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## WOODEN AND IRON SHIPS.



VERY question of an important character requires calm, careful and candid investigation in order to arrive at correct conclusions. At the present moment the above-named subject is justly engaging much attention among our naval architects and shipping merchants.

In Europe it is already settled in favor of iron vessels, but with us it is far otherwise. As facts are the only reliable arguments that cannot be refuted, this question cannot be decided by mere assertions. On another page we publish the letter of Mr. J. W. Griffiths, the well-known naval architect, in which he makes several statements that require correction, both for his own sake and that of others (if there are any) who may have imbibed similar notions. He states that we proposed, on page 131, present volume of the SCIENTIFIC AMERICAN, to "enlighten our readers on the subject of naval architecture;" that we "are in favor of iron vessels and give them the preference over wood;" that the eminent shipbuilder, whose opinions we quoted on page 180, in regard to iron ships "has an object in view beyond his country's good;" and that "either ignorance or avarice forms the basis of all projects for substituting iron for wood in the outer shell of our ships."

We are surprised that Mr. Griffiths should make such charges against those who differ from him in opinion, more especially as they are totally devoid of reliability. We never proposed to enlighten our readers on the subject of naval architecture. It was stated on page 131 that it would afford us much pleasure to receive communications on the subject from practical shipbuilders; that is all. The eminent shipbuilder against whose opinions ignorance, avarice and self-interest are insinuated, is altogether interested in building timber vessels; he is a man of reflection, long experience, and has had great opportunities of observation. We have no preferences for iron over wooden vessels; such a term is entirely misapplied to us. We examine facts, arrange and compare them, and upon these we express opinions. This we have done on this question, with impartiality, for we have neither had professional prejudices nor personal mercantile interests to warp our judgment in the investigation. We do not pretend to infallibility, but the facts which we have presented have never been refuted; and Mr. Griffiths himself has come round to such opinions, in all but the outer shell of ships, while Donald McKay has come wholly up to the iron standard. Let us give us a brief review of the question as it was and as it now stands.

Three years ago we directed attention to the great increase of foreign screw steamers, on page 285, Vol. XII. (old series) of the SCIENTIFIC AMERICAN, and showed clearly how they were rapidly taking away the trade that had been formerly carried on by American ships. From opinions expressed by such authorities as Mr. Griffiths, we then stated that as wooden screw steamers could be built as cheaply here as those of iron in England, our merchants should endeavor to regain their lost trade by building such. We said: "The longer they delay, the weaker and less able will they become for the struggle, while their rivals will be growing stronger and stronger, and increasing in wealth, power and influence." Our merchants did not heed this injunction, and, as a consequence, their rivals have grown stronger, while they have become weaker. Twenty-five years ago the whole Atlantic mail and passenger, and most of the goods traffic, was carried on in American bottoms; to-day nearly

all the mail and passenger, besides a great deal of the goods traffic, is carried by foreign ships, the great majority of which are iron screw steamers. These facts are indisputable; how can we account for them but upon the theory that iron screw steamers—all things considered—are the cheapest and best for such traffic? By careful inquiry, backed up by many new facts, we expressed such an opinion (not a preference, as Mr. Griffiths calls it) on page 305 of our last volume. We said: "This is no time for boasting of what we have done or what we can do, but of speaking by deeds. We have lost and are still losing our carrying trade, from the competition of a class of steamers the efficiency and economy of which our people do not yet appreciate—iron screw steamers." A short time after these opinions were published, a letter appeared in the Boston *Traveler* from Donald McKay, then in Europe, in which he said that iron and steel "as materials for shipbuilding had proved more economical than timber in the long run, and it is high time that our shipbuilding merchants turned their attention to the subject." This was a remarkable coincidence of opinion, in support of the one we had expressed. We exhort our shipping merchants to examine the question candidly for themselves and not be guided by any man's opinion; let them take facts, and not assertions, as the basis of their operations, for we assure them that while some of our nautical architects are indulging in vain disquisitions, "the Philistines are upon them." We have not a single new Atlantic steamship on the stocks, from one end of the country to the other; while in Great Britain there are 16,000 tons of new iron screw steamers building for the American trade. These are ugly but indisputable facts to which our shipping merchants would do well to take heed in due season.

## THE LEATHER-DEALERS AND THE LYNN STRIKERS.

It would seem that for muddling the mind there is nothing like leather. The utter ignorance of the forces which regulate the wages of labor and the general distribution of wealth, displayed by the shoemakers of Massachusetts in their strike, has received a countenance and parallel from a very unexpected quarter. It is known that the notes of the leather-dealers in this city rank A 1 in the money market. This is the class of men who do not fail. They are the solid men of New York. But it seems that in their comprehensions of the nature of wealth, and of the influence of its production upon its distribution and accumulation, they are just as foolish as the shoemakers of Natick. They have just issued a circular the object of which is to persuade the tanners of the country that these manufacturers would make more money by suspending a portion of their works. To advise the shoemakers to purchase and read "Wayland's Political Economy," would doubtless be breath or ink thrown away, but it would seem that the gentlemen who ride down leisurely from their brown stone houses at 10 o'clock in the morning, and fill the earliest omnibuses in the afternoon, might find time for the task, for it is not a large volume.

Wealth does not consist of gold and silver only, but of all articles of merchandise in the community. It is being constantly produced and constantly consumed. The more there is produced in the community the more is there to divide between the capitalist and the laborer. When ready-made clothing, food and all other objects of human desire are rained down spontaneously from the skies, then may the laborer improve his condition by ceasing to work, and the manufacturer grow rich by suspending his operations. But in the present order of things, there is but one way for classes or communities to accumulate wealth, and that is by producing more of it than they consume; in other words, by industry and economy.

## ACTIVITY AND INDUSTRY OF INVENTORS.

The list of claims furnished us by the Patent Office, and published weekly in our columns, shows the progress of inventions in this country, without requiring any statistics to convince our readers, at home and abroad, that the inventors of our land are not asleep or inactive. There never has been a time when more industry was manifested by inventors than the present; and we have never known of so many sales of patents, at remunerative prices, as we have lately. The claims on another page indicate that one hundred and five patents were issued for the week ending March 20th. In looking over

this list, we are happy to recognize the names of many of our own patrons among the number. Forty-one of the patentees whose names appear in this week's list had their papers prepared at, and their applications conducted to a successful termination through, the Scientific American Patent Agency. We presume we are safe in asserting that there were never before so many Letters Patent issued to the clients of a single agency in this or any foreign country in one week, and some of them are on very valuable inventions, and will be the means of promoting their owners in some cases from poverty to a competence, perhaps to affluence, if judicious means for introducing their inventions to the public be brought into requisition.

## WORKING STEAM EXPANSIVELY.

The practical application of high pressure steam as a mechanical force, and the economical generation of it, are items of no small interest to the manufacturing community at large; and the immediate object of this article is a few remarks upon the existing state of affairs in this city as regards its use and control. As a general principle, high pressure engines obtain a much greater degree of popularity than low pressure, and the reason may be found in a variety of causes, the chief of which are a lessened first cost, greater simplicity of construction, and others which are not necessary to speak of; therefore our observation is confined solely to them. We find that in by far the greater part of the places where steam power is used, the principle of expansion, if practiced at all, is but very imperfectly so; the steam follows the piston during the whole stroke and seems to escape, with but very slight breaks, in a continuous stream at the exhaust, without stopping long enough in the cylinders to produce the proper effect economically and well. As a natural consequence these engines do not perform regularly or run with that ease and freedom with which they should; while the steam, instead of working expansively and putting out its full force, merely impels the engine around from the actual pressure accumulated in the boiler.

Aside from the matter of injury which it is alleged high pressure steam is the cause of, to the valves and chests (and which is a matter of great doubt), from the very nature of its uncontrollable elasticity it is the most powerful motor, practical in every-day use, which is known; but to exert this power and this force, it must be legitimately and properly used. It is not so used, nor does it fulfill its true purpose when it follows the piston all the way. What is the use of a complex mechanical apparatus to regulate the force of the steam to the cylinder, if the cylinder itself is so small as to demand that the valves be opened to their fullest extent the whole day long? Under such a state of things it is but a nuisance and a stumbling block, and much better off the engine than on it. It is to the general ignorance of the manufacturers and their unwillingness to go to any expense (though they may reap the reward in a few years, at most, in the saving of fuel, of their outlay), that these matters are to be traced. It is unquestionably better to use steam expansively at 55 or 60 lbs. per square inch, at which point its elasticity and temperature are great enough for any ordinary mechanical purpose, than at a much greater pressure, non-expansively. Dr. Lardner says of expansion:—"Since the cost of producing steam as a mechanical force depends chiefly on the quantity of fuel necessary to effect the evaporation of a given quantity of water in a given time, it follows, therefore, that all the mechanical effect produced by this principle of expansion is so much power added to the steam without additional expense." Its principle is therefore obvious enough in economy of steam power. To produce the greatest mechanical effect, which forms by far the largest portion of expense required to operate steam power, many things are important, but the chief of them are in the prevention of heat from escaping from the steam during its passage from the boiler to the engine, and in employing "cut-offs," as they are termed, to operate the steam expansively; there are many of these in operation, of different forms and principles, but a great many are thrown aside and condemned simply from the fact of the pistons not having sufficient area to develop the principle properly and well; and it is a matter well worthy the attention of those applying such apparatus, that they consider most carefully whether the initial diameter of the cylinder is such as to make their inventions thorough and efficient, for, as has been mentioned, many have

been thrown aside from this cause, and both the principle of expansion and the patentee alike injured. And, as regards the radiation of heat, the other matter alluded to, and which has a most important bearing on the subject of expansion, there seems to be but little attention paid to it, if in fact there is any at all—that is, in most cases, cylinders lie naked and exposed in cold rooms, and steam pipes, unclothed, run along floors and by stone walls, without any protection whatever, and then it seems a matter of surprise to the various parties concerned that with an apparent pressure of 75 or 80 lbs. per square inch, they do not get the work demanded. It would be found, on thorough and careful management, every way better and more satisfactory to increase the cylinders and apply expansion gear, than to go on, day after day, in the old way—forcing the boiler and engine to the ultimate destruction of both, years before they should have given out.

William Fairbairn (than whom no more practical nor able engineer exists in England) says of forcing engines and boilers, and working non-expansively that it is "the great evil which causes all the trouble, and the gangrene which corrupts the whole mechanical system," and recent disasters and explosions tend to confirm the opinion.

It is impossible to conceive of a more economical, safe, and in every way efficient system of steam power, than the principle of working expansively; the steam escaping in tiny jets at the exhaust, rather than with a rush and roar which makes everything tremble; the fuel burns quietly away and roasts itself into ashes, instead of melting into a mass of clinker and burning out the grate bars; and the whole system moves on as harmoniously as one can conceive of. A little practical looking after the every-day, common-sense matters of the use of steam power, rather than dabbling in abstruse philosophical theories, which are of no earthly use to the manufacturer or to the mechanic until they become absolute scientific facts, would result in a more complete system than this country has ever yet enjoyed; and manufacturers would have no more cause to complain of the expense attending the use of it. And it is plain that in order to effect this much-desired end there must be some vital regeneration of the forces antagonistic to such reform. These lie not in legislation, nor yet bitter invective and much exclamation, which the daily press employs on the occasion of each disaster; the rather must we look to increased vigilance on the part of employers as a matter of absolute protection to their lives and property, and to engineers for increasing and never-tiring vigilance on their part. If, as we read, "eternal vigilance is the price of liberty," it is much more the price of safety about steam.

#### PERORATION ON A WAGON BRAKE.

A case was recently argued before Judge Dunlop at Washington, on appeal from the decision of the Commissioner of Patents, involving the novelty of a wagon brake, and upon which the aspiring attorney "spread himself out" in the following eloquent style. The remarks we find reported for the venerable *Intelligencer*:

"Now (said he) far be it from me to reflect on the action of the honorable Commissioner, for I can readily perceive the force of the reasons which he gave for declining to interfere in the matter. Nor do I wonder that those to whom he intrusts the duty of making the original and final examinations makes mistakes, but I do wonder that they make so few, knowing as I do, by practical experience, the numberless official cares and trials unseen by stranger eyes, which continually harass, annoy, and weigh down their spirits during all the hours of the day, and which often reach and burden the mind with their leaden weight and influence even during the still and silent hours of the night. I have done; but I feel and know that into the hands of an impartial judge the interests and rights of my client are now committed, for a decision which is destined to surround the home of a meritorious inventor with all the comforts and joys which an earthly competence can afford, or to crush forever the bright anticipations which have long, and are even now, alternating between hope and fear."

No one being dead we may be permitted to add, by way of completing the picture, that, when the aurora of the morn's bright future shall dawn upon this occidental hemisphere, may it shed its refulgent beams upon a proud and happy people, whose highest anticipations of earthly bliss have been realized over all that vast expanse of territory from the rock-bound coast of Maine to the tranquil shores of the Pacific!

"The star-spangled banner, O long may it wave!"

#### TESTIMONIAL LETTERS.

The accompanying letters (selected from a large number received within a few days) indicate the universal sentiment of inventors who have their business conducted through the agency connected with this publication. We might fill columns every week with such testimonials; but the few we select are sufficient to show the character of such as we omit:—

**MESSRS. MUNN & Co.**—I received your note in due time, stating that my Letters Patent were ordered to issue. I assure you it was gratifying intelligence to me; and you will please accept my sincere thanks for your services in prosecuting my case before the Patent Office. I shall take great pleasure in recommending you as prompt and skillful patent agents to my friends. I have conversed with manufacturers and patentees who have done business with you, and all unite in giving you the highest praise. Respectfully yours,

B. E. ORTON.

LYNDON, Ill., March 12, 1860.

**MESSRS. MUNN & Co.**—Dear Sirs:—We received your letter of the 28th ult. in due time, bringing to us the gratifying intelligence that you had been successful in conducting our patent case. We received our Letters Patent on the 9th inst. We feel under obligations to you for the manner in which you have executed our drawings, and for the promptness with which you have prosecuted our case through the Patent Office; and we assure you that if we should ever make application for another patent, it shall be through the medium of your agency, and shall commend you to our friends or any who we may find desirous of procuring patents. We will also do all we can to extend the circulation of your valuable paper. We remain your obedient servants,

H. GARTNER,  
J. McCANN.

NASHPORT, Ohio, March 12, 1860.

**MESSRS. MUNN & Co.**—Verily, you are not mere agents, but true and sincere friends to patentees and inventors. You have got granted to me more than I ever expected, or even dared to ask for. I deeply appreciate your kindness, and shall not fail to reward you handsomely in case I should make anything by my invention. Meanwhile, accept my heartfelt thanks for your generosity. I am, with sincere respect, your obedient servant,

C. PRETSCH.

TRENTON, N. J., March 15, 1860.

**MESSRS. MUNN & Co.**—Gentlemen:—The patent for my improved steam boiler came to hand a few days ago. I am much pleased with your promptness and success in obtaining me my Letters Patent, and shall take great pleasure in recommending you to my friends. Respectfully, your obedient servant,

JOHN ARMSTRONG.  
NEW ORLEANS, La., March 13, 1860.

The annexed extract is made from another letter written on other business:—"The writer of this takes this opportunity of returning his sincere thanks for the very able, prompt and efficient manner in which you have conducted his case. On the 6th inst. the patent was issued; by the end of this week our factory for manufacturing the article will be in full operation, and we have already orders on hand sufficient to keep us busy for some weeks."

#### SELF-ACTING SHIPS' PUMP.

There is a great power in the waves of the sea, and several attempts have been made to apply it to work bilge pumps, but without success until now. The apparatus of J. W. Mackenzie, 65 Butler-street, Brooklyn, recently noticed in our columns as having been secured by patent, and which we have examined, appears to have peculiar merits in making a leaky ship, for example, free itself from water by its own motion. The patent covers the arrangement of chambers and valves in such relation to and in communication with a ship's hold and discharge-pipe or passages; that as the ship pitches or rolls heavily, any water which flows into her hold by reason of being sprung, shall be automatically raised therefrom and discharged into the sea. The apparatus is so arranged that it displaces no cargo. It is a fresh water tank, taking the place of a tank carrying 8,000 or 10,000 gallons of water; besides it forms a bulkhead dividing the hold into two separate compartments, on the same principle that is now coming into general use. The lower chamber of the apparatus is a well room for the ordinary pumps after it has been emptied of fresh water. It is also a ventilator, carrying off foul air from the bilges. The inventor is a practical seaman, having been for several years an officer on board of steamships, for which branch of marine he considers the invention indispensable. Many of our steamers that have gone down might have been saved or kept afloat long enough to be run ashore, brought to anchor, or until a friendly sail have in sight to rescue the living freight.

#### INDUSTRY—MANUFACTURES—COMMERCE.

**Basket Willows.**—George Rhey, in the *Gardener's Monthly*, says:—"The *Salix Russelliana* is the kind of willow generally grown around Philadelphia for osier work, and is the same as usually employed by nurserymen for tying. They are mostly grown on swampy ground, in rows 8 feet by 2. A crop (sometimes two) of hay is also cut off per annum, and enters into the calculation of profit from the plantation. The crop is not worth much till the third year, when it will produce about \$15 per acre. About five or six years after planting they are in their prime, and will afford from 15 to 20 pounds from each stack, and bring prices ranging from four to five cents per pound when cleaned. The willows are cut just before the buds burst in Spring, and must be kept moist till cleaned." As several persons have made inquiries of us in regard to the peeling of willows, we answer all by saying that, by boiling them for a few minutes in a large iron boiler with water, the skin peels off easily from end to end, leaving a beautiful, smooth surface. This is the method pursued in all factories where dry willows are made into baskets. The boiling has also the effect of rendering the willows much tougher than when in the green state.

**Cotton.**—The year's crop of cotton is 4,500,000 bales, which is 671,000 more than that of last year. The prices of cotton are rather low, while those of manufactured goods are very fair; therefore, manufacturers are making large profits.

**American Copper.**—During the past year, 696 tons of copper were shipped from the various mining districts of Lake Superior. This was an increase of 149 tons over the product of the previous year.

**Eastern Shipbuilding.**—Increased activity is now manifested among the New England shipbuilders; and yet there never was more difficulty in obtaining paying cargoes for those vessels that are now in our ports. The keels of two new ships, of 1,000 tons each, have lately been laid at Newburyport, Mass., and a number of small coasting vessels are on the stocks. The Maine shipyards are becoming more busy than they have been for two years past.

**Strikes of Trades.**—Quite a number of strikes have taken place recently. In addition to the great strike of the shoemakers in Massachusetts, the mechanics of Baldwin's works, in Philadelphia, have struck for 50 per cent over days' wages when they are working over-time.

**Oregon Gold.**—Further accounts from California have been received, the great feature of which are the reports from Oregon concerning the discovery of new gold mines, of vast richness, in the vicinity of Jacksonville. Marvelous stories are told of the success of some of the miners.

**Exports of Cotton Goods.**—The value of American manufactured goods exported last year, amounted to \$8,316,222; in 1858, it was \$5,651,504; being an increase of \$2,665,718.

**Imports.**—There has been a very great increase of foreign imported goods, and many sensible merchants express fears regarding our ability to pay for them. Since the 1st of January, goods to the value of no less than \$53,486,822 have arrived; which is an increase of \$5,000,000 over the same period of time in 1859. Our total exports of goods in this period has only amounted to \$17,098,000.

**Metal Market.**—The metal market is not very lively. The price of foreign pig iron has advanced from \$24 to \$25.50 and \$27. This is owing to the strike among the Scotch iron-makers.

**Breadstuffs.**—The best qualities of flour are in very good demand, and range from \$7.50 to \$8. The poorer grades are very dull of sale.

#### THE PROFITS OF TANNING.

The leather-dealers of this city, in their recent circular on the depressed condition of the trade and manufacture, give the following estimate of the profits of tanning. It would not seem to be a very disastrous business. They take 10,000 hides as a basis; a greater or less quantity will give the same result:—

10,000 hides, average say 22 lbs., 220,000 lbs., say cost 22c.	\$48,400 00
Add 5 per commission for buying.....	2,420 00
Loss of interest on value of hides, say 7 per cent.....	3,288 00
Cost of hides, commission and interest.....	\$54,108 00
220,000 lbs. hides, with gain 60 per cent—\$52,000 lbs., at 21 cents.....	78,920 00
Deduct 6 percent for selling leather.....	4,435 20
Net proceeds.....	\$69,484 80
Deduct for hides, commission and interest.....	64,288 00
Leaves tanner for tanning.....	\$15,276 80