Scientific American.

THE ADVOCATE OF INDUSTRY, AND JOURNAL OF SCIENTIFIC, MECHANICAL AND OTHER IMPROVEMENTS.

VOL. XIII. NEW YORK, OCTOBER 17, 1857. NO. 6.

THE
SCIENTIFIC AMERICAN,
PUBLISHED WEEKLY
At No. 128 Fulton street, (Sun Buildings,) New York,
BY MUNN & CO.

O. D. MUNN, S. H. WALES, A. E. BEACH.

Responsible Agents may also be found in all the principal cities and towns in the United States.

Sampson Low, Son & Co., the American Booksellers, 47 Ludgate Hill, London, Eng., are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.

Single copies of the paper are on sale at the office of publication and at all the periodical stores in this city, Brooklyn and Jersey City.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.

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Chemical Action of Sugar.

M. Dabrunfault's examination of the changes suffered by cane sugar, in the fermenting process, previous to the formation of alcohol and carbonic acid, has led him to the conclusion that the altered cane sugar—or its analagous grape sugar or fruit syrup—is not a simple variety of sugar; only a certain quantity of it becomes glucose by crystallization, the residue polarizing to the left with the same power that the separated grape sugar polarizes to the right. In the vinous fermentation of the altered sugar, that which disappears in the first part of the process is optically neutral, while the sugar which disappears last polarizes strongly to the left. No one sugar is exclusively decomposed before another in fermented mixed sugars. The sugar produced from starch by the action of malt is not identical with grape sugar; for the former is less soluble in alcohol, less liable to change by ebullition, or the alkalies, and its polarizing power is three times that of the latter.

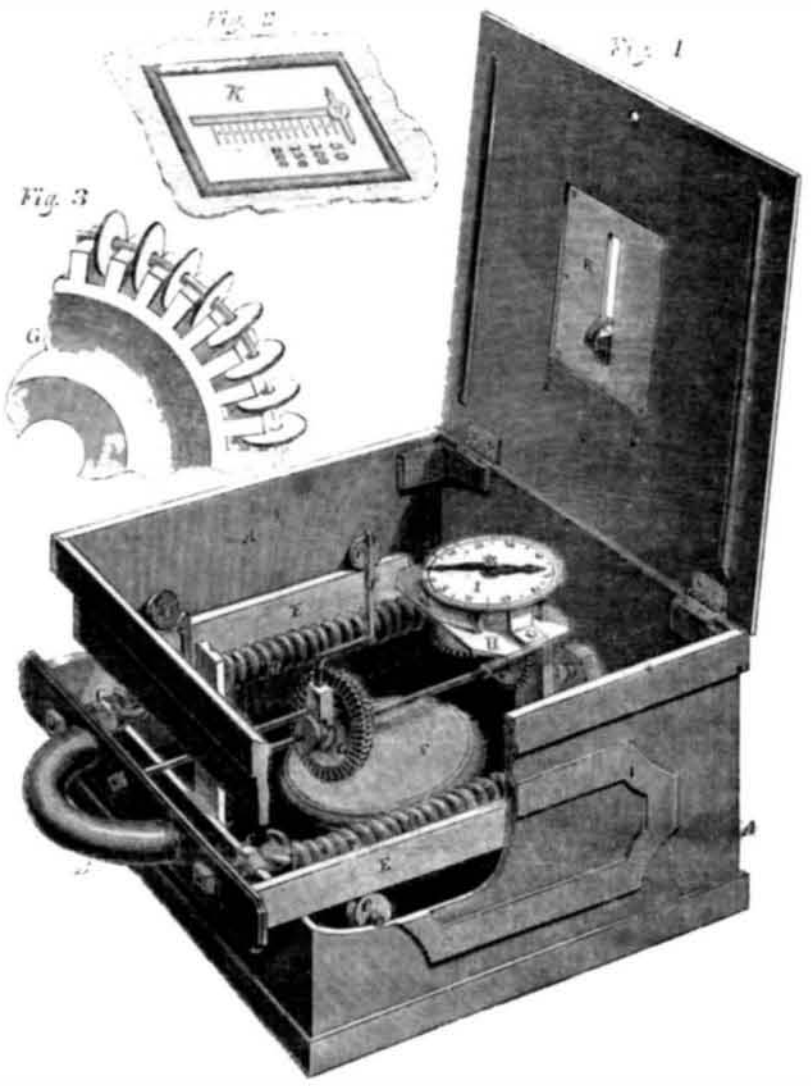
Wood Gas.

Dr. Pettenkofer, of Munich, Bavaria, has been quite successful in his experiments for obtaining gas from wood, being the discoverer of a method of manufacturing this gas, by which a flame of great clearness and strong illuminating power is produced. After the charring of the wood in the retort, the evolved gas is exposed to an extended surface of heated iron, and thence passed through the tar receiver, the condenser, and the lime for purification, into the gasometer, the whole process requiring only about one hour. The gas is not injured by remaining any length of time in the gasometer. According to Briesach, 4½ cubic feet of gas gives per hour the light equal to 15½ wax candles—five to a pound; the same amount of coal gas gives the light of 11 to 13 wax candles. Experiments have also proved that one cwt. of dry fir wood is equal to 759 cubic feet of pure gas, 20 lbs. of charcoal, and 5 to 7 lbs. of tar; the time required for distillation is 65 minutes.

Indigo.

The war in India will cripple our supplies of this article, and as the demand for it is very great, we shall have to look about for some new place whence to obtain it. As it is a native of the southern part of our country, the planters should be quickly stirring to bring its cultivation back again to its native land. It will grow best on recently cleared lands, and requires a very moist soil; it must also be protected from high winds, and in time of draught should be well irrigated. Great Britain has been too smart for us, in making it grow best in her own possessions, and we have been compelled to import it from that country. Let us take our own again, and, by attention to its cultivation, keep it as one of the staples of our commerce.

LEONARD'S DYNAMOMETER.



This is an instrument for ascertaining and registering the draft of plows, mowers, reapers, wagons, carriages, &c., and, as its name signifies, it is a measurer of motive power.

At the present time, when every State and County are holding their agricultural fairs, we would call their special attention to this instrument, which would be so valuable an aid to them in deciding the relative merits of the implements, machines and cattle subjected to their judgment for approval or the reverse. It consists in a small cast iron box, A, having a handle firmly fixed to the back, by which it is attached to the object whose draft is to be ascertained, and another handle in front, to which the horse, or other motive power, is attached, as seen at B. This handle is fastened to a plate having two hooks, C, on it, with which the springs, D, are connected, the other ends of them being firmly fixed to the back plate of the box. The front handle and plate, carrying the springs, which are regulated to the mechanism of the machine, are supplied with two guides, E, running between friction rollers, *e*, thus keeping the whole steady during the strain; these are, so to speak, the power receivers.

Now to describe the measurers, which peculiarly characterize this dynamometer from others. F is a leather disk mounted in brass, which is rotated by a strong marine clock underneath—not seen in our engraving. G is a traveling wheel, which moves up and down the disk, and receives motion from it; it works in a slotted mandrel, so that it can move backwards and forward, and still, when turned by the rotating disk, communicate motion through the train of gearing, H, to the indicating hand, I, and face. Fig. 3 shows an enlarged view of the periphery of this traveling wheel, which is furnished with a number of little wheels, set at right angles to itself, so that it can move with ease along the disk, and ensure a perfect motion. Fig. 2 is an indicator, which is placed outside the box on the lid, and is operated by the projecting wire, J,—K, Fig. 1, showing the back of it. This shows the greatest strain that has been on the machine during the testing.

It is evident that if the traveling wheel, G, be exactly in the center of the disk, F, it will remain at rest, but the further it is pulled from the center of the periphery the quicker will it move, and by the gearing, H, give a faster motion to the hands, I, they being so graduated that with 100 lbs. strain on the springs, the traveling wheel will be pulled out so far as to cause them to move one space of the dial, say from 0 to 1.

The operation is as follows:—The handle at the back of the box is attached to the plow carriage, or other article to be drawn, and the horse, or other motor, hooked on to the handle, B. The clock is then wound up through a hole in the base of the box, and the time noted; the horse is allowed to pull for one minute, and then stopped. The outside register, K, will give the greatest strain that has been exerted on the springs, and the indicating hands will tell the draft of the plow. If, for example, the large hand has moved from 0 to 1, then 100 lbs. strain has been exerted; if from 0 to 2, then 200 lbs., and so on. If, however, an average is wanted, you pull for about a quarter of an hour, and by comparing the time with the number noted, you obtain the average strain required to work the plow, or other machine.

The different modifications which this machine is capable of, will allow it to be used to test the power of steam engines, and mill gearing, and to register the speed of vessels at sea. It is also applied as a water and gas meter.

This is the invention of Mr. W. B. Leonard, Corresponding Secretary of the American Institute, at whose Fair in the Crystal Palace it is on exhibition. Patented December 19th, 1854.

Any further information or particulars may be had of John Sherry, manufacturer, Sag Harbor, N. Y., or Leonard & Clark, 11 Platt street, New York.

The British East India Company.

According to recent and authentic documents, this company now rules, directly or indirectly, an empire of 500,000 square miles, with a population of more than 160,000,000. The nominal money capital of the company is set down at $80,000,000, and its annual revenues are estimated at $135,000,000. The salaries of the principal officers are: Governor General, $125,000—perquisities, $200,000; Members of Governor's Council, $48,000; Bishops, $12,000 to $15,000; Law Judges, (30 in number,) $15,000; Collectors and Magistrates, (45 in number,) from $6,000 to $19,000. In striking contrast with these great salaries is the pay of the native soldiers, being eleven cents per day.

The standing military force of this powerful company is about three hundred thousand men, European and natives—the former the flower of the British army. The department of the topographical engineers is remarkable for its skill and efficiency, and has done much for the material development of the country. Railroads completed and in construction, now span the whole extent of the empire, from Carnatic to the Himalayas, opening a brilliant prospect for the agriculturist at no distant future. There are also in operation at the present time more than four thousand miles of the magnetic telegraph, with which connection will soon be made along the southern coast of Arabia, and through Egypt, submarining the Red Sea, with the Mediterranean lines, thus communicating directly with the whole of the western world. There is special interest attached to this company, at this moment, growing out of the terrible rebellion now fearfully progressing in India, for upon the company devolves the momentous duty of stopping the progress of the insurrection, and the heavy responsibility of its consequences.

Portfolio for Periodicals.

W. Root, of Marietta, Ga., has sent us an ingenious little model of an apparatus for holding periodicals, &c. It is very simple and can be made by any of our subscribers for holding the loose numbers of the SCIENTIFIC AMERICAN, or any other journal which they think worth preserving. It is simply a cardboard back, or an old book back of sufficient size will answer the purpose, and in the top and bottom of the back is placed a bit of wire so bent as to form a loop inside the cover; around each of these loops, from one to the other, a number of strings are tied, and behind these strings each number of the journal is slipped, so that they are held as firmly or nearly so as a bound book.