very thin film, not, however, like a varnish but having a fine grain, and so that on being examined with a magnifying glass the bare stone will be seen in the interstices of the grain. The fineness and regularity of this graining, upon which the excellence of the result materially depends, is obtained by a careful adjustment of the heat of the stone, which should be such as to cause a rapid evaporation of the ether—and by nicety in the preparation of the solution. Whilst the bituminous film is being put upon the stone, it is necessary to avoid all motion of the atmosphere, as caused by the breath or by quick movements of the person, as anything of this kind will make the thickness of the film unequal. When ready, the prepared stone is placed behind a photographic negative on albuminized or collodionized glass, and is then exposed to the light, the duration of this exposure being only ascertainable by practice. If the exposure has been too short, the picture on the stone will be too faint and wanting in the half tints, whilst if the stone is exposed too long a time, the picture will be heavy and devoid of all sharpness and effect. After this, the soluble portions of the bituminous film are washed away by ether, which must be used in excess, otherwise it is very apt to form spots and marks which cannot be got rid of.

When the washing or development of the picture is completed and the stone dried, it is treated in exactly the same manner as a crayon drawing on the stone, that is to say, with an acidulous gummy solution, to clear the whites and increase the transparency of the picture. After this, it is well washed with pure water and essence of turpentine, and it is finally inked with common lithographic ink. If the stone is well prepared it should take the ink at once without any retouching being required, and it will print like a common lithographic stone, the impressions improving as the printing goes on, and the stone will give as many impressions as a common lithographic stone.

Translated for the Journal of the Franklin Institute.

Mode of producing Alcohol from Vegetable Fibre, and especially from Wood. By M. J. ED. ARNOUD.

Under present circumstances, when the manufacture of alcohol is becoming so extensive that it diverts many first materials, especially the cerealia, from their true and more useful employment, I have thought it would be of interest to present to the Academy the results of some researches on a new mode of producing alcohol, although these researches are not yet complete.

Starting from the labors of M. Braconnot, published thirty-five years ago, and upon those more recent, of M. Payen, I undertook to produce a material analogous to starch, sugar, and alcohol, from vegetable fibres, and particularly from wood. My first attempts have fully answered my expectations. I have succeeded, with certain substances, in rendering soluble 97 per cent. of the substances employed, and with certain kinds of wood, in converting into sugar and then into alcohol, from 75 to 80 per cent. of the wood used.

The wood is reduced to coarse saw dust; in this state it is dried up

to a temperature of 100° , (212° Fah.,) so as to drain off the water which it contains, often amounting to one-half of its weight. The wood is then suffered to cool, and concentrated sulphuric acid is poured over it with great care, and very small quantities at a time, so as to prevent the materials from heating. The acid is mixed with the wood as it is poured; then for twelve hours the mixture is let alone; after that it is rubbed up with great care, until the mass, which is at first dry, becomes sufficiently liquid to run. This liquid, diluted with water, is brought to ebullition; the acid is saturated with lime, and the liquid, after filtration, is fermented, and the alcohol distilled in the ordinary way.

In this experiment, the sulphuric acid must be at least 110 per cent. of the weight of the dry wood. Experiments now on hand lead me to hope that the quantity of acid may be considerably diminished; but even now, even with a higher proportion, the manufacture of alcohol would be economical, in consequence of the low price of the matters employed, to wit: wood, chalk, and sulphuric acid.—*Academy des Sciences, Paris, October 23d, 1855.*

For the Journal of the Franklin Institute.

Performance of the U. S. Steamship Susquehanna, during her Employment in the Japan Squadron.

By the kindness of one of the engineers who has been on board of this ship during her entire cruise, we are enabled to present to our readers an abstract of her whole performance, which comprises an amount of steaming probably never before equalled during one cruise by any steamer in the world.

The particulars of the *Susquehanna* were published in this *Journal*, in October, 1852, (vide vol. xxiv., pp. 251–6,) but her principal dimensions may be recapitulated. *Hull*, 257 feet long between perpendiculars, 45 feet beam, $26\frac{1}{2}$ ft. hold, 2452 tons Custom House measurement. *Engines*, two inclined cylinders, 70 inches diameter, 10 feet stroke, poppet valves, Stevens' cut-off gear, arranged to cut off at 5 feet, and not adjustable. *Wheels*, 31 feet diameter, 9 feet 6 inches face, 26 paddles 34 inches wide, average dip, 5 feet to 5 feet 6 inches. Space occupied by engines and boilers in length of vessel, 90 feet. Total, with 900 tons of coal, 102 feet 9 inches in length.

The *Susquehanna* was, for a time, the flag ship of the Japan Squadron, to which she belonged since her departure from Norfolk, in June, 1851, and on which service she has been employed for three years and eight months, having returned to Philadelphia in March, 1855. During her cruise she has circumnavigated the globe under steam, a feat never before performed; has been in motion 340 days, during which the engines were in continuous operation, except for about ten days; has steamed and sailed over 60,000 miles, and has consumed over 11,000 tons of coal. For the whole time during which she was in motion, her mean speed was $7\frac{5}{10}$ th knots per hour, with an average hourly consumption of $1\frac{3}{10}$ th tons of coal; and the following tables will show the uniformity of results attained during the outward and homeward passages, as well in speed as in consumption of fuel and slip of the wheels:—