

THE  
**Scientific American,**

PUBLISHED WEEKLY  
At 128 Fulton street, N. Y. (Sun Buildings.)  
BY MUNN & CO.

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

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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—\$2 a year.—\$1 in advance and the remainder in six months.

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**Subdivisions of Chemistry.**

The following extract from a recent lecture by Prof. Campbell Morfit, presents useful information in clear and comprehensive terms:

"Chemistry is that branch of knowledge which teaches the internal nature of bodies, explains the manner in which they react upon each other, and affords the means of rendering them available for many useful purposes to which they would be, otherwise, unsuited.

The grand practical division of modern chemistry is into organic and inorganic chemistry. The former, in contradistinction to the latter, relates to the study of substances having life, and existing according to the original formation by nature. A more critically exact classification would be into, 1st, Mineral chemistry, or inorganic chemistry proper; 2d, The chemistry of organized beings, which we so term because though now dead they have had their origin in a vital principle; and 3d, organic chemistry, comprehending those substances which have a present or very recent vital existence.

Analytical chemistry devises methods for detecting the various elements of a compound, and estimating their proportions. Synthetic chemistry enables us to form homogeneous compounds of dissimilar substances, and is sometimes used to verify the results of analysis. Assaying is analysis by the dry method, and without the use of liquid re-agents. Practical or applied chemistry consists in the application of chemical principles to the arts, for example, to the making and fixing of colors for paints or dyes, to the processes of bleaching, soap-making, distillation, brewing, pottery, and glass-making, and to culinary and domestic operations. It is more elegantly termed technical chemistry, and to this branch belongs also metallurgy, or the chemical arts of separating metals from their ores.

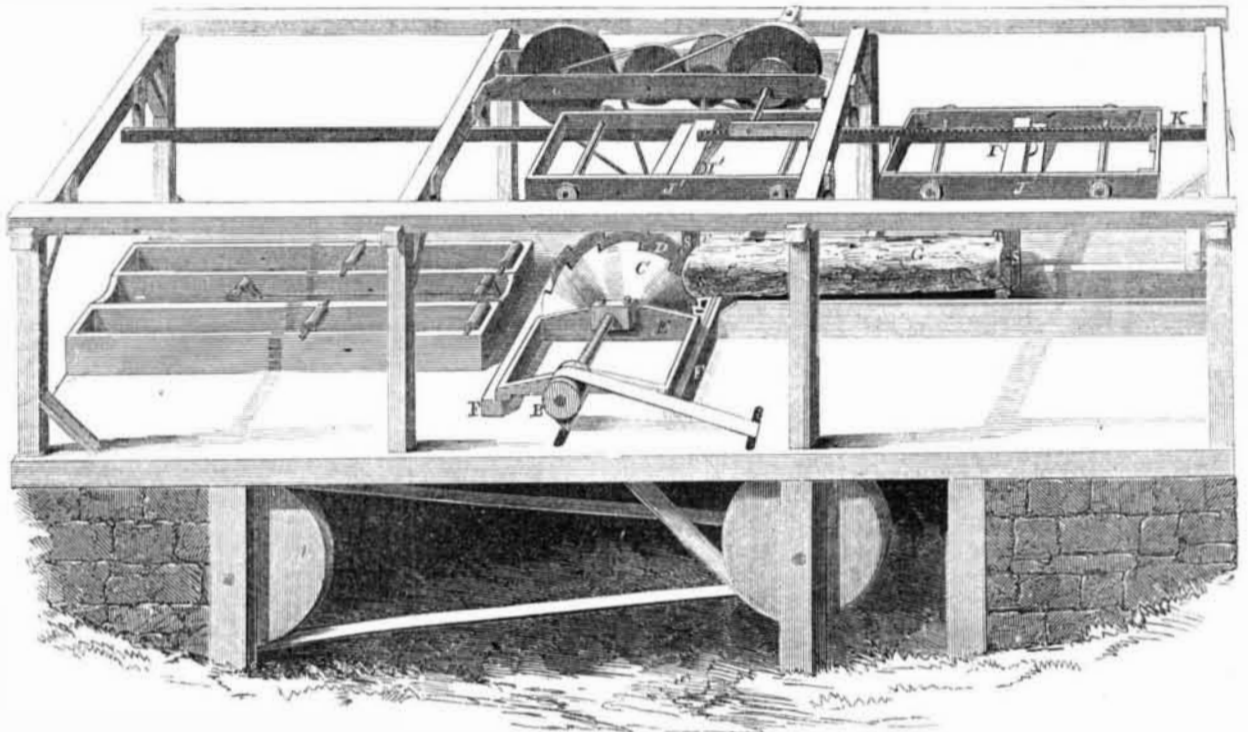
Pharmaceutical chemistry relates to the preparation of remedies employed in medicine. Medical chemistry is allied to physiology, and treats of the application of chemical principles and products in the theory and practice of medicine. Toxicological chemistry refers to poisons,—their special action upon the animal system, and the means of detecting them. Forensic chemistry embraces both of the latter branches, and assists in the legal adjudication of questions concerning life, health, and property.

The subdivisions in the science are many and increasing; and the varied uses to which it is now applied, for the convenience, economy, and profit of the world are so great, that even subordinate branches are growing or taking place out of those that had previously existed.

**Legal Tender.**

The following item from *Thompson's Bank Note Reporter*, may be new to some of our readers: "American gold coin in any amounts—American silver to the amount of five dollars—three cent pieces to the amount of thirty cents, and one cent pieces to the amount of ten cents are legal tender."

**EGGLESTON'S IMPROVED SAW MILL.**

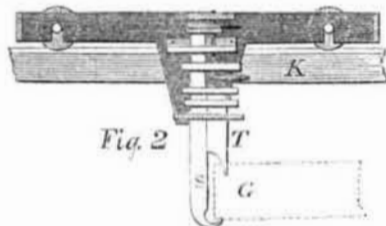


The valuable invention here represented contains two principal features. Two circular saws are employed, and so arranged on sliding frames that they may be moved simultaneously in opposite directions, so that by allowing the saws to approach each other by the proper amount, after each board is removed, each saw is set to the log instead of the log to the saw, as usual: and two cuts are made at the same time on opposite sides of the log. The carriage for the log is also placed overhead, and the log ingeniously suspended thereto, so as to be out of the way, and not to interrupt the movements of the attendants about on the floor.

Fig. 1 is a perspective view of a whole mill, and fig. 2 a section of one of the elevated carriages, J. The same letters being employed to indicate the parts in both figures.

G is the log to be sawed, and C and D are the two circular saws, each mounted on independent arbors. Each arbor is mounted on a separate frame, E, which frame is carried on guide ways, F, in lines transversely to the axis

of the log. Both the frame which carries C, and that which carries D, are provided with long racks, not represented, and these racks mesh into opposite sides of a small gear wheel not represented. This gear wheel is fixed on a shaft which is under control of the sawyer, and retained by obvious means in any required position. Thus, by turning this pinion, the saws, C and D, are moved toward each other, or separated at pleasure, and the saw-



ing, which is commenced by removing a slab from each side, progresses further into the log as each sawed piece is removed, until there remains a piece of a thickness only equal to the thickness of the dogs, S and T, which

hold the log.

These dogs, S and T, of which there are two pairs, one for each extremity of the log, are precisely similar, except that they face in opposite directions, and each pair is attached to separate carriages, J and J', which carriages run on the same track, K, and can be placed at any required distance apart, according to the length of the log to be sawed. Both carriages are moved steadily forward as the sawing progresses, by the usual means, as represented. By turning the hand wheels, I and I', easily reached from below, the dogs, S and T are made to release their holds on the stuff, and again to seize very firmly on the ends of a new log so soon as it can be placed in the proper position. Every facility is thus provided for working very rapidly and accurately, and the advantages arising from the arrangement are too obvious to require rehearsal. The invention was patented on the 3rd of March, inst., by Mr. Philander Eggleston, of Mobile, Ala., from whom any further information may be obtained.

**Hydro-Steam Engine.**

A large silk manufactory is being constructed in Newark to be driven by a water wheel, the water for which is pumped in a continuous circuit by steam. The pressure maintained on the jet of water is very great, and the wheel is a small and exceedingly well finished turbine, the diameter of which is only about one foot. The revolutions are consequently so rapid that instead of multiplying the speed in transmitting it to the shafting, as is usually necessary with all machinery of this description, whether impelled by water or steam power, it has in this case actually to be reduced. It is claimed by the inventor, Mr. Wm. Baxter, that the simplicity and economy of the steam pumping machinery employed, is such as to more than balance the waste in transmitting the power through the water wheel, and that consequently the power is produced and given off to the machinery at a less cost for fuel, and with less wear and tear of the machinery, as well as also more steadily, than in the ordinary steam engines. We shall watch the result, and refer to it again.

**Endurance of Submarine Cables.**

At a meeting of the Institution of Civil Engineers on January 27, there were exhibited

portions of the submarine cables leading to Calais and Ostend, which had been ruptured during the recent gales by a vessel dragging her anchor, as described on page 213. The iron protecting wire had been twisted and ruptured by the force of the vessel hanging upon these cables successively, but the gutta percha covering of the copper wire was but little injured, and exhibited no ragged or disturbed condition, but only a simple and clean break or section. The rest of the covering was represented to be in as good a state as when first laid down five and a half years before.

**New Process of Tanning.**

We have received from Edwin Daniels, of Elkhorn, Wis., a sample of calfskin "upper leather," tanned by a process for which a patent was issued to him on the sixth of January last. It is well tanned, firm, yet soft and elastic. No bark was used in preparing it, and the inventor informs us that the outlay for buildings and fixtures is just about one-tenth that of tanning with bark, only one vat being required for every ten used in the common process.

Catechu (old *terra japonica*) contains more tannin than any other substance employed in the manufacture of leather; hitherto, how-

ever, it has not been used for making the best qualities of leather, because it rendered the skins tanned by it brittle, and liable to crack. This defect has been overcome by Mr. Daniels, who employs it as the principal agent in his process, combined with the sulphate of aluminum, the nitrate of potash, and an acid, by which the skins and hides are "plumped" in a high degree, and the tannin made to combine with the gelatine in proper proportions to form soft and firm leather, susceptible of a fine finish, free from brittleness, and not liable to crack.

Catechu comes to us from India in the form of a concentrated crystallized extract; it has simply to be dissolved in warm water, and is then ready for use. Considerable machinery and apparatus, such as bark, mills, etc., required for bark tanning, are unnecessary for this process. Persons interested in the manufacture of leather will be furnished with samples by addressing Mr. D.

The Wethered system of combining superheated with common steam, an American invention, is now in use in the British Admiralty yacht *Black Eagle*, and also in H. B. M. steamer *Dee*. The officials report a saving of from 31 to 38 per cent in consequence.