of sulphur, add sixty parts of iron chips, and mix the whole with water to which one sixth part vinegar or a little sulphuric acid is added. Another cement is made by mixing one hundred parts of bright iron filings or fine chips or borings with one part powdered sal ammoniac, and moistening with urine; when thus prepared, force it into the joint. It will prove serviceable under the action of fire.

4. STOVE CEMENT, FOR THE JOINTS OF IRON STOVES.—Mica, together with finely sifted wood ashes, an equal quantity of finely powdered clay, and a little salt. When required for use, add enough water to make a stiff paste.

5. IRON CEMENT, WHICH IS UNAFFECTED BY RED HEAT.—Four parts iron filings, two parts clay, one part fragment of a Hessian crucible; reduce to the size of rape seed and mix together, working the whole into a stiff paste with a saturated solution of salt. A piece of fire brick can be used instead of the Hessian crucible.

6. CEMENT FOR FASTENING WOOD TO STONE.—Melt together four parts pitch and one part wax, and add four parts brick dust or chalk. It is to be warmed, for use, and applied thinly to the surfaces to be joined.

The Vicissitudes of the Sea.

The steamship Abbotsford recently arrived at New York, 108 days from Antwerp, during which the following mishaps occurred: On reaching one of the southern points of England, the ship stopped for a few minutes to land her pilot, and while so engaged was run into by another steamer, and so badly injured that the vessel had to go to London for repairs. Delay one month. The Abbotsford then continued her voyage to New York, but in mid-ocean, during a heavy gale, her propeller suddenly broke off. This converted her into a sailing vessel. The captain then put back to Queenstown, Ireland. On approaching land, a heavy gale blowing, he signalled for help from another steamer, which, in the effort to connect a hawser, dashed into the Abbotsford, knocking a hole forty feet long, happily above the water line. Through this aperture the water poured in whenever the vessel rolled, until the fore compartment was filled. But at last they reached Queenstown harbor; temporary repairs were made, and tugs employed which took the vessel to Liverpool. Here another month was consumed in repairs, and then another start for New York was made. Heavy gales were encountered, and the passage was long but successful.

Petroleum in Algiers.

A petroleum well, capable of giving a large and paying yield, has recently been discovered in Algiers, near the plain of Cheliff. The substance looks like tar, is soft and very tenaceous, melts in boiling water, and dissolves in turpentine. It burns with a very bright flame, and yields a large variety of products and considerable carbonaceous residue on distillation. It is neither tar, naphtha, bitumen, nor asphalt, but seems to possess the properties of all, in a measure. It has most characteristics in common with naphtha, but, unlike that substance, is almost completely insoluble in alcohol.

Honors to a Young American Lawyer.

The British Social Science Association has lately awarded its first prize of $1,000, for the best essay on international arbitration, to Mr. A. P. Sprague, of Troy, N. Y. Mr. Sprague is a young man of great promise and ability. The essay in question occupied 150 pages.

SCIENTIFIC AND PRACTICAL INFORMATION.

CURE FOR WARTS.

Lisfranc immerses the parts on which the warts are developed in a strong solution of black soap. This causes a slight cauterization of the surface of the wart. The loosened tissue is to be removed and the application repeated every day till the cure is complete. Oil of vitriol should never be used for this purpose; it is very irritating, and inflames the warts instead of curing them.

NEOGENE.

The above name is given by M. Sauvage to a new white alloy composed of copper 57 parts, zinc 27 parts, nickel 12 parts, tin 2 parts, aluminum 0·5 part, and bismuth 0·5 part. It has a silvery appearance, is sonorous, tenacious, malleable, and ductile, and is recommended for jewelry, as a substitute for silver in plate, and for low coinage. The new elements in the combination are those of the bismuth and aluminum. The alloy is very homogeneous, and is susceptible of a high polish.

A NEW SYSTEM OF DREDGING.

M. Bazin, of Angiers, France, proposes to attach, to a steamer with an engine of 60 horse power, two pipes on each side at some 12 feet below the water line. These pipes are to be 10 inches in diameter, about 50 feet in length, and are to be connected to the ship, so as to swing up or down, and also so as readily to yield to the movements of rolling, etc. The extremities of the couple on each side are united by tubes of like diameter, open at the forward end. In clearing out a quicksand, the vessel is got underway at the speed of 8 knots per hour; and on reaching the obstruction, the tubes are lowered with the soft mass. The water pressure above the sand or mud, which of itself would force the material into and up the tubes, is aided by the onward motion of the vessel, and the result is that the mud is driven through the tubes and into the hold. When the vessel is full, the apparatus is raised, and her contents hoisted out or otherwise discharged in some suitable locality. M. Bazin says that, with tubes of the size and with the speed above mentioned, 43,200 cubic feet of mud per hour could be raised. He points out that, in case of their becoming obstructed, the tubes can easily be cleared by simply elevating them out of the mass and allowing the water to rush through them.

Useful Recipes for the Shop, the Household, and the Farm.

The main objection most people have to sending communications on postal cards is that the writing is, of course, open to general perusal. A good way of avoiding this difficulty is to use sympathetic ink. A solution of 10 grains hyposulphite of soda in 16 teaspoonfuls water is the simplest fluid for the purpose. Use a perfectly clean pen, and after writing go over the letters with a smooth paper cutter to remove all traces of the salt. Exposure to the heat of a bright coal fire turns the writing black.

Soluble glass can be made of pure sand 15 parts, charcoal 1 part, and purified potash 10 parts. Mix and heat in a fireproof melting pot for five hours, or until the whole fuses uniformly. Take out the melted mass, and, when cold, powder it and dissolve it in boiling water.

To make pocket mucilage, boil one pound of the best white glue and strain very clear; boil also four ounces of isinglass, and mix the two together; place them in a water bath (glue kettle) with half a pound of white sugar, and evaporate till the liquid is quite thick, when it is to be poured into molds, dried and cut into pieces of convenient size. This immediately dissolves in water and fastens paper very firmly.

A solution of chloride of lime, in water to which a little acetic acid has been added, is among the many receipts recommended to remove ink stains from linen.

Marble can be stained different colors by the following substances: Blue, solution of litmus; green, wax colored with verdigris; yellow, tincture of gamboge or turmeric; red, tincture of alkanet or dragon's blood; crimson, alkanet in turpentine; flesh, wax tinged with turpentine; brown, tincture of logwood; gold, equal parts of verdigris, sal ammoniac, and sulphate of zinc in fine powder.

Mounting fluid for microscopic objects is made of gelatin 1 oz., honey 5 ozs., distilled water 5 ozs., rectified spirit ½ oz., and creosote 6 drops. Filter through fine flannel. Heat the honey before adding to the gelatin, which last must be dissolved in the boiling water. When cool, add the creosote.

Copies of signatures, which may be printed from on a copperplate press, can be made by writing the words and then sprinkling the wet ink with very finely pulverized gum arabic. Make a rim of dough, putty, or similar material, about the writing, and pour in melted fusible alloy of 5 parts bismuth, 3 lead, and 2 tin. This alloy melts at 199° Fah.

To bleach sponge, wash first in weak muriatic acid, then in cold water; soak in weak sulphuric acid, wash in water again, and finally rinse in rose water.

A very good imitation of meerschaum, which may be carved like the genuine article, can be made by peeling common potatoes and macerating them, in water acidulated with eight per cent sulphuric acid, for thirty-six hours. Dry on blotting paper, and for several days on plates of plaster of Paris in hot sand. The potatoes should be strongly compressed while drying.

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