our lands trebled themselves in value. We cannot express the weight of the obligation which the country owes to this invention. The extent of it cannot now be seen. Some faint presentiment may be formed from the reflection that cotton is rapidly supplanting wool, flax, silk, and even furs in manufactures, and may one day profitably supply the use of specie in our East India trade. Our sister States, also, participate in the benefits of this invention ; for, besides affording the raw material for their manufactures, the bulkiness and quantity of the article afford a valuable employment for their shipping."

In 1807, the cultivation of cotton was in its infancy, and the vast effects of Whitney's invention had but just begun to be developed.

Mr. Whitney afterwards embarked in the manufacture of arms for the United States Government; using machinery of his own invention. He was the first to make each of the parts of a musket to fit the parts of any other musket.

The later years of his life were passed in the enjoyment of wealth, which he used with much benevolence. In January, 1817, he married Miss Henrietta F. Edwards, youngest daughter of Hon. Pierpont Edwards, late Judge of the District Court of the State of Connecticut. He died at New Haven, January 8th, 1825, and a fine monument, modeled after the tomb of Cæsar, is erected over his remains in the cemetery of that place. Upon it is inscribed—

"ELI WHITNEY,

"THE INVENTOR OF THE COTTON GIN."

THE GREAT NAVAL CONTROVERSY.

Donald McKay, the eminent ship-builder, has addressed a communication to Senator Grimes respecting the merits and demerits of the navy, which have so recently been brought into dispute by Mr. Dickerson in his recent tilt with Mr. Isherwood and others. Mr. McKay, with an evident degree of fairness, characterizes Mr. Dickerson's attack as unjustifiable; and he thinks "he should be punished and made an example of." The letter is very long, and so much of it as refers to personality we omit; but that portion which draws a comparison between the American and English naval vessels, in point of speed, contains matter of interest, as bearing on the controversy now going on between Mr. Dickerson, Mr. Isherwood and the lesser lights who have entered the lists:—

"Understanding that there was to be an investigation regarding Mr. Isherwood's machinery and his official course as an engineer, I present the following table of British war-steamers, with their speed at the measured mile; and I know full well what the delusion of a measured mile trial is, and know that at sea, under ordinary circumstances, they do not equal the measured mile time by at least fifteen per cent, and often more. In running the measured mile (and I have seen it done, and know all the jockeying) the sea must be perfectly smooth and no wind, the ship trimmed and made ready, boilers and fires clean, furnaces full of burning coal, and steam kept bottled up until they near the first "post;" then the valves are opened wide, and the mile is run. The tables of speed of our own naval sloops are taken from the ships' logs in a sea-way, with sea-sick firemen, and in some cases burning bad coal. I know that there are no steamers in the English and French navies of the size of the *Sacramento* class, that, under the same circumstances, are so efficient in point of speed, economy, and destructive powers. I think they admit this. We have no ships to compare with the *Mersey* and *Diadem* frigates—a class of vessels used in the British navy, which carry powerful batteries, have great steam-power, and are very fast. For instance, the *Mersey* frigate, tunnage 3,726, draught of water 22 feet 7 inches, horse-power 4,000 (the length of the stoke-hole, or boiler-room, in this steamer, is over 68 feet, having 32 furnaces); speed at measured mile, Stoke's Bay, 13·29 knots. The *Minnesota* class of frigates are their equals in armament, but not in speed.

"Our side-wheel gun-boats are far ahead of anything of the kind used in Europe, and with a light draught of about eight feet of water maintain a speed hardly, if at all, equalled by any of our fastest merchant steamers, and carry a very heavy battery. Also the screw gunboats are vastly superior to the English and French gunboats, both in speed, battery, and generally efficiency; also for operations on our coast, their very light draught of water makes them a valuable arm of offense.

"Regarding the sloops of the *Sacramento* class, they combine high speed with powerful batteries, although their exceedingly light draught of water prevents their being good sea-boats, as they will roll excessively, yet they have not their equals in the above good points in the British or any other navy. And these sloops have been presented to the public as complete failures, having very slow speed. I will present a table of the fastest screw corvettes and sloops in the British navy, having nearly the same tunnage. This table is compiled from a list of forty-seven corvettes and sloops, and is the speed made at the measured mile, and not their full speed at sea, where the conditions are changed and speed much less:—

	Tuns.	Speed per hour.
Racoon	1,467	10 knots.
Pearl	1,469	11.31 "
Pylades	1,275	10.11 "
Satellite	1,462	11.4 "

"As I mentioned above, these are the fastest of a class that correspond with the *Sacramento* and other of our new sloops, and have an average draught of from twenty to twenty-two feet of water. These vessels would be entirely unsuitable for operations on our coast, owing to their great draught of water; and having this great draught a large propeller can be used, will be deeply immersed, and can be made more efficient than with a lighter draught. This is the opinion of engineers, and has been confirmed by experience.

"The following table gives the speed of our new steam sloops of about 1,367 tuns, and with the very light average draught of about fourteen feet of water:—

	Tuns.	Knots per hour.
Sacramento	1,367	12.5
Adirondack	1,367	12
Shenandoah	1.367	12.25
Ticonderoga	1,367	12.5

"The above speeds were made at sea, and, as their officers say, ' under the usual condition of cruising ships.' We can all see that at the measured mile trial (after the manner our English friends have of getting the maximum speeds) a much higher rate could be obtained.

"Their machinery is much like the well-tried English plans, having the same valve gearing, but with 'surface or fresh-water condensers," and much higher steam can be carried by using fresh water in the boilers; also many other important advantages are gained by the use of a 'surface condenser.' And it seems that the 'Sewall condenser,' now in use on our naval steamers, is all that can be desired; at least the best in use.

"Mr. Isherwood advocates the use of a smaller cylinder and higher steam,* and is opposed to complicated machinery, made to expand the steam to its fullest extent, believing the end does not justify the means, and that it is safer and just as economical in the end to employ simple and always reliable valve machinery. The success of the English machinery is entirely due to extreme simplicity and strength. After the painful experience with the complicated machinery of the *Pensacola* and *Richmond*, it does seem that Mr. Isherwood is right in his views. We are a fast people, and want everything we have to do with to be fast. Our naval steamers are fast, yet they must go faster, even if they break down in so doing. This is the way the public feel in this matter, and the performances of the *Alabama* and her consorts have made us all crazy in matters of speed. It is one thing to see them at sea, then to overtake them, afterwards to capture them. I do not think any of these privateers steam thirteen knots, and believe they will yet be captured by our new sloops.

"I hope our navy will be efficient, as it always has done its duty, and desires that the best talent in the land shall be at the helm, but do not see that others can do any better than our chiefs of bureaus have done; that our ships and machinery are failures; or that Mr. Isherwood is incompetent because he does not agree in all points with those assailing him.

"The *Nypsic* gunboat came to the Navy Yard at Boston from Portsmouth, and her officers said 'she made eleven knots under steam, and has since been very efficient on the blockade.' The *Pequot*, a gunboat of the same class, has just returned from a trial which, from all that I can learn, has not been entirely satisfactory, and did not give the speed of the *Nypsic*. Also, the *Saco*, of the same class, now fitting out at the Boston Yard, has, like the *Pequot*, new and peculiar machinery, in both cases experiments. I mention this to show that private establishments are engineering for the navy, and without Mr. Isherwood's success."

* [This is correct. The gravest charge brought by Mr. Dickerson against the engineering capacity of the Navy Department is, that it has, through Mr. Isherwood, it schief engineer, introduced small engines, and diminished opportunity for expansion and high steam pressure in nearly all the new vessels of the navy. Mr. Dickerson denounces this method as ruinous, because attended with enormous expense without any corresponding increase of speed, and declares it to be also contrary to good engineering. He affirms that the true plan—that which the experience of nearly all engineers (Mr. Isherwood excepted) has demonstrated to be the best—is to have *large cylinders with plenty of area for working steam expansively.* The experience of engineers, generally, is as Mr. Dickerson has stated. There can be no doubt that engines of great piston area, using steam expansively, are better calculated to secure speed with economy than small engines, little expansion and high pressure. Fast vessels can be made on the Isherwood plan, but their consumption of coal will be enormous. Equally fast vessels can be built on the other plan with a great economy of fuel. Nearly all of our privately-built steamers have their engines made with a view to this economy. The example of the *Pensacola*, which Mr. McKay appears to regard as conclusive in favor of the Isherwood system, ought not to have any weight in the matter, for there are two histories of this vessel, one of which favors Isherwood and the other Dickerson ; both well sustained by evidence.—EDS.

The Committee on the Decimal System.

We see that a committee has been appointed by the House of Representatives to examine and report on the adoption by this country of a decimal system of weights and measures. It seems to us that the course of this committee is perfectly clear. Our scientific associations have been in the practice for many years of appointing committees on the same subject, and the labor of these committees have been barren of results from the fact that they wasted their efforts in long discussions rather calculated to display their own learning than to accomplish the object of their mission. Whatever may be urged against the French system, it is, to say the least, about as good as any that can be devised, and it has the very great advantage of being already in operation in a considerable portion of the civilized world. Even in our own country it is habitually used among men of science, and in scientific books and periodicals. To adopt any system other than the French would be ridiculous. To the minds of common-sense, practical men the agreement is closed. All that our Congressional committee has to do, is to ascertain exactly what the French system, as now in operation, actually is; and to report a bill for its immediate adoption in this country. The ready adaptability of our people would soon conform their transactions to the improved system, and we should be forever relieved of the vast labor of computing by our present complex and irrational methods.

A NUMBER OF THE "SCIENTIFIC AMERICAN" WANTED.—We are having numerous pressing calls for "Number *One*" of this volume. In consequence of the destruction of a train of cars by fire, on one of the Western roads, nearly our whole Western edition of "Number *One*" was destroyed, and we have none now on hand. If any of our readers, who do not preserve their numbers for binding, can send us copies of this missing number, we shall esteem it a great favor.

A GENEROUS and wealthy Englishman, Mr. George Elliot of London, has bestowed 1,000 tuns of coal as a free gift to the Sanitary Commission of this country. This donation was entirely unsolicited, and will prove a most valuable and timely addition to the resources of the soldiers' friends.

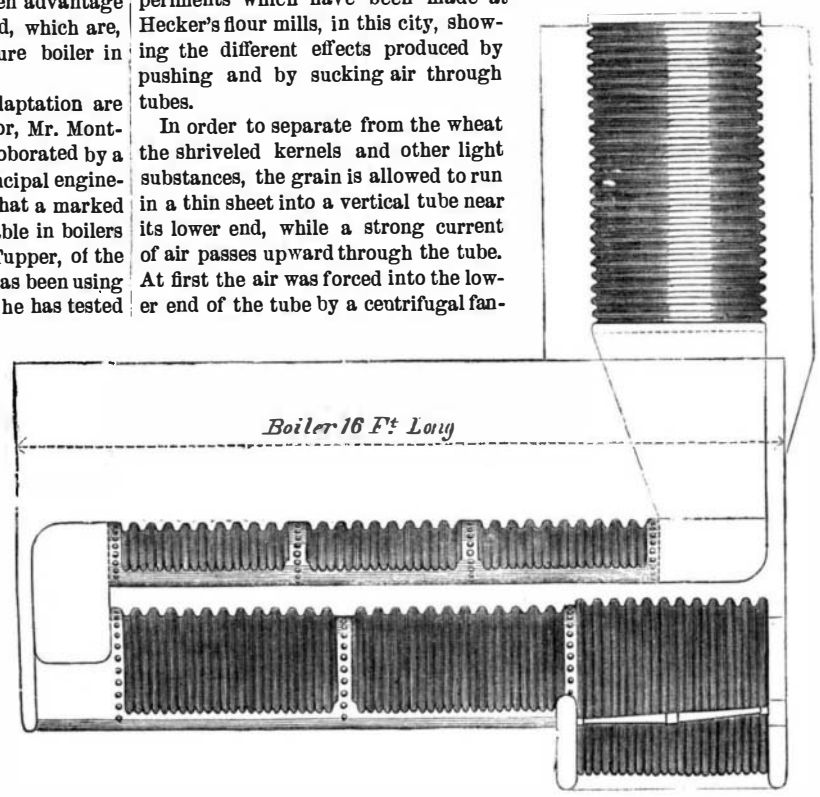
Improved Corrugated Iron Boiler.

The steam boilers herewith illustrated are peculiar in many respects; the chief point where they differ from others is in the character of the iron composing them. This iron is of the kind known as "corrugated," which means simply so rolling the sheets that instead of having a plain flat surface there are a series of arches throughout or over the whole surfaces. This method of treating boiler-iron renders it immensely stronger for the same weight of metal than a plain sheet, and this peculiarity is taken advantage of in the plans which are shown annexed, which are, a long cylinder boiler, also a low pressure boiler in section.

The advantages claimed for this adaptation are many, and it is asserted by the inventor, Mr. Montgomery—whosestatements are also corroborated by a large number of certificates from the principal engine-makers and engineers of the country—that a marked improvement over old forms is observable in boilers now in use on his plan. Capt. C. H. Tupper, of the steamer *Troy* and others, states that he has been using this corrugated iron in a boiler and that he has tested it severely, having carried 150 lbs. to the square inch on an arch without a single brace upon it.

The chief points claimed for this corrugated iron are, that a boiler made ofit is much stronger for the same weight; that more heating surface is afforded in the same length or dimensions in these than those made of flat iron; that being constructed wholly without braces the danger of scale collecting around the same, as in ordinary boilers, is obviated, thus preventing deterioration of the metal from this cause; and it is cheaper to make—a boiler of this iron costing about two-thirds of one of equal heating surface constructed of plain iron; and also a great economy in point of weight is manifest. The deposit of scale and sediment, which is such a source of injury to the ordinary boilers, is also claimed to be much less in this, if not wholly prevented. The mechanical reader will see, by referring to the section of the low-pressure boiler, that the corrugations extend across the crown sheet or arch, and that the expansion and contraction of the sheets, which is always going on when the boiler is "fired-up" from one day to another, and suffered to cool, does not permit scale to adhere, as from the causes above mentioned it is dislodged as fast as formed, and may be washed out with a hose and afterward drawn out of the hand holes. The use of this iron is also a guarantee for the employment of the best quality of the metal, as in the process of manufacturing the sheets any inferiority is readily perceived and the plate rejected. The boilers of the *Isaac Newton*, recently burnt on the North River, weighed 51,448 lbs., if they had been corrugated the weight would have been 36,020 lbs.; instead of being 30 feet long they would have been 21 feet 6 inches; and in lieu of the heatingsnrface in the furnaces being 386 square feet, with corrugated iron it would have been 376 square feet. From these figures the reader will see that an obvious advantage is apparent in the use of this material. A large number of circulars, testimonials, &c., have been shown us from eminent engineers, all certifying to the value of this form of iron for all purposes where great strength, lightness and rigidity are required.

This mode of constructing boilers is the invention of Richard Montgomery, and has been secured by Letters Patent. Further information may be had by addressing Mr. Wm. A. Dodge, agent, 77 John street, New York.



MONTGOMERY'S CORRUGATED IRON BOILER.

EXPERIMENTS OF DRIVING AND OF DRAWING AIR THROUGH TUBES.

At the last meeting of the Polytechnic Association, Dr. Rowell gave an account of some instructive experiments which have been made at Hecker's flour mills, in this city, showing the different effects produced by pushing and by sucking air through tubes.

In order to separate from the wheat the shriveled kernels and other light substances, the grain is allowed to run in a thin sheet into a vertical tube near its lower end, while a strong current of air passes upward through the tube. At first the air was forced into the lower end of the tube by a centrifugal fan-blower. By this plan it was found impossible to raise the light grains more than eight feet, and unless the blast was nicely regulated some of the sound kernels would be carried over.

The fan was then placed at the upper end of the tube so as to draw the air upward. It was then found impossible to raise the light grain more than three feet; though this arrangement worked better than the first.

Then Dr. Rowell suggested to Mr. Hecker to substitute for the centrifugal blower a spiral fan, like a boy's windmill. This proved perfectly successful. The shriveled grains are drawn upward sixteen feet, not a single sound kernel is carried over, and the separation is completely effected. The centrifugal blower required a three-inch belt, but the spiral fan is driven by a belt one inch in width. The vertical tube terminates in a large square box, a round hole is cut in one side of this box, and the fan is placed just outside of the hole; the diameter of the fan being about one inch greater than that of the hole. The fan has four blades, each about five inches in width at the outer end, and about one foot in length.

On placing a thermometer at the lower end of the tube, Dr. Rowell found that the attenuation of the air reduced the temperature about five degrees.

Eight tuns of greenbacks were carried over the New Jersey railroad to Washington, one day last week. The money is said to be the collections of different Internal Revenue officers.

THE WORLD'S INDEBTEDNESS TO SCIENCE.

The fourth and last lecture of this course was given, according to appointment, on the 18th ult. The character of the lecture was much the same as those of previous ones which, it is almost needless to say, were of a high standard. Prof. Doremus paid a glowing tribute to Dr. Priestly as the discoverer of oxygen gas; and he then proceeded to state, in terse language, what an important element it was in the formation, not only of the globe itself, but of the plants and animals inhabiting it; three-fourths of our bodies, four-fifths of vegetation, and one-half of the crust of the globe being composed of this gas. So omnipresent and indispensable is it that it has been called "vital air," and its influence upon and absence from animated nature is very marked.

The economy of nature also occupied the attention of the lecturer; and he said that it was most beautiful to remark how the different processes went on without loss; for the gases respired by man, and which were noxious to his system, were taken up and absorbed by plants, to whose growth they were essential; these appropriate the carbon in the atmosphere and leave the oxygen, while man throws off the former and retains the latter. Experiments to prove that oxygen was essential to the perfect production of artificial light were then tried; these consisted, in one instance, of the introduction of ignited sulphur to a jar containing oxygen gas. In the atmosphere the combustion of the sulphur was but feebly supported; but in the presence of the pure oxygen it gave forth a brilliant light. A similar experiment with iron resulted happily. "Our bodies change every minute," said Professor Doremus, "from the action of this invisible but ubiquitous gas. I am not the same that I was a few minutes since, this audience is not the same; and, through the magic influence of oxygen, vigor is given to the intellect, power to the muscles, and vigor to the whole system." Professor Draper has beautifully said that this gas is "the cradle of the animal kingdom, but the grave of the vegetable one."

Some experiments with chlorine gas were next in order; and the effect this had on compounds of hydrogen—decomposition—was descanted on at some length; the great pecuniary value of this gas, as a bleaching and disinfecting agent was also alluded to. One instance of the value of chemistry, and especially the discovery of chlorine gas, to the commercial interests was exemplified in the fact that (as stated by the lecturer), before this gas was discovered, goods were sent from English factories to India, solely to be bleached; as the limited area and want of sunlight (which was formerly the sole reliance for producing white goods) precluded the possibility of doing it so economically at home. Nitrous oxide, about which so much has been published in the Scientific American, *pro* and *con*, was also highly spoken of as a means of producing insensibility during surgical operations; and the only objection to its use was the disgusting manner in which it was administered in general. The wonderful exhilarating qualities of