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HOME PROSPECTS.

We are the advocates of peace, both foreign and domestic; but as war is sometimes—unfortunately too often—an inevitable necessity, we have, in accordance with the spirit of the times, decided to put the SCIENTIFIC AMERICAN, for one week at least, upon a war footing, regretting, however, the necessity which obliges us to depart, even for so brief a period, from the exclusive discussion and elucidation of the beneficent topics for which this journal is altogether intended.

Our present number shows that we have brought out the big gun, and that we have got upon the stocks iron plated frigates of war, soon to be in readiness for sanguinary conflict upon the high seas. We have not yet reached those "last days" spoken of by the good old prophet Isaiah, when "the mountain of the Lord's house shall be established in the top of the mountain, when He shall judge among the nations, and shall rebuke many people; and they shall beat their swords into plowshares, and their spears into pruning hooks; nation shall not lift up sword against nation, neither shall they learn war any more." For fifteen years past we have had extensive correspondence with mechanics and manufacturers throughout all the States, and we have yet to learn that the predictions of the inspired prophet have even an incipient realization on this or any other continent.

We know not of an instance where a single rusty old sword has been beaten into a plowshare, but we have heard it announced that even the weather-beaten muskets of our distinguished fellow citizen, George Law, have at last found a ready sale. Amidst the general dullness of trade and finance, the forges of Mars are blazing away with unwonted fury, and even "strange fire" is issuing forth from their smoky embers. Dragons' teeth have suddenly sprung up as armed men, and we can almost hear "the shout, the shock, the groan of war." This, then, is the ugly side of the question, and before using our big gun to pour broadsides from our iron frigates, we will stop to think the matter over a little more seriously.

The old adage says that, "It is an ill wind that blows nobody good," and this is as true now as it ever was. If our readers suppose that the "rumors of wars" which now fill the country have destroyed *all* trade, enterprise and business prospects, they are roundly mistaken. The printers of daily newspapers have all that they can possibly do to supply the immense editions for which the public anxiously calls. The want of a new invention by which papers can be more quickly thrown off was never more sensibly felt than to-day. We are told that the fire-arms and gunpowder manufacturers are overcrowded with orders, and, in some instances, are employing double sets of hands and running their works day and night. Colt's great establishment, at Hartford, Conn., is said to be flourishing to an astonishing extent. We hear of the *farming* out from that concern to neighboring machine shops of one job involving forge work for seventy thousand arms. We are also told that the New England wagon manufacturers have received large orders for baggage and transportation wagons; this will also give employment to many. There is an immense demand, so we hear, for rubber clothing, coats, pants, boots, knapsacks, buckets, tents, blankets, spreads, and every conceivable article required for field use. All the above goods are, at the present issue, *cash articles.*

Several of the States have appropriated large sums, amounting to millions of dollars in the aggregate, for arms and munitions of war. Nearly all of this money will necessarily go to our mechanics and inventors, and keep thousands of them busy through the winter. The influx of money is very great at the present time. Nearly every steamer from Europe brings us half a million or a million. One steamer, the *Persia*, from Liverpool, arrived, a few days ago, with three millions. From California the regular supply is from one to two millions monthly. Meantime, at New York, there are, in our banks and savings institutions, $32,000,000 in specie on hand, and the prices of stocks have, of late, much advanced. Tennessee, North Carolina, Missouri, and some other State stocks, have improved very sensibly since the 18th of December. Illinois Central Railroad stocks, which stood, Dec. 7, at 51, sold January 3d for 79½, an advance of 28½ per cent. New York State 6 per cent stocks, New Loan, still remain above par, the latest quotation being 104. In reference to the cotton crop of the Southern States, we understand that the shipments from some of the seaports are very large. At the West, large orders for grain are reported, accompanied by the gold. Red Western wheat has risen, within a short time, from $1.08 per bushel to $137½. The panic, or "hard times," that our people passed through three winters ago appears to have had the effect of preparing them for a similar contingency in the future. We notice that the savings banks of the single state of Massachusetts, contain deposits to the amount of almost *fifty millions of dollars.* These deposits are on interest, and consist, almost wholly, of the earnings of mechanics and other working classes. As the total population of that State is only 1,331,499 souls, it will be seen that the financial condition of that great mechanical and manufacturing State is extremely good. This desirable state of things doubtless exists, in a proportionate degree, in many, if not all of the other States. By the recent treaty of peace, ratified between China and the Anglo-French allies, that immense empire is now at peace with the world. The previously signed treaty between China and the United States is therefore now brought into practical operation, thus opening to our people an immense and highly profitable market for all kinds of American manufactures. The House of Representatives has lately passed a bill for the construction of *two great lines of railroads*—a northern and a southern route—from the *Mississippi river to the Pacific!* It is expected that the bill will shortly pass the Senate and become a law. The construction of these railroads will form one of the most gigantic enterprises of the day, will give occupation to hundreds of thousands of workmen and engineers, and will impart a permanent stimulus to every description of business. The Homestead Bill, which has just become the law of the land, *gives every man a farm for almost nothing*, provided he will go West and cultivate it. We have thrown together these few items in order that our readers may see that, notwithstanding the political troubles which now brood over the country, our condition, in a financial and industrial point of view, is better than in 1857.

With such abundant resources at command, and with our political difficulties composed, a thrill of joy would sweep over our whole land, and start into new life the wheels of commerce and manufacturing industry.

PROGRESS OF NAVAL ARCHITECTURE—NAPOLEON'S NEW IRON FRIGATE.

It was said of Napoleon the Great, when he was an exile at St. Helena, that if some person were but to elevate his old grey coat upon a pole, in some corner of France, all the rest of Europe would quake. It is pretty much the same with his successor, the present emperor. All Europe watches every movement of Louis Napoleon with the most sensitive interest, and his prolific genius keeps all the nations of the Old World busy. No sooner does he adapt some new idea and commence to put it into practice, than John Bull straightway follows in his footsteps. This is especially the case with naval affairs, as it would never do to allow the French to surpass the English in maritime efficiency. In nautical skill, and in all that concerns the manning and maneuvering of ships, England has long maintained a decided superiority; but with that scientific grasp of intellect for which the ruler of France is distinguished, he, sometime ago, concluded that it was perfectly possible to construct war ships, so invulnerable in their character, as to give them the same advantage over others more ably manned but less skillfully constructed, which a soldier, furnished with a coat of mail, has over a nude antagonist. In carrying out his ideas, he has produced *La Gloire*, a great war frigate covered with thick plates of steel, and perfectly proof against shells, and almost so against solid balls. As to the necessity of commercial nations adopting this entirely new system of building war vessels, we think there can be no question. Mr. H. Vivian, a member of Parliament, in writing to the *London Times* respecting the *La Gloire*, gives it as his opinion that the best wooden war ships are as useless in her presence as the old flint musket is before the Minié rifle. Ten vessels of the same class are now building in French dockyards, so that England must endeavor to meet the issue of supremacy, when it comes, by equal, if not superior ships. In order to encounter such vessels as the *La Gloire* on equal terms, two giant iron frigates are now being built in Great Britain, and these are intended to be very superior in steam power as well as general construction. One of these frigates, called the *Warrior*, is now building in London, and the other, called the *Black Prince*, by Napier & Co., at Glasgow. A correspondent, writing to us from Malone, N. Y., gives a brief description of this latter vessel, which will be of general interest. He says:—

As you enter the yard of Messrs. Napier, the first object which attracts attention is a great iron framing resembling what we might fancy would be the skeleton of the *Great Eastern.* It is at present surrounded by a scaffolding, upon which several hundreds of workmen are busily engaged like bees around a hive. The *Black Prince* is to be 420 feet long; her breadth, 58 feet; dep h, 42 feet. She is to be divided into eighteen watertight compartments, and two great Armstrong rifled guns are appointed for each bulkhead. The bottom is constructed of plates 1¼ inches thick, and the sides lined with plates ⅜ths of an inch thick. Over this is to be laid teak wood planking, 1 foot thick; and the teak is to be covered with wrought iron plates, each 15½ feet long, 3 feet wide, and 4½ inches thick. All these iron plates are made in the best manner. They are tongued and grooved on the edges and ends, so that they fit most accurately into one another, and make watertight joints throughout the whole hull. All the iron plates are cut and punched close to the vessel, whereby the fitting of them is rendered very convenient. When completed, the *Black Prince* will be 10,000 tuns burden, and her screw engines, now being built by Penn & Co., of London, will be 1,250 horse-power. No person can have an adequate idea of the great size and strength of such a ship without actually beholding it, but the account given will convey such an idea as will at once render it apparent that no wooden frigate could possibly compete with it.

The conclusion at which our correspondent arrives respecting such an iron ship is reasonable. It appears to us that such a frigate could walk through an entire fleet of wooden war ships as easily as a life guardsman could cut his way through a regiment of pasteboard soldiers. In addition to the above, we find some further information on the same subject in the London *Engineer.* It states that the entire shells of the *Warrior* and *Black Prince* are made of the best scrap iron, which has been found far superior to common rolled iron for resisting shot. The ribs which spring from the keels are 3 feet 8 inches apart, and are T-shaped beams; and inside of these another set of iron beams run along the whole length at intervals of 5 feet, and all strengthened with enormous iron girders. The decks are to be covered with timber, supported on huge iron arches. The engines are to be so protected that no shot will be able to reach them, and the stem and stern may be completely riddled and yet the frigate will float. When finished, each of these vessels will certainly be a "leviathan of the deep."

WHAT WE MOST NEED.

Food and raiment are the chief of the material wants of man; if we have these wants fully satisfied, we should have necessity for little besides, at least for the physical man. Thus, tailors and cooks, who make the final preparation of the things we most need, seem to be the most worthy of the dignity and praise which are always denied them.

If we consider a house with its appurtenances as a kind of mantle or overall for the family, we very readily arrive at the conclusion that nearly all kinds of mechanical and chemical work have in view, directly or indirectly, the wants of the stomachs or skins of men. A steam engine grinds corn or weaves cloth, or if it builds a railroad or a ship, it is only to transport the corn and cloth to the consumer.

The first inventions of men, of course, were such as ministered to their necessities or pressing wants. The

garden of Eden was so happily planted, and Adam was so perfect, that all his wants, as soon as felt, were satisfied, and he had no use for an inventive faculty. But a change came, and the garment of fig leaves was invented—an invention the first among men—and the rude prototype of all the strangely fangled notions of tailors and milliners. When the human family increased beyond the narrow limits of a tropical climate, or perhaps in Eden, when winter came on, they invented for themselves more perfect garments from the bark of trees and the skins of animals. The arts of preserving food and building houses must have been very early learned, and the improvements in food and raiment must soon have culminated in the invention of roast beef and breeches, which may still be received as symbols of our greatest perfection and of our exaltation above the brute creation.

Many people think that if they only had enough to eat and to wear, and at the same time had nothing to do, they would be happy. These are foolish people, for they do not understand how and why nature exacts labor. It is only after laborthatbread tastes sweetest, and raiment is most becoming. Some of our paupers are practical illustrations of these do-nothings; they incapacitate themselves for labor by the practice of laziness, and the State gives them enough to eat and to wear, and they have nothing to do!

Besides the necessities of victuals, clothes and labor, there is perhaps a necessity of amusement or recreation for the senses; the ear needs music; the nose, fragrant odors; the eye, gay colors; the tongue, spices, &c. These wants open a wide field for invention; they call into action the talent of such as Beethoven, Piesse, the French milliner, and the great and lamented Soyer.

A New Instrument for Taking Horizontal and Vertical Angles.

Mr. Abel Ware, of Athens, Maine, recently obtained letters patent on a new surveying instrument, one of which he exhibited at our office a few days ago. As a piece of workmanship it is exquisitely fine, and the improvements which the patent secures appear to be of much importance in furnishing a cheap and portable instrument, which are both *desiderata* to the practical surveyor. The object of the invention is the production of an instrument which is adapted to the measurement of both vertical and horizontal angles, and is much more simple in its construction and less expensive than the theodolite, while it is capable of performing the work of the transit and of the circumferentor, though its cost does but slightly exceed that of either of these instruments, thus meeting a long-felt necessity for an instrument which shall be cheap, compact, portable, and sufficiently correct to supply the ordinary requirements of the land surveyor in taking both vertical and horizontal angles. To effect this purpose, the several parts of this instrument are combined in such a manner that by the use of but one graduated limb or circle and rotating vernier plate or carriage with its sights or telescope, both horizontal and vertical angles can be taken. The inventor will be happy to give further information in regard to his instruments upon being addressed as above.

Americans at Sevastopol.—When this city was besieged by sea and land, a few years since, the Russians sunk a large fleet of war vessels in the river and harbor, to prevent them falling into the possession of the British and French, and also to render the river unnavigable. After the Crimean war was concluded, our countryman, Colonel Gowan, made a contract with the Russian government to raise the sunken vessels and clear the channel of the river. For several years he has been engaged in fulfilling his contract, and has, by the latest news, rendered the river once more navigable. He employs daily about 200 men, who, with his clerks, &c., occupy the naval arsenal, which was converted into a rendezvous specially for them. The operations connected with the raising of sunken ships, &c., are on a large and grand scale; by the improved apparatus which Colonel Gowan uses, his principal divers being able to remain in 22 fathoms of water for the space of four hours; and though the operations have extended over four years, only one accident has happened, and that was the drowning of one of the divers in consequence, of one of the air pipes bursting under the pressure of the air, which was being pumped into it. It is supposed that Colonel Gowan's operations will yet occupy two years.

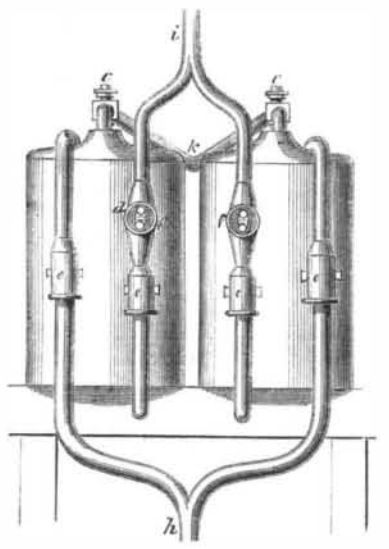
ROMANCE OF THE STEAM ENGINE.

Article VI.

SAVERY—SHIP'S INDICATOR—STEAM FIRE-ENGINE.

After the Marquis of Worcester, the next steam inventor of prominence who appeared on "the stage of time" was Captain Thomas Savery, also an Englishman. This was about thirty years after the noble Marquis had been laid to rest at Ragland Castle. Very little is known of Savery as a man, but he published a pamphlet in which we have a record of his mechanical and inventive abilities. It is certain that he possessed considerable wealth and that he had acquired a thorough practical knowledge of mechanics. In 1718, no less a personage than the great Sir Isaac Newton made a report to the government on the practicability of a machine invented by Savery for measuring a ship's way at sea, which, from the description, appears to have been principally composed of a set of blades placed on a vertical spindle set down under a ship's bottom, and which was revolved by the water. It communicated motion to an indicator through a train of gearing, like that of a gas meter. Captain Savery also constructed a fire-engine and exhibited it before King William, at Hampton Court, and the monarch was highly pleased with its performance. At this period Newton was president of the Royal Society, and all matters of science and mechanics were treated before that body with profound respect. To this institution Captain Savery carried his invention, and in its transactions is a record of an experiment made with it before its members, in their apartment. It is stated to have been quite successful, but we are not left in doubt as to what the engine was, as the accompanying engraving is a representation of it, taken from the printed volume of proceedings for the year 1699.

In the illustration, *k* is a pipe which conducts the steam from a boiler, left out of the figure to render the



explanation more clear. The steam passes into two receivers similar in form to retorts. A pipe, *i*, branching from each of these vessels is inserted into their bottoms; *e e d f* are valves opening outward and preventing—by their action—the return of any water that may have been forced through them. A pipe, *h*, proceeding from the cistern also branches to both receivers, and is inserted into the top of each. Valves are placed at *c c*, by which a communication may be opened or shut off with the boiler, alternately, accordingly as they may be adjusted—one being open when the other is closed.

Steam from the boiler being permitted to flow first into either of the receivers, the water which that receiver contains is forced by the steam pressing upon its surface, up one of the branches of the pipe, *i*, and when the vessel is thus emptied ofthe water and filled with steam, the valve, *c*, is closed, and communication with the boiler cut off. Cold water is then suffered to flow over the surface of the vessel, which thus condenses the steam within and forms a vacuum. The pressure of the atmosphere now forces water from a cistern or well below up the pipe, *h*, into the empty vessel. At the instant steam was shut out from one receiver it was admitted into the other, by turning the other steam valve, and then the water was forced from it up the pipe, *i*, during the period that condensation was being effected in the other vessel, and so on, as has been described. In this manner, by the employment of two close vessels standing in the same relationship to one another as the two cylinders of a common fire-engine, first by the pressure of steam and then by its condensation alternately in each vessel, a constant column of water was raised from a cistern and forced to an elevation proportionate to the pressure of the steam. This was certainly a direct steam engine, and was recommended principally for raising water from mines. It would, and did, do this, but not economically, although it exhibited much ingenuity. Its inventor was rather despised than appreciated by the owners of English mines, for whose benefit it was chiefly designed. Subsequently he added several improvements to this engine, which will be illustrated in our next article on this subject, together with a further account of this very worthy inventor.

MECHANICS, ATTENTION—TURNING TOOLS.

The proper shape of a tool employed for turning metal can only be determined by experience, aided by a philosophical knowledge of the laws which govern motion. The relation of the curve or straight line to the ends desired to be attained must be as carefully considered as that of any motive agent whose action is correspondingly valuable to man. A tool which has merely a very sharp and hard edge will not accomplish the same useful results as one which is constructed upon philosophical principles, with respect to its shape and position. It would save a great deal of time and expense in machine shops if a more correct knowledge generally prevailed among those who forge tools, so that they might form them as nearly right as possible while "the iron is hot." Much valuable time is wasted in grinding down tools to the proper shape after forging, a great deal of which time might be economized.

If we consider the first principle of a cutting tool, we shall find it to be that of the wedge, and that in its performance it separates the atoms comprising a whole by cleaving them asunder with more or less force, as its shape is correct or incorrect; but the way in which the action of that wedge is to be applied is the secret of the whole art of tool making. Speaking of tools, we do not in this connection recognize any but roughing tools.

Let us suppose a round shaft to be in the lathe, and the tool applied to it; the first consideration is whether the one in hand is such as to act with economy, and produce good workmanship. The surface of the shaft is to be turned down one-fourth of an inch, and it is a well known law that all revolving bodies throw off at a tangent with their circumferences whatever is loosely attached to or detached from their surfaces. In obedience to this law, the object to be attained is to turn the surface of the iron so that its refuse will run in a tangent. Now, supposing the tool to be moving laterally, as it does in operation; if the edge be inclined at an angle of 45°, the "chip" will first endeavor to pass off at a tangent, but, as it meets with resistance from the cutting edge and the surface, it will deviate from that direction, and, running down the angle of 45°, a corrugated and very brittle chip is produced. If we alter the edge of the tool so that its point reaches high above the "centers" of the lathe, and set its angle sloping partially, instead of arbitrarily to the right, while its cleaving edge forms a tangent (or nearly one) with the circumference, the chip produced will run off the tool in a true spiral, and vary but slightly from the path we claim it should travel. In the first mentioned instance, the turning produced, although apparently even and true, is not and cannot be so even and perfect as that produced by the second tool set forth. The fact of the cutters being high above the centers of the lathe prevents the work from rolling upon and "chattering" it, as it is called. Moreover, by testing the heat of the two chips, produced as described, as they leave the tool, it will be found that the last-mentioned is not so hot—consequently the tool worked with less friction on the metal, and therefore less power was required to drive the work. When we consider this fact, we directly recognise its great value; for, if we admit that one instrument is more economical of power than another, we must admit that the freest working one will remove more iron in a shorter space of time. From this recognition, the pecuniary value of the instrument becomes evident.

But in discussing the quality of tools which have keen edges and cut "clean," we do not allude to