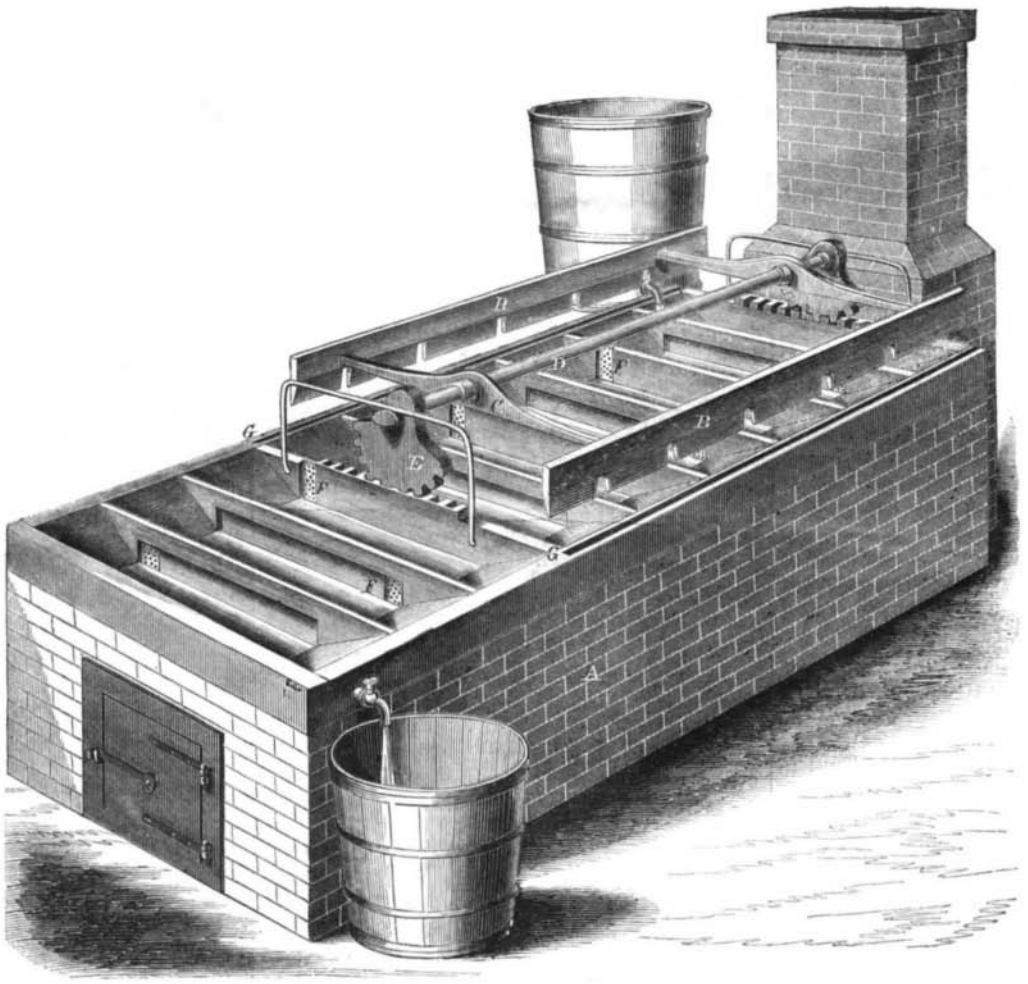
Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

VOL. IX.—NO. 1. (NEW SERIES.) | NEW YORK, JULY 4, 1863. | SINGLE COPIES SIX CENTS. $3 PER ANNUM—IN ADVANCE

Improved Evaporating Pan.

The interests of a large portion of the community are at present turned toward manufacturing sugar from sorghum or northern cane. The article thus far produced has not been brought to market in sufficient quantities to be ranked as a staple, but it is increasing in importance every year, and after the growing crop is reaped it will be manufactured extensively. We illustrate this week an improved apparatus for boiling the juice, which presents some novel features. The pan is set in the furnace, A, and has a metallic bottom which is divided by a number of wooden partitions into several compartments. In the partitions devoted to boiling the juice, there is a skimmer, B, fitted. This skimmer consists of two long boards fastened to projecting arms, C. These arms proceed from a central shaft, D, on which is keyed two toothed quadrants, E, working in racks placed on one of the partitions. There are a number of perforated plates placed over the apertures, F, in the partitions, which, through the medium of a gate, regulate the quantity of juice admitted from one compartment to the other. The inclined sides of the pan form an important part of the invention, as it is asserted that the natural tendency of the boiling liquid is to deposit the scum and sediment on these, from whence it is easily removed in an obvious manner by the skimmer. The operator takes hold of one side of this appliance, and inserting the board in the scum, draws it toward him and throws it into the trough, G, on the side, from whence it flows into a proper receptacle. The same process can be repeated as to the other side of the pan without leaving the spot, so that by the addition of this skimmer the condition of the liquid is at all times under control. The sugaring-off is completed in the pans over the furnaces, and the height of the chimney can be increased if required. These features are novel and practical, and facilitate very much the operation of boiling down.



BOWLUS'S PATENT EVAPORATING PAN.

The patent for this invention was procured through the Scientific American Patent Agency, on April 28, 1863, by J. A. Bowlus, of Fremont, Ohio. Further information can be obtained by addressing him as above.

WITH DISPATCH!—Quite recently the steamer *Scotia* was captured while endeavoring to run the blockade; she was condemned at a prize court and sold by the Government. Mr. Ben. Wier, of Halifax, purchased her and she is now ready to run the blockade again. We hope a similar fate to her previous one awaits her.

SCIENCE IN SHIPBUILDING.

It has hitherto been the common theory respecting naval architecture, that the speed of a vessel under a given power is mainly dependent upon what are known as her "water-lines," or shape from stem to stern. The main study of shipbuilders has, therefore, been to perfect these lines so as to diminish resistance and avoid the formation of eddies while the vessel is in motion. Probably they have reached perfection of model in this respect; but much room was still left for improvement in another important particular. The weight and inertia of the water to be displaced by the vessel, does not constitute the whole of the resistance to be overcome. A large additional amount arises from the friction between the water and the entire submerged surface of the vessel. This is due to the viscidity which water possesses in common with all fluids. A film of water adheres to the entire submerged surface, and when the vessel is moved there is a resistance to be overcome, arising from the cohesion of the particles constituting the film with the particles lying next to them. Of course, this resistance will be overcome in proportion as the submerged surface is diminished. It thus seems highly important to form such transverse sections of a vessel as shall, with the maximum area or contents below the water-line, afford the minimum extent of boundary line or wetted surface. This problem forms the subject of a paper lately read before the Glasgow Philosophical Society by James R. Napier. In the construction of vessels whose breadth and depth of water are not limited, the question reduces itself to the common mathematical problem of passing a curve of given length through two points, so as to enclose the greatest area between the curve and the straight line joining the points. But when the breadth and draft of water are limited, as by the width of dock entrances and the depth of rivers, the problem is far more complicated. The given dimensions of breadth and depth afford a rectangular space within which it is required to enclose the greatest area with the least extent of boundary—wetted surface of the vessel. A transverse section of a vessel thus constructed will afford the greatest displacement or capacity below the water-line, with the least surface for friction. The breadth and draft being thus given, the problem is to find the radius of curvature, or radius of bilge, which will afford the shortest boundary enclosing the greatest area—the line which will secure the greatest carrying capacity with the least frictional surface. As this radius is formed in terms of the breadth and depth, it can be applied to the construction of all the transverse sections from the stem to the stern of a vessel. It does not interfere with the water-lines, and thus these "sections of least resistance" may be introduced into a vessel having water-lines of any desired model. We can scarcely do more in this article than indicate the general process by which this "radius of bilge" is found. Such a curve is to be found as will enclose the greatest area with the least boundary. Of course this area, divided by the proposed boundary, must be a maximum. By the methods of analytical geometry we first find this proposed area in terms of the proposed breadth and depth and radius (the latter as yet being an unknown quantity). In the same manner we find the proposed boundary in the same terms, the unknown radius being likewise involved. Placing the value of the area as a numerator, and the value of the boundary as denominator, we have a fraction of which we have now to find the maximum value. This is readily done by the methods of the differential calculus. A quadratic equation appears in which the radius is the unknown quantity. Solving this equation, we find the value of the radius in the known terms of breadth and draft. This is the radius of curvature which will afford a maximum area below the water-line of a vessel with a minimum amount of surface. The following are some values of this radius, for given breadths and depths:—

1. When D (depth) = 4 B (breadth), then r (radius)

=.114 D. 2. When D=2 B, then r =.23 D. 3. When D=B, then r =.35 D. 4. When D=$\frac{1}{2}$ B, then r =.54 D. 5. When D=$\frac{1}{3}$ B, then r =.63 D. 6. When D=$\frac{1}{4}$B, then r =.70 D.

Taking the fourth of these propositions where the depth is one-half of the breadth, and constructing a section with the ascertained radius, the area divided by the boundary gives a result expressed by .531 D. When we make the section a simple semicircle, the area divided by the boundary gives only .5 D, showing that in the proportion of surface to area, there is a gain of about six per cent in the section above described over a semi-circular section. The gain is still greater over sections formed by ogee curves of great concavity, such as are sometimes employed on vessels. That cross section which gives the greatest ratio of its area to its boundary is entitled to be called "the section of least resistance." It follows from this also that of two steamers, equal in displacement and capacity, with engines of the same power, and equally well modeled as to water-lines, the one will excel in speed whose sections are constructed with the radius of bilge as found according to the method set forth in the paper of Mr. Napier. These results of pure mathematical science are not chimeras, for they have been applied with unprecedented success in the construction of several steamers in Glasgow, and they must ere long come into general application. They furnish another illustration of the value of pure science in promoting the progress of the useful arts. Mechanical ingenuity, however great it may be, cannot dispense with the deductions of science, but must employ them in attaining the highest results.

LITERARY NOTICES.

The American Annual Cyclopædia. D. Appleton & Co., 443 Broadway, New York.

The value of a volume which includes all the prominent events of the day, and which sums up in a compendious form the principle occurrences of the year, is almost incalculable. Such a work is the "American Annual Cyclopædia," and the utility of the publication for ready reference for all classes in the community, whether lay or professional, cannot be over estimated. Under their appropriate headings, political, civil, military, and social affairs receive attention; and the amount of information conveyed in the biographies and obituaries, notices of distinguished men, in commercial and scientific statistics, is such as to render the "Cyclopædia" an absolute necessity to every one who desires to keep pace with the spirit of the age. The individual who could carry even a brief synopsis of the events described in the book would unquestionably be considered a well-read man. The article entitled "Army Operations" contains full and copious notes on the physical aspect of the war, the attitudes of the two sections of the country, and the causes which led to the disagreement still, unhappily, existing. This portion of the "Cyclopædia" occupies no less than one hundred and forty-eight of its pages, and its importance justifies the space bestowed upon it. Many a lavishly-praised history of the war is ushered into existence without possessing a tithe of the merit of this excellent digest. Mr. Samuel Colt's invention, the revolving pistol, which made his name so famous, is also noticed; and the narration of the early struggles of the inventor and his subsequent success forms one of the most interesting pages in the work. Under the caption "Confederate States" we notice a thorough investigation into and register of the important events which transpired in that section of the country during 1862, and the financial and executive departments of the pseudo-government, so far as known from published accounts, are detailed at length. The British Industrial Exhibition has also a large space allotted to it, and the wonders of the mechanical, artistic, and scientific world claim the reader's attention and interest. We consider the "Cyclopædia" one of the most valuable books issued from the press this year, and shall have frequent occasion to refer to its columns. It is pleasant to notice the fidelity with which the minute incidents and every-day occurrences connected with the particular subject in the "Cyclopædia" are reproduced and retained. They serve to add a zest and flavor of energy and spirit to the volume, without which it would be as flat and unprofitable as soda-water without carbonic acid gas. The "American Annual Cyclopædia" is a book that cannot be dispensed with; and we welcome it as a valuable addition to our library.

The Atlantic Monthly. Ticknor & Fields, Boston, Mass.

Almost with the regularity which attends the issue of a daily newspaper, this standard magazine appears monthly upon our table, and the volume for July is replete with interest. The leading article, "The Doings of the Sunbeam," is a careful review of the photographic establishment of Messrs. E. H. and T. Anthony, the widely-known artists of this city, and gives the reader a very clear insight into the details of the several processes there carried on. "The Wraith of Odin," a poem; "Gala Days," by Gail Hamilton; "Paul Blecker," (concluded); "The Growth of Continents," a continuation of Professor Agassiz's interesting series on subjects of a kindred nature; "English Naval Power and English Colonies; and many other articles in prose and verse which we are unable to specify for want of space. The story of "Paul Blecker" is written with such strength and intensity of purpose and feeling, that the reader is impressed with the idea that it must be a life-history; and the interest in the narrative—so we may call it not inaptly—ceases only with the closing line. Out of all the fire and trial that hedges about the principal characters of the tale—out of the heat of passion there springs a lesson of purity which is an earnest and vital aid to those who lean to virtue's side but are tempted from it by circumstances, that is as refreshing as it is sound and healthy. One reads Miss Dodge's "Gala Days" with a feeling very much akin to that curtly expressed by Sir Charles Grandison in reference to bores:—"I never know what they are going to say next." "Gala Days" is a dashing, rattling, voluble narrative of events, and the charm of recounting them seems never to weary or pall upon the writer. Several glaring inconsistencies were noticed by us, as in that line where the authoress apologizes for using the barbarism "lets up" and then confesses to "kicking" her husband, and defiantly defends the phrase and the act as though she were conscious of its inelegance but *would* have her own wilful way. "Our General" is a record of General Butler's career in New Orleans, and is an interesting review of events occurring during that period. No one who wishes to keep pace with the current literature of the day should fail to read the "Atlantic."

The Scalpel. Edward H. Dixon, editor. Published by Everardus Warner, No. 1 Astor House, New York.

Although this publication is professedly a periodical devoted to the elucidation of knotty theoretical points in medical science and practice, yet there are many pages on which popular subjects are treated in a terse, vigorous and to-the-point style that claims the attention of the reader and invites his criticism. The present issue (No. 3 of Vol. XII) contains, among other articles, one upon the evils of "diploma-shops" or "doctor-factories" as they are sometimes called. This article has too much truth in it to be slighted by the general reader, and we think that, in connection with the theme, a little attention might be profitably bestowed on some unworthy representatives of the surgical art who follow the army and saw off the legs and arms of soldiers. The operations in many cases ought not to be performed, and when done is oftentimes mere brutal butchery. Charles Reade, the celebrated English author, in his new novel, is engaged in a scathing raid upon pretenders to medical science in London, and will doubtless succeed in opening the eyes of the doctor-ridden public to the enormity of their sufferings. The "Scalpel" is the pioneer in this much-needed reform at home.

The Practical Shepherd. Published by J. B. Lippincott & Co., Philadelphia, and D. D. T. Moore, Rochester, N. Y.

A new work on sheep-husbandry entitled "The Practical Shepherd," is about to be issued; it is edited by the Hon. Henry S. Randall, LL.D., author of "Sheep-Husbandry in the South," &c. Mr. Randall is well known to be the most reliable writer on sheep-husbandry in the country; and the new work is intended to be standard authority upon all questions relating to sheep, such as descriptions of the various breeds, their management, breeding, diseases and remedies, &c. The information obtained by its author has been derived from thirty-five years' personal experience with large flocks, together with a knowledge of different systems, received from a very extensive correspondence with leading flock-masters in every part of the world. The book will be a manual to which every farmer can refer when he wishes to ascertain any fact connected with the management of sheep.

Composition and Properties of Coal Gas.

Gas made from cannel coal consists of olefiant gas, associated rich hydro-carbons, and light carbureted hydrogen. These give to gas its illuminating properties, especially the two first; the latter giving but little light. It also contains hydrogen, carbonic oxide and nitrogen. The first two burn with a strong white light, and constitute the light-giving constituents of gas. Although this is the case, this is but a small proportion of the complex mixture of coal gas. The light carbureted hydrogen forms from thirty to forty per cent. of coal gas; it burns with a yellowish flame and gives but little light. The hydrogen and carbonic oxide compose the remaining gas. They give no light on combustion but a faint blue flame. The light carbureted hydrogen and carbonic oxide may be regarded as mere diluents of the two first. Dry gas made from cannel coal and freed from carbonic acid contains the following proportions:—

	Per Cent.
Olefiant gas and associated hydro-carbons	9·21
Oxygen	0·16
Nitrogen	5·37
Light carbureted hydrogen	38·08
Hydrogen	42·33
Carbonic oxide	4·84
	99·99

Gas from Anthracite Coal.

At a recent meeting of the Board of Councilmen of this city, the following resolution was offered by the president:—

Resolved, That there be and is hereby granted to the Anthracite Gas-Lighting and Heating Company, of New York, permission to lay pipes and mains for conducting gas, for illuminating and heating, and for other purposes, through the streets, avenues, lanes, and other public places in the city of New York, for a period of fifty years, as provided by the general manufacturing laws of the State of New York; the same conductors to be laid under the supervision of the Street Commissioner, the said company being required to restore the streets opened by them for laying such pipes to the same condition as before the said pipes or mains were laid.

Which was referred to the Committee on Finance.

This is a singular resolution relating to a preposterous project, judging from the name of the company. Illuminating gas cannot be produced from anthracite coal.

A Great Salt Deposit.—It appears from scientific investigation that the salt deposit at New Iberia, Louisiana, is of the most extensive and wonderful description. For vastness and purity it is unequaled on the globe. One account says:—"Imagine, if you can, the granite quarry of Massachusetts or the marble quarry of Vermont to be solid deposits of pure rock salt, clean and transparent as so much clear white ice, in one solid, inexhaustible mass, underlying the earth, and you then acquire an imperfect idea of the vastness of this salt formation."

Iron clad Ladies.—The last new thing in the way of dress ornamentation is leather. The Princess Metternich made her appearance lately in a dress of Havana-colored silk, ornamented with leather trimmings, studded with steel-headed nails. The bonnet was of the same material, ornamented in a like manner, and, strange to say, so was the parasol. Similar ornaments are the rage among ladies in this city. They make the fair wearers look as if they were iron-clad.

Arrival of Cotton at New Orleans.—During the week ending May 22, there were received at New Orleans 2,492 bales of cotton, principally from the country which has just been opened by General Banks. In the four days following—that is to say to May 26—1,340 more bales came to hand. This made altogether a stock on hand and on ship-board of 7,150 bales, with a prospect of much more to come at once.