

There can be no doubt that if they are not so desirable they are really more beautiful than natural teeth. American dentists have achieved a triumph of skill in their manufacture, and have conferred a benefit upon suffering humanity.



**Strength of Steam Boilers.**

Messrs. Editors:—I do not intend here entering into the causes of the large number of boiler explosions that take place, but having lately read in the daily press accounts of the bursting of several locomotive boilers, it struck me that some simple and general rule by which to ascertain their strength would be useful to all who either make or use them; and especially because, although the general principle herein conveyed is well known, still I have found few, especially amongst practical men, who have any idea of the actual pressure it would be safe to test boilers to. I therefore subjoin a table I have worked out, which shows one-third of the pressure per square inch a boiler one inch in diameter will bear without bursting, and no material should be loaded with a greater strain. For boilers of any size it is only necessary to divide the number of pounds in the table, opposite the thickness of plate used, by the diameter in inches; the result will be the greatest load that ought to be put on a safety valve in pounds, per square inch. The iron used is understood to be of the best quality, with a tensile strength equal to 70,000 pounds per square inch. Although all boilers should be tested to the extent given by the table, they should not be regularly worked up to that pressure, on account of their depreciation by wear and tear, by oxidation and otherwise, which, according to the time they have been in use, will of course proportionately lessen their efficiency.

1-8th-inch plate,.....	2,500 pounds.
3-16th-inch plate,.....	3,750 pounds.
1-4th-inch plate,.....	5,000 pounds.
5-16th-inch plate,.....	6,250 pounds.
3-8th-inch plate,.....	7,500 pounds.
7-16th-inch plate,.....	8,750 pounds.
1/2-inch plate,.....	10,000 pounds.
9-16th-inch plate,.....	11,250 pounds.
5-8th-inch plate,.....	12,500 pounds.
3-4th-inch plate,.....	15,000 pounds.

Suppose, for instance, we have a locomotive boiler made of 5-16th-inch plate (their usual thickness) and 45 inches diameter, the table would give  $6,250 \div 45 = 139$  lb., the greatest amount to which the safety valve should be loaded; whereas another boiler, 35 inches diameter, and the same thickness of plate, would, by the same rule ( $6,250 \div 35$ ), bear 178 pounds per square inch, without any extra strain on the iron. If, however, we make the 35-inch boiler of 1-4th-inch iron, we find opposite 1-4th-inch, 5,000, which, divided by 35, gives 143 pounds, showing that 1-4th-inch plate in a 35-inch boiler, will bear more pressure than 5-16th-inch plate in a 45-inch boiler. This also shows conclusively that by making two boilers of different diameters, that have to work at the same pressure, of the same thickness of plate, that either one is too weak, or there is a waste of material in the other.

WILLIAM TOSHACH.

Schenectady, N. Y., Jan. 15, 1864.

**Nature and Art—King-Crab War Ships.**

Messrs. Editors:—Perfection is only to be found amongst the numerous specimens of the handiwork of the Great Creator, which he has placed so lavishly around us for our use and instruction, and we should make the proper application of the lessons which are continually placed before us. If we seek color, form, or perfect adaption to the use intended, we can find them all among the many models which nature has given us for guides. It was many years before the principle of the arch was discovered and applied, and yet every human being carried a perfect illustration of it in the arrangement of the bones of his body. And for lighthouses and towers, where can be found for stays or supports a better system than that shown in the roots of the sturdy oak. The design of the roof of the London Crystal Palace was taken from a leaf. A new and fashionable design for a calico pattern was found to have existed as a fossil many thousand years old. Palssey, the famous potter, discovered in a fossil shell a perfect system of defensive fortification. And

now when the public mind and the minds of inventors are run wild over the changed system of warfare inaugurated with heavy guns and shot-proof vessels, let us see what nature will do for us. She furnishes a model of an engine of war, which, if made of suitable size, could destroy any vessel now afloat, in spite of iron plates, big guns, and almost anything else. I allude to the species of crab (*L. cyclops*) the king crab or horse hoof found on the coast of New Jersey. This creature is provided with almost everything requisite for a first-class ram ship, and to this I would invite the attention of scientific men and naval constructors. I will not enter into a scientific description of the animal in detail, but will simply state its most prominent features for the purpose specified.

In shape it is like a turtle, covered with a thick shell or armor, and armed with a sharp stylet or prow. The back of it is brought down wedge-shape, which will enable it to have considerable speed through the water. Its propelling power is placed underneath, so that its feet or paddles are hid and are not liable to be injured. It has apparatus to lower and raise itself in the water, around the bow, and it is armed with a row of smaller spikes, which would be sure to strike anything met in its path through the water. A vessel constructed to contain in itself the above-mentioned principles, with the addition of a telescopic smoke-stack and pilot-house, and perhaps a revolving prow, would be really formidable. Manned with a pilot, engineer and fireman, it could attack any vessel with impunity; being submerged when in action, and showing nothing but the smoke-stack, it could approach a vessel without being seen, and then, with its great speed and weight, it could strike a blow with the force of a dozen "Swamp Angels," thus utterly demolishing its opponent. If attacked and surrounded by boats, it could rise to the surface, spin around and scatter its assailants like chips. In fact, under almost any circumstances, I can see in a monster king crab admirable means for protection and defense.

C. D. K.

Frankford, Pa.

**An Effectual Corset Wanted.**

Messrs. Editors:—The air we ladies have to breathe up here in Vermont circulates all round the world and is breathed by all the filthy creatures on the face of the earth, by rhinoceroses, cows, elephants, tigers, woodchucks, hens, skunks, minks, grasshoppers, mice, racoons, and all kinds of bugs, spiders, fleas and lice, lions, tobacco-smokers, catamounts, eagles, crows, rum-drinkers, turkey buzzards, tobacco-chewers, hogs, snakes, toads, lizzards, Irish, negroes, and millions of other nasty animals, birds, insects and serpents; besides it is filled with evaporations from dead decaying bodies, both animal and vegetable, and all sorts of filth, and we ladies are obliged to breathe it over after them, ough! bah!

Now we want, and must have, some contrivance that will effectually keep this foul, disgusting stuff out of our lungs. We have tried the three kinds of corsets which you noticed in your paper the last year; but when we do the best with them that we can, about a teacupfull of this nasty air will rush into our lungs in spite of these miserable contrivances, and when we blow it out again another teacupfull of the disgusting stuff will again rush in, and when we blow that out still another will rush in; and so we are obliged to keep doing from the time we wake up in the morning till we go to sleep at night, and I do not know but we do all night.

If these corsets are worth anything to keep this disgusting air out of a body, and we have not put them on right, please come immediately yourself or send the inventors to show us how. If they are a humbug I hope their inventors will be tarred and feathered and rode on a rail, and you, for noticing them in the SCIENTIFIC AMERICAN, be obliged to breathe about 60 pints of the nasty, foul, nauseous, filthy, disgusting, dirty, defiled, loathsome, hateful, detestable, odious, abominable, offensive, stinking air which surrounds this earth per minute for a hundred years.

SUSIE PINKINS.

[We can suggest but one kind of corset which would effectually meet our fair correspondent's wishes. Instead of the ordinary laced-up corset, take a piece of strong hempen cord and apply it closely about the neck, tie one end of it to a beam, and let the whole weight of the body suspend at the other end. We

guarantee that if the cord is strong enough it will put an end to all future complaints on this subject.—Eds.

**The French Railway System.**

The reform of the French railroad system has lately been a subject of serious inquiry by the Government, and the report of a commission appointed two years ago, presided over by M. Michel Chevalier, has been published by order of the Minister of Public Works. It appears that the government directly controls the management of French railways, and there is not that freedom and individuality, and enterprise manifested in conducting them, as in America and Great Britain. The trains are slow but are generally very safe. The express trains in France carry the mails, hence they have frequent stoppages; and their total speed is below that of trains in the United States. The commission very warmly recommend a reduction in the fares of passengers—a recommendation which the companies are not inclined to follow, without special reasons. Passengers cannot be compared to merchandise: a company provides as many trucks as can be filled, but must always be prepared to carry a number of empty passenger-carriages at a loss. It would often be easy to reduce fares if every train could be filled. The goods traffic seems to suffer, while the passenger traffic gains, by the regulations imposed in return for monopoly. As French railways are not bound to dispatch any goods not delivered the day before the train starts, or to deliver them until the day after their arrival, it follows that, between several towns (Paris and Rheims, for instance), goods are a longer time on the way than by the old road waggons. The time of goods trains between Marseilles and Paris is nine days; the fast carriers on the road did it in ten days. The French companies defend their delay on the ground of the time required for weighing, classifying, marking, loading, and unloading; all which are well done, but too well done. It seems that there are constant disputes and law-suits in France between the owners of merchandise sent and delayed and the railway companies. Frenchmen are now crying out for greater speed, more branch lines, and easier terms for merchandise.

**The Great West.**

The four States of Indiana, Illinois, Iowa, and Wisconsin, have a computed area of 124,000,000 acres, or a surface of about one half greater than the whole British Isles. From 1850 to 1860 the area under cultivation rose from 11,956,269 acres to 25,949,886 acres—an increase of 142 per cent. At the same time the value of the farms advanced from \$278,704,593, to \$1,027,292,333; and the value of the farming implements rose from \$15,924,442 to \$39,645,875.

The population of these four states was 2,337,491 in 1850, and 4,513,208 in 1860.

The aggregate live stock of the four states was:—

	1850.	1860.
Cattle of all classes.....	1,946,756	3,724,726
Sheep.....	2,291,392	3,523,827
Swine.....	4,660,196	6,033,368
Horses and Mules.....	668,739	1,340,054

In other words swine increased in numbers 29 per cent., sheep 54, cattle 90, and horses 100 per cent.

The immense grain crops of these four states increased as follows:—

	Crop of 1849.	Crop of 1859.	Est. for 1862.
Wheat, bushels	21,445,745	63,624,450	83,812,946
Rye, do.	263,325	2,446,137	2,603,524
Barley, do.	391,063	2,605,133	2,971,680
Indian corn do.	119,257,125	233,620,654	290,639,035
Oats, do.	20,681,272	37,303,750	43,247,662

Such are the kind of products which constitute the foundation of our nation's material power.

AN English inventor, in the Eastern counties, has constructed a small paddle-wheel boat which is propelled by a pendulum. It is a jolly-boat, and the pendulum is worked by four men. He contends that it is operated with half the power of an oared boat. This principle is nothing new. It has been tried and found unsuccessful, for obvious reasons, well understood by scientific men. Many years ago, a Mr. Lenet, of Albany, tried the experiment on the Hudson, and found the direct application of power to the paddle-wheel was more effective than through the pendulum.

NEW RAT POISON.—The *Journal d'Agriculture Prctique*, recommends artificial carbonate of baryta to be mixed with various kinds of food for rats. This salt is almost tasteless, and it is said, does not become poisonous until after the action of the gastric juice renders the salts of baryta soluble.

**Heating Apparatus for Kerosene Lamps.**

The discovery of petroleum and its adaptation to domestic uses is certainly one of the most wonderful things of the day. The rapidity with which it has come into general use, in many cases supplanting even gas as an illuminator, is also astonishing, and it is difficult to conceive what substitute could be found if the supply should ever give out.

Fish's patent kerosene lamp, which has obtained so wide a notoriety, and is acknowledged as a necessity in every well-regulated family, cooks the contents of the vessel attached to it by making the chimney constitute a flue, thus taking advantage of the large surface of the chimney as a radiator. The principle of this apparatus is different and is a modification of Mr. Fish's former invention, and can be used in connection with any gas or lamp burner. It consists of a light cast-iron stand, A, having a tube, B, securely fastened to its under side. This tube slides upon a rod, C, which is also fastened to a clamp, D. This clamp is of cast-iron, and is made in two parts, which are jointed together at F; one of the jaws which encircle the collar of the burner on the lamp is made longer than the other, and there are also three short raised edges inside the jaws, which bite into the collar and hold the stand firmly in place, when the thumb-screw, F, is set up tightly against the opposite jaw. The sliding tube is also fitted with a set-screw, so that the height of the vessel to be heated can be regulated as desired. By the use of this apparatus a common glass chimney can be used, without endangering its safety or the contents of the vessel in process of heating. With fixtures that depend upon the chimney for support, it is evident that if, from any cause, the glass is broken, the vessel will be thrown down, scalding those in the vicinity. Such a casualty is impossible with this arrangement; for although the chimney is as liable to break as any other, its failure in no way endangers any one.

This apparatus also serves another purpose, as shown in the engraving. The screen or paper shade on the glass lamp is sustained by the cast-iron stand on which the pot or kettle ordinarily sets, thus furnishing a pleasant relief to the eye and holding the shade without burning it out in a short time, as is the case with all others now made. It can also be used over gas burners, as well as on kerosene lamps, and here it is even more efficient, as the absence of the chimney renders it possible to bring the vessel nearer the flame.

The plan on which this apparatus operates is clearly shown by the engravings: the clamp is merely slipped over the collar, the thumb-screw set up, and the task is done; the vessel above can be heated in from three to ten minutes, according to the condition and quantity of liquid in it. This apparatus is an exceed-

ingly convenient one for invalids, nurses, sick, children, and for general use in the family; for making tea and coffee and cooking light food in summer, it is very useful, and as an efficient arrangement for economizing the heat of kerosene lamps it is unrivalled.

This attachment was patented November 17th, 1863, by Warren L. Fish, of Newark, N. J. For further information concerning this invention, address

or not, but in the night he must depend for safety altogether upon the fidelity of the switch-tender. The self-regulating signal illustrated herewith has this virtue—it cannot be misplaced, or set wrong, except through design, as the least attempt to change the switch turns the signal light, and any alteration from the correct point is shown by a glance.

The mechanical arrangement is readily seen; the lantern, A, is set with glass of different colors, and is

placed on a rod, B, and shielded by the case, C; this rod runs through the stands, D, and is revolved by the action of the rack and pinion, E. As the lever is thrown over it turns the pinion, which revolves the lantern, so that each color is in turn brought opposite to the opening, F, in the case. As the engineer of a regular train knows, of course, what color or signal shows the way to be clear and the switch right, he has no hesitation, but proceeds when he sees the beacon: the lantern screws down on a shoulder, so that it always sets in the same place, and the outside case may be locked, if necessary, to secure the lantern from being tampered with; no lock is necessary on the switch lever, as the lantern records every movement made by it; suitable vents or air holes are made in the lantern and case.

A patent on this invention was issued to H. H. Barnes, of Mexico, N. Y., Dec. 15, 1863, through the Scientific American Patent

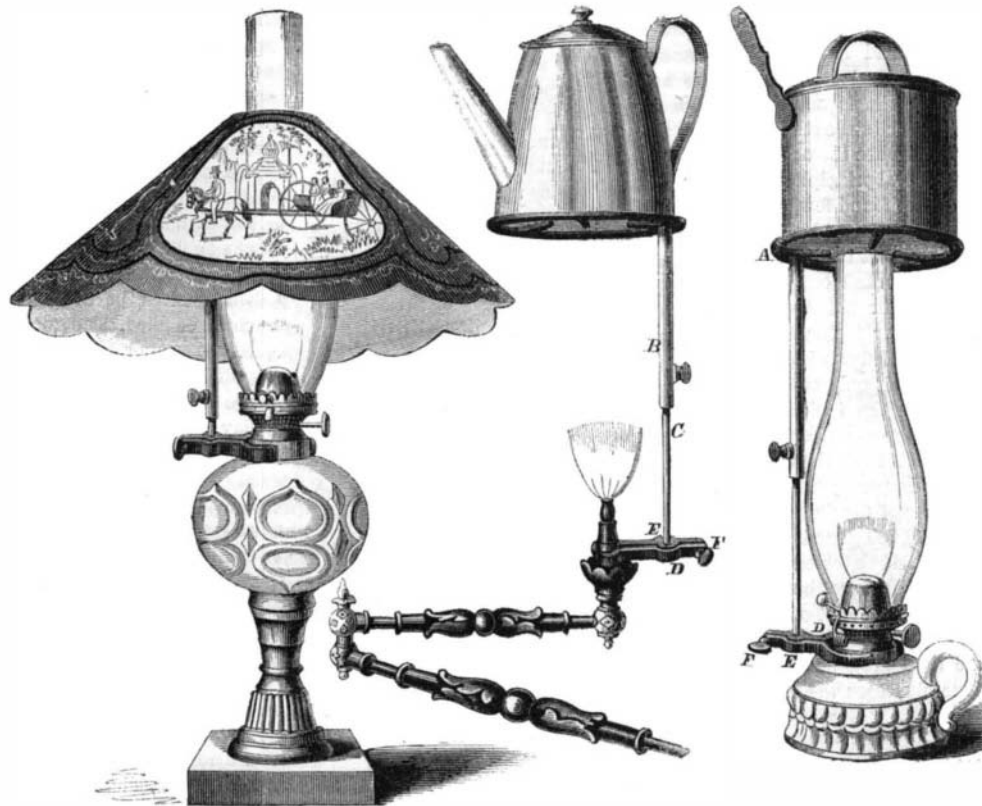
Agency. For further information address the inventor at that place, or through Messrs. Lord & Andrews, 41 and 43 Warren street, New York.

**England Imitating our Ordnance.**

We are going to pay the Americans the highest compliment which one nation can pay to another—imitate them. Our cousins having sent some agents to this country to find out what we are doing in the way of guns, we are doing likewise, and Captain Goodenough, R. N., has set off for America, to learn all that he can about the Dahlgrens, and Parrotts, and Brookes. It is time we did this, for every day shows us more and more completely that we are nowhere in the matter of artillery, and that we have wasted three precious years in order that Sir Wm. Armstrong might enjoy supremacy in our arsenals. The latest report of the Elswick doings is that the 600-pounder at Shoeburyness is going. In spite of all the care that was taken to prevent the gun from heating, and which was the reason why

it was fired only three times an hour, the piece has shown ominous indications of failure. But *n'importe*, Sir William Armstrong is building a one thousand-pounder, which will cost us only £10,000. *Liverpool Courier*.

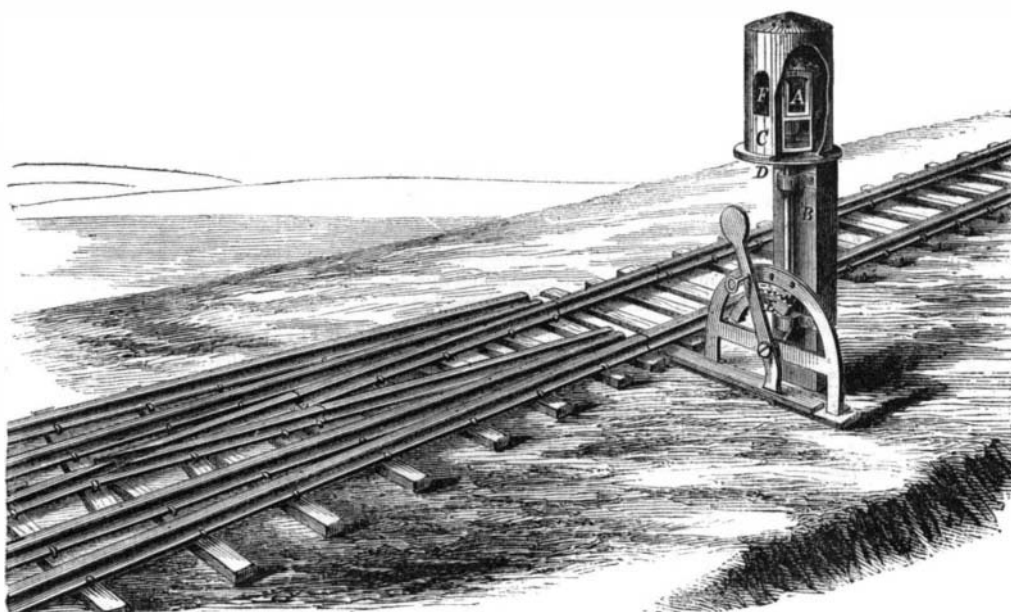
[The very confident tone of the English journal indicates that there can be no possibility of our refusing to grant so "simple" an act of courtesy.—Eps.]

**FISH'S HEATING APPARATUS FOR KEROSENE LAMPS.**

W. D. Russell, agent, No. 206 Pearl street, New York city.

**Improved Railroad Switch Signal.**

So many accidents are continually occurring from misplaced railroad switches, defective signals, and the carelessness and inattention of those who have the

**BARNES'S RAILROAD SWITCH SIGNAL.**

safety of hundreds of lives in charge, that a self-regulating apparatus which places the possibility of accident from the causes above mentioned almost out of the question, has become an imperative necessity. Switchmen are generally the dumbest and most stupid creatures that are employed around a railway, and it is remarkable that such persons should be placed in such responsible positions. In the day-time an engineer can see for himself whether the switch is right