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NEW YORK, SATURDAY, FEBRUARY 9, 1861.

WORKING STEAM EXPANSIVELY.

The result of the experiments at Erie on the working of steam expansively, a brief statement of which we published on page 6 of the present volume, seems to have led some of our cotemporaries to the conclusion that the long established and universal opinion on this subject is all a delusion. It will be impossible to determine what lesson these experiments really teach until we get a full statement of them from the engineers of the Commission, with the able and learned discussion of the experiments which we have no doubt will accompany their report; but we shall be very much surprised if Chief Engineer Isherwood and his associates draw the broad inference which we have mentioned above. Indeed, it seems to us impossible that this sweeping conclusion can be established by any one series of experiments with one engine or one pair of engines.

The pith of the whole matter of expansion is just here: After the flow of steam into the cylinder is cut off, that which is already in the cylinder will continue to exert a pressure as it expands, constantly decreasing until it comes down to the pressure of the atmosphere; in condensing engines, still lower. Now, a certain amount of pressure on the piston is necessary to overcome the friction and inertia of the engine and its connections, and it is only the pressure above this which is available in driving the machinery. Consequently, a card may show considerable pressure on the piston, and the whole of this pressure may be exerted in overcoming friction, leaving none for useful effect. Of course, the point in the expansion where the useful effect of the pressure ceases will vary with different engines, and with an infinite variety of circumstances. It is manifest, too, that the higher the pressure the greater would be the amount of expansion that would yield profitable results.

From the meager accounts yet published of the experiments at Erie, we draw the conclusion that, with engines constructed precisely like those there used, working with 20 lbs. pressure in the boilers and cutting off at .354 of the stroke, with resistance such as was there overcome, there is no gain compared with cutting off at $\frac{1}{4}\frac{3}{4}$ of the stroke. This inference follows by strict necessity from those experiments—this, and no more. It may be philosophical to keep the mind open for further light on all subjects whatever, but the fact that there is economy in working steam expansively has been proved by such a vast mass of evidence that it will take a corresponding amount to overthrow it. The idea of regarding it as overthrown by a single set of experiments seems to us preposterous.

CAST IRON RIFLED CANNON.

The London *Engineer*, of January 4, states that Mr. Bashley Britten had repeatedly made good practice with cast iron cannon which had been rifled, and submitted by him to the British government as far back as 1854. Experiments with such cannon have been recently conducted by Mr. Britten, on a scale of such magnitude as to test the question in the most thorough manner. Two 9 pounders, four 32 pounders, and three 68 pounders have been fully tested. These were ordinary cast iron service guns, taken at random from the military store, and rifled without being strengthened by any addition of bands, &c. The work of rifling one gun can be executed in about ten hours, at a cost of only five dollars. Elongated projectiles, weighing 15 lbs., were fired from the 9 pounders, 48 lbs. were fired from the 32 pounders, and 90 lb. projectiles were fired from the 68 pounders. The charge of powder was only one-half of that employed for common guns, being only 5 lbs. for the 32 pounder, and 7½ lbs. for the 68 pounder. Fifty four rounds were fired from the 9 pounders; three hundred from the 32 pounders, and the same number from the heavy 68 pounders. Four of the guns were submitted to very severe tests, to ascertain what they would stand. The 32 pounders were fired with ten rounds of service shell of 48 lbs.; then ten rounds with shells each 72 lbs.; then ten rounds of solid shot 96 lbs. each. The 68 pounders were submitted to three similar courses of ten rounds each; two of the courses were with shells of 90 and 135 lbs., and one with a solid shot of 180 lbs. Not one of these guns was injured by these trials. An ordinary smooth bore cannon, firing round shot with a charge of 10 lbs. of powder, and having an elevation of 10¾ degrees, has an average range of 2,700 yards. The same gun when rifled, and firing a 48 lb. shell with a charge of 5 lbs. of powder, at an elevation of 10 deg., had an average range of 3,300 yards. The precision of the rifled gun was also imcomparably superior to the smooth bore; the deviation of the latter ranged from 14 to 40 yards, while that of the former was between 0 and 3 yards. It thus appears, that by rifling common and smooth-bored cast iron guns, their efficiency is more than doubled, with smaller charges of powder. With such guns, the shells and shot must be elongated to obtain the results desired.

FIVE THOUSAND VOLUNTEERS WANTED.

Reader! we ask you to examine carefully the number of this journal which you now hold in your hand. Look at the fine quality of the paper upon which it is printed; look at its superb typographical appearance; look at its spirited engravings; look at the great variety of the useful and entertaining matter which it contains, and then decide whether it is worth four cents or not. If there is any doubt lingering on your mind, put fifty-two numbers together, reckon up the number of pages, and look once more at its costly engravings; then sweep over its solid contents, and figure up once more, and see if the whole volume is not worth almost $2. If you are not satisfied with the investment, call a meeting of your neighbors, open the books and examine the subject a little more in detail, and if $2 is too much, make up a club of 20, and thus procure the paper one whole year for $1.40; or, if you cannot get 20 names, get 10, and you shall have it for $1.50. If it is not worth this sum to read, you can almost get back the whole amount by selling it for waste paper; or, it can be made into bed blankets, and one night's sleep under its warm covering, will fill your head with all sorts of grand discoveries for carrying on the affairs of the material universe, and possibly you may invent some appliance to save the Union. Thus will your pockets be filled with rocks, your head with information worth a great deal to you in all the affairs of life, and millions will rise up and call you blessed.

You say, "These are dull times." Well, admitted; but better times are coming, and you cannot afford, for the sake of a dollar or two, to be ignorant of what is going on in mechanical and industrial pursuits. Blot these elements of power out of existence, and we should speedily sink into the condition of China. What we now propose, is to raise a volunteer company of 5,000, who will come forward and send us their names and subscriptions for one year. Our books are now open, and clerks are ready with pen and ink to enroll the names. Who, among all our readers, will be the first to send in a club of 10 or 20 names? Friends of the SCIENTIFIC AMERICAN! will you not lend us a hand, and thus place us under renewed obligations to you. We mean to keep on working for your edification, instruction and benefit, and shall not relax a muscle in our endeavors to make our journal as good as the times, and, we think, a little better.

WE are indebted to Hon. Warren Winslow, M. C. from North Carolina, for a copy of the Patent Office Reports; also, for a copy of the Report of the Commercial Relations of the United States with Foreign Nations.

WHAT BECOMES OF WEALTH?

A boot and shoe dealer has hanging in his store a pair of boots worth $7. They constitute a portion of his wealth, and a portion of the wealth of the world. A man buys them and begins to wear them; by friction against the pavements, little particles of the leather are rubbed off, and thus separated from the rest of the sole. Every particle that is thus removed takes out a portion of the value of the boots, and when the boots are entirely worn out, the seven dollars of wealth which they formed is consumed. The wheat, corn, &c., which was raised by our farmers last summer is being eaten up. No particle of matter is destroyed by this process, but the value which was in the grain is destroyed.

As, while men are wearing out clothing and eating up food, they are generally busily employed in producing wealth of some kind, the wealth of the world is not usually diminished by this consumption, but it is changed. This applies, however, only to personal property; town lots and farms generally retain their value, but the personal property is in a state of perpetual destruction and renewal. As the several particles of water which constitute a river are forever rolling away to the ocean, while their places are being supplied from the springs and fountains, so the movable wealth of the world is constantly being consumed to gratify human wants, and constantly being renewed by the restless activity of human industry.

Boiler Scale Preventor—Self-acting Blow-off.

The incrustations formed in steam boilers are principally composed of the carbonate of lime, which is held in solution in all hard and sea waters. When hard water is maintained in a boiling condition, its lime slowly separates and comes to the surface in the form of a white scum, which gradually attaches itself to the sides of the boiler and becomes a hard scale. By frequently blowing off the water at the surface, such incrustations can almost entirely be prevented, and a self-acting apparatus for this purpose is certainly far more simple, safe and economical than hand blow-off pipes or chemical substances fed into the boiler at stated intervals. On page 252, Vol. XIV. (old series), of the SCIENTIFIC AMERICAN, we published an illustrated description of the self-acting surface blow-off patented by James H. Washington, No. 36 Fawn-street, Baltimore, Md. At that time it made a very favorable impression upon our mind, and we have since learned that its utility has been fully demonstrated. It is now used in the boilers of Cromwell & Co.'s line of steamers, running between New York and Baltimore; and Mr. John Baird, engineer-in-chief, states that it is a valuable invention for keeping the boilers clean. One has been used on the steamship *Vanderbilt*, and Mr. J. German, chief engineer, has also expressed an equally favorable opinion of its merits. It is employed in several other steamers, including the *Baltimore*, the *Mount Vernon*, the *R. R. Cuyler*, the *S. R. Spaulding*, and the *S. B. Virginia*. The united testimony of the several engineers of those steamers is that it is simple and durable, and is very effective in keeping the boilers clean by preventing the formation of scale. The boilers of every steamship should be provided with some such apparatus for blowing off, as incrustations, being non-conductors of heat, cause a great waste of fuel, which can be avoided by preventing the formation of scale.

EUROPEAN PATENTS.—The proprietors of the SCIENTIFIC AMERICAN have long been engaged in procuring foreign patents, and offer their services to obtain patents in the following countries: Great Britain, France, Spain, Cuba, Belgium, Holland, Denmark, Russia, Prussia, Hanover, Sardinia, Wurtemburg, Lubeck, Baden, Brunswick, Bremen, Frankfort, Hesse Cassel, Homburg, Nassau, Oldenburg, Waldeck, Sachsen Coburg Gotha, Sachsen Weisen, Lieppe Detmold, Schaumberg, Macklenberg, Schwerin, Strelitz, and other departments of the Zollverien—also Norway and Sweden.

STEEL BELLS.—Many inquiries have been made of us in regard to these bells, and, so far as we are able to learn anything in regard to them, they are well spoken of. Our readers will find Messrs. Naylor & Co.'s advertisement of these bells in another column.

AN electric telegraph is about to be laid from Beirut to Damascus. The engineers have already arrived. Work on the French carriage road to Damascus has been resumed, and is prosecuted with great vigor.

Making Turpentine.

The great turpentine country commences about thirty miles south of Weldon, N. C., and thence extends to Wilmington, one hundred and thirty miles further south. It again extends from Wilmington, N. C., nearly to Florence, S. C., a distance of one hundred and six miles. In this entire region there are but few cultivated farms, and for miles there is hardly a garden, the turpentine business engrossing the whole attention of those employed in it, and preventing them from cultivating the soil. On this subject, we give the following from a traveler recently visiting that region, addressed to the Boston *Commercial Bulletin*:—

Early in the season, say along in the vicinity of the first of March, the pine trees are boxed and chipped. Boxing is to cut a hole or box in the trunk of the tree, about a foot from the ground, large enough to hold a quart or two of the sap or turpentine, and above that the bark is chipped off two or three feet each season, until the hight of from ten to fifteen feet is reached. From time to time three or four boxes are made in each tree, which is correspondingly chipped. The turpentine is dipped from the tree into buckets, and from thence conveyed to barrels. The ladle is an iron "scoop," which is, however, rather flat in shape than otherwise, but as the turpentine is adhesive there is no difficulty in dipping it. From a pint to a quart is taken out at each dipping, and sometimes seven dippings are made in a season. A tree lives under this process about fifteen years.

The principal labor employed in the dipping (which is always during warm or hot weather) is black, under the direction of white laborers, who superintend the turpentine distilleries, by which the sap of the pine tree is converted into spirits of turpentine and rosin. Tar is made from the light wood or most pitchy part of the wood, melted by burning, over a cauldron.

The pine forests are owned in large tracts, and the principal part of the labor, free and slave, come from sections of the State, where the slave property is still owned, but hired out. It puts a great amount of money into circulation. From $175 to $250 per annum is paid for the slave labor, but the white labor is better compensated.

At Wilmington, in the turpentine distilleries, in the coopering establishments, and in every branch of the turpentine labor, hardly a white man is to be seen. The proportion of white men through the pine forest region is somewhat greater.

Between Florence and Charleston, in this State, the turpentine ambition has doomed many of the forests to be boxed and chipped, though there are some landowners who regard it as the part of prudence to hold back for lumber, and one of them declares that not a tree of his shall be boxed. South Carolina is running close upon the "Old North State" in the turpentine production, but cotton and rice are yet her great staples.

Shoe Manufacture in New Orleans.

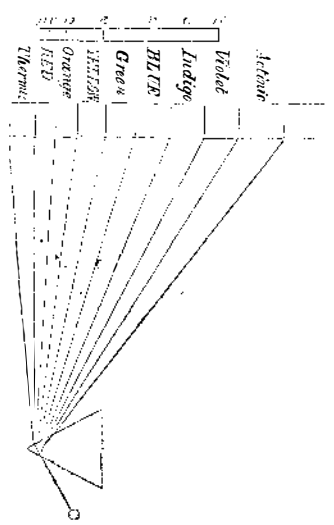
A brogan factory commenced operations in the city of New Orleans about January 1, and although not yet in full blast, turns out now about six hundred pairs a day. Messrs. Rozet & Queyrouze, the originators of this enterprise, expect to be able, within a few weeks, to turn out sixteen hundred pairs per day, of as substantial and elegant brogans as can be manufactured anywhere in the United States, and upon the same terms or less!

Mr. Rozet, though not familiar with the manufacture of brogans, proceeded, about six months ago, to Massachusetts, and posted himself up. Having done so, he proceeded to collect his materials. Some of these he obtained there, others in Richmond, Va., and others in France. The patent right to some of the machinery used has been secured by Messrs. Rozet & Queyrouze. Some of it came from France, and some from various Northern and Southern States. The leather used will come from Tennessee, until it shall be tanned in New Orleans. It is the best white-oak tanned leather, and the manufactured article, when complete, will compare with any made in Massachusetts, and can be afforded at the same price.

Our able cotemporary, the New Orleans *Commercial Bulletin*, "hails this pioneer enterprise in a department of manufactures, as one which promises the most important results, and which will actually do more for 'Southern rights' than half a dozen political conventions, and all the buncombe harangues that may be delivered from now till doomsday."

The Dark Lines in the Sunbeam.

If a beam of light, entering a dark room through a small hole in the shutter, is allowed to pass through a triangular glass prism, it will be bent or refracted out of its straight path and separated into the seven colors of the rainbow, producing a beautiful elongated image on the wall of brilliant and various hues. The color which is refracted least is red, and then in order, orange, yellow, green, blue, indigo and violet. The image thus formed is called the spectrum, and it has been the subject of an immense amount of study. It has been found that, if the light is analysed by a prism of pure flint glass, and a narrow spectrum produced, it will be crossed by numerous dark lines, called, from their second discoverer, "Fraunhofer's dark lines."



Seven of these—more distinct than the others—were named by Fraunhofer, B C D E F G H. The positions of these seven lines are indicated in the cut, in which their relations to the several colors are shown.

If a spectrum is formed with electrical light, or with light coming from any burning substance, it is crossed by bright lines instead of dark ones, and the number and position of the lines vary with the substances which produce the light. For instance, if a light is produced by burning soda, and a spectrum is formed with this light, two bright lines appear in the position of the dark lines, D, in the solar spectrum, while, in the spectrum produced by the burning of potash salts, bright lines take the place of the dark lines, A and B, in the cut. It is this department of investigation which has led to the conclusion that the sun's atmosphere contains potassium and sodium, but does not contain lithium; a discovery which we announced only a few months ago.

It might seem at first thought that the facts above stated could never be of any use to mankind, but every discovered truth, however abstract or remote it may at first appear, is very apt to be drawn into the service of man. It is found that a quantity so exceedingly minute of some substances, introduced into a flame, alters the position of the bright lines in the spectrum, that a test is thus furnished far more delicate than any heretofore known, of the presence in compounds of various substances in inconceivably small quantities. It has long been known that Saratoga water and other compounds contain substances in sufficient quantity to affect their properties, and yet so minute or so subtle as to escape the detection of all known tests. The value of a test so delicate as that furnished by the lines of the spectrum it is impossible fully to appreciate.

In another column we publish a translation from a German publication, by Messrs. Fleury & Reuschaupt, giving an account of some of the eminent Robert Bunsen's experiments in this direction. Some of the statements of the smallness of the quantity of some substances which can be detected by the new test seem absolutely incredible; they are, however, no more wonderful than many other facts in nature.

FARADAY'S LECTURES.—We commence in this number the publication of Faraday's lectures on the "History of a Candle." This is a favorite subject of his, as he delivered a series of lectures on it some years ago. The present series will be found more interesting, if possible, than those of last year. A candle, in its origin, composition and burning, connects itself with the whole field of physical science.

Annual Review of the Lumber Trade of Albany for 1860.

We learn from the Albany *Evening Journal* that the lumber trade of 1860 has been satisfactory to manufacturers and dealers. Although prices have not been high, they have been steady and sufficient for a fair remuneration.

The receipts for the year have been about ten millions of feet of boards and scantling more than in the previous year, and the total amount, 301,022,600 feet, is a larger quantity than has been received at any other market.

The following table exhibits the receipts at Albany during the years named:—

	Boards and Scantl'g, ft.	Shingles, M.	Timber, C. ft.	Staves, lbs.
1850	210,701,900	34,224	28,832	150,515,280
1851	222,238,083	34,165	110,200	115,087,290
1852	317,136,820	31,564	291,714	107,961,289
1853	293,720,073	27,385	19,916	118,666,750
1854	311,571,151	24,003	28,909	135,805,091
1855	256,923,652	57,210	24,104	110,255,285
1856	235,345,515	36,899	14,533	102,548,492
1857	180,097,629	71,004	85,104	153,264,629
1858	267,406,411	31,823	119,497	135,011,817
1859	291,771,762	48,756	70,381	114,570,503
1860	301,022,600	41,222	46,888	148,735,360

The following table exhibits the valuation of the receipts during the years named:—

	Boards and Scantling.	Shingles.	Timber.	Staves.
1850	$3,251,878	$ 119,784	$4,325	$577,310
1851	4,119,568	121,524	19,010	546,655
1852	5,495,960	111,026	52,509	507,418
1853	6,299,617	99,585	3,386	569,600
1854	4,985,139	86,891	6,649	611,123
1855	4,426,586	228,84	4,854	631,149
1856	3,573,529	129,147	2,717	461,468
1857	2,881,560	248,515	15,218	689,691
1858	4,412,905	111,383	20,334	540,049
1859	4,857,177	170,646	11,965	458,282
1860	5,042,128	144,277	7,971	594,942

The stock on hand to be wintered at Albany is not larger than usual, and is pretty well assorted.

Albany receives this year over three hundred million feet of lumber, the value of which, with staves and shingles, is nearly $6,000,000. The handling of this amount of property gives employment to a small army of men, and the business transactions connected with it are among the largest in that city. Her position at the termination of the canals and on the Hudson river, with the ample slips and basins in the lumber district, gives her unrivalled facilities for receiving, storing, selling and shipping the lumber annually marketed here, and she still maintains her position as the largest lumber mart in the world.

City Savings Banks.

The total aggregate of deposits in the four large savings banks—the Seaman's, Bleecker, Greenwich, and Bowery—is not far from thirty-three and one-quarter million dollars, against twenty-two and one-half million in January, 1858. The comparative condition of these banks for the two periods, in point of deposits, may be stated as follows;—

	Jan. 1, 1858.	Jan. 1, 1861
Bowery	$6,697,393	$10,294,995
Bleecker, about	8,000,000	10,000,000
Greenwich, about	1,000,000	4,000,000
Seaman's, about	6,750,000	9,000,000
Total	$22,447,393	$33,294,995

The other savings institutions in the city have on deposit, at the present time, an aggregate of from eight to ten million dollars.

The following statement shows the general increase of deposits at this time over those of the corresponding periods just after the panic of 1857, in five other banks not included in the previous statement:—

	Jan. 1, 1858.		Jan. 1, 1861.
Broadway	$679,777	about	$1,130,000
Emigrants' Industrial	1,415,281		2,655,902
Manhattan	1,456,000		2,946,000
Mechanics' and Traders'	311,686		542,444
East River	662,589		1,210,151

The majority of the depositors in the Emigrant Industrial are Irish, while in the Bowery and East River Germans preponderate; the depositors in the other banks are made up of all classes and nationalities.

STUDY THE FACE.—A story is told of a great French satirist, which finely illustrates his knowledge of human nature. He was traveling in Germany, in entire ignorance of its language and currency. Having obtained some small change for some of his French coins, he used to pay drivers and others in the following manner: Taking a handful of the numismatical specimens from his pocket, he counted them one by one into the creditor's hands, keeping his eye fixed all the time on the receiver's face. As soon as he perceived the least twinkle of a smile, he took back the last coin deposited in the hand, and returned it, with the remainder, to his pocket. He afterward found that in pursuing this method he had not overpaid for anything.

THE *Great Eastern* is undergoing repairs at Milford Haven, England.