

that a cultivated nose is not so rare in other lands as it is here.

*Gum-arabic.*—In some parts of Africa this article is as important as the wheat crop with us, last year it was a comparative failure, hence present high prices. The cultivation of cotton has also had a material influence on the collection of gum, and it is argued therefore that we are not likely to see former low rates.

The iron, silk, cotton, wood and other manufactures are left out, being foreign to our purpose, noticing only one apparatus that seemed worthy of remark.

Where power is required at intermittent intervals and not very large amount, an engine is used resembling a stationary steam engine. The cylinder is charged at one end with a mixture of coal, gas and air, which is fired by an electric spark. The power thus evolved drives the piston to the other end of the cylinder, where the operation is repeated and from the alternation, rotary motion is produced in the usual manner. The advantage is that power can be produced at the instant it is required, and fuel is only expended while work is being done.

The situation of the city is picturesque from almost every point of view, but from the sea it presents a scene to be remembered. Imagine if you can, a landscape bathed in sunlight, with a setting of clearest sky and bluest water. The panorama embraces beautiful islands, forts, beacons, a forests of masts, miles of noble buildings, above which rise the spires of the churches, and the view is closed by the encircling hill, studded with gardens and country seats.

The effect is heightened by reflecting on the antiquity of the place. The site of the cathedral has been used for a church ever since Christ was first preached to the Gentiles; and in the Phœnician times was a temple of Janus.

#### Glue.

Good glue is hard, clear, though not necessarily light-colored, and free from bad taste and smell. Glue which is easily dissolved in cold water is not strong. Good glue merely smells in cold water, and does not dissolve until it has been heated to nearly the boiling point. Glue is insoluble in alcohol, though a small quantity of alcohol may be mixed with the solution without difficulty; though if too much alcohol be used, the glue separates from the water and falls to the bottom of the vessel in the form of a white, viscid substance. Neither does it dissolve in ether, or in the fixed, or the essential oils, although oily matters of all kinds may be incorporated with the solution of glue. These facts will enable our readers to judge of the value of those recipes in which they are directed to dissolve glue in alcohol or in oil for the purpose of making a glue

which will remain liquid at all times. A little alcohol may be added, but if the amount of alcohol be sufficient to produce any marked effect, the glue is apt to separate. One of the most marked characteristics of good glue is its property of gelatinizing. By this is meant the fact that a moderately strong solution of the glue which is quite fluid when hot forms a stiff jelly when cold. This property is no bad test of the quality of glue. The firmer the jelly the better the glue. It is true that great efforts have been made to get rid of this property, and acids and various salts have been added to the solution of glue for the purpose of preventing its gelatinization, and thus retaining it in a liquid form that would be ready for use at any moment. But by those who have devoted the most careful attention to the subject, the fact stands unquestioned that the strongest glue is that which is purest and which gelatinizes most completely. Good glue, properly prepared and well applied, will unite pieces of wood with a degree of strength which leaves nothing to be desired. The fibres of the hardest and toughest wood will tear asunder before the glue surfaces will separate, and certainly anything more than this would be unnecessary. Mr. Bevan found that when two cylinders of dry ash, each an inch and a half in diameter, were glued together, and then torn asunder after a lapse of twenty-four hours, it required a force of 1260 lbs. to separate them, and consequently the force of adhesion was equal to 715 lbs. per square inch. From a subsequent experiment on solid glue he found that its cohesion is equal to 4000 lbs. per square inch. This would indicate that the method of applying this substance as a cement is capable of improvement, and it is undoubtedly true that great care and skill must be used if the best results would be obtained.

The most obvious defects in glue are the mixture of extraneous matters and incipient putrefaction. There are other substances beside gelatin, present in the matters from which glue is prepared, and unless these substances are carefully separated the glue will prove of an inferior quality. Hence, in selecting glue, choose that which is transparent and free from clouds or flocks in its substance. Very clear and colorless glue is by no means the best; but, whatever be the color, see that it is clear. It is true that in some cases very finely divided powders have been added to glue with the avowed object of rendering it stronger. We feel inclined to believe, however, that such additions serve merely to cloak defects in the glue itself, or in the mode in which it is applied. Peter Cooper is said to add very finely divided Paris white to his glue, and it is claimed that the glue is improved not only in appearance but in actual strength. How this may be we know not. White-lead added to glue is said to make it water-proof as well as to strengthen it, and from the well-known relation of white-lead to oils and animal substances it is not impossible that this may be the case. For our own part, however, we have always found good, pure glue equal to any requirements which we might demand of it. The greatest and most common defect in glue is incipient putrefaction. This may occur either at the glue factory or in the workshop of the mechanic, and in either case it is fatal to the strength of the glue. It is easily detected, however, by the smell. The odors of good glue and of that which has begun to

decay are so different that, once observed, they will never be forgotten. Glue which has begun to putrefy at the factory may not exhibit any odor so long as it is kept perfectly dry. The only means by which this defect can then be detected is by moistening it. Glue which exhibits a bad odor when moistened should be rejected and used only for making the coarser varieties of articles; and when the glue-pot begins to show any signs of putrefaction, it ought to be carefully cleaned out and thoroughly soaked and washed.—*Manufacturer and Builder.*

#### Vegetable Electromotors.

The *Chemical News* contains an article contributed by Edwin Smith, M. A., giving results of researches in a field which so far as we are aware has been hitherto untraversed. He says: It is well known that a voltaic combination may be made of two liquids and a metal, if one of the three acts chemically upon one and only one, of the other two: thus—we may employ copper, and dilute nitric acid, or platinum, potash, and nitric acid. Connect a platinum crucible with one terminal of a galvanometer, pour in a little solution of caustic potash, place in this the bowl of a tobacco-pipe having the hole stopped up with wax, pour into the bowl a little nitric acid, dip in the acid a small slip of platinum foil, and connect this with the other terminal of the galvanometer; a powerful deflection of the needle indicates the presence of an electric current and shows its direction to be from the alkali to the acid, the platinum serving merely as a conductor. It occurred to me, when performing this experiment, that an electro-motive combination might just as well be made of two vegetable substances, with platinum for conductor, provided only they were of a nature to act chemically upon one another—an alkaloid and an organic acid, for instance. It also seemed to me not unlikely that, wherever two flavors are habitually conjoined in our cookery and eating, the reason why they mutually improve each other is because a certain amount of electric action is set up between the substances employed to produce them. The rationale of the right blending of flavors might be found partly, no doubt in chemistry, but partly, also in galvanism.

Pursuing this idea, I tried pairs of eatables which generally go together, such as pepper and salt, coffee and sugar, almonds and raisins, and the like, and found that a voltaic current more or less strong was excited in every instance which I tested. Bitters and sweets, pungents and salts, or bitters and acids, generally appear to furnish true voltaic couples, doubtless in consequence of the mutual action of some alkaloid salt and an acid of its equivalent. As others may like to repeat or extend the experiments, I will describe shortly my mode of procedure. Cut two pieces of platinum foil about 5 inches by 2½ inches, and a number of pieces of filter paper a trifle larger. Well-washed linen is sometimes more convenient than filter paper. Have a small wooden board near the mercury cups of the galvanometer, and let a short copper or platinum wire, dipping into one of the cups, rest on the board. The substance to be tried must be brought to a state of solution, the stronger the better, by infusion, decoction or otherwise. Suppose coffee and sugar are to be operated upon; solutions of both having been prepared, dip into each a slip of filter