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ENERGY AND APTITUDE OF AMERICAN MECHANICS.

In the course of some apposite remarks upon schools for the dissemination of correct mechanical knowledge, and the inculcation of the truths of science among the practical workers in machinery in general, the London *Engineer*, England, pays a deserved compliment to American mechanics and says that "many articles of machinery could now be imported here, were there a market for them, and sold under London prices. We know of many instances in which this could be done, and yet iron, and workmen's wages are one-half dearer on the other side of the Atlantic than here. The workmen are better educated, more ingenious, and somehow, although they do not work physically harder, turn out more work than our own mechanics. The cheapness of their work can only be accounted for on the principle of microscopic profits. Many of the marine engine factories, most of the locomotive works, and nearly every railway carriage factory in the States has been, at some time or other, bankrupt; a commentary upon the spread of engineering information."

The statements are all correct in the above-quoted paragraph, but the conclusions and inferences of the *Engineer* are erroneous. Tools are made cheaper here and equal in quality to those abroad, because we have special machines for special work, and for the reason that the same tool is adapted to do many different kinds of work. In the locomotive shops of the East, this principle is of necessity carried to an extreme point. Some of the shops have failed, it is true, because of the competition of the roads to which they furnished engines, on which they relied for payment and were disappointed. Workmen cannot be paid with bonds and coupons, and when a new engine is delivered once a week or month, as the case may be, we fancy it would endanger the stability of any shop to be paid in bonds, worth, perhaps, 50 cents in the dollar. Greater quantities of work are produced by the exercise of that keen ingenuity for which "Yankees" are famous, as in fitting up brass boxes in the lathe instead of filling, as is usually done, and otherwise adapting means to ends. In many shops East one man will run two lathes, or two planers; and objectionable as this is in general, it is perhaps not so much so where the workman contracts to do it and receives wages accordingly. So also with apprentices; they are so only nominally, for in a short time they acquire as much dexterity as a journeyman; and, stimulated by an ambition to be considered "smart fellows," do as much work as one paid at twice the wages they receive. Thus a journeyman may receive \$2 per day, while an apprentice obtains in his last year of servitude \$1, and is equal to a full hand. This being the average rate of pay down to \$1 50 *per capita*, and even still lower; for all journeymen do not receive \$2 per day by any means. The present time is an exception to this rule, as the demand for good workmen is greater than the supply. For patient and steady persistence on one kind of work, and for thorough and faithful execution, there is no artisan better than an English one; but the American workman "gets sick," as he phrases it, of sameness and monotony, and demands change; he is restless and uneasy under restraint and delay, and the work in our machine shops never

goes on so well as when every man is put on separate and continually varied jobs, as far as possible, and feels that his handwork will be contrasted with that of his fellows. This characteristic is only true of intelligent and conscientious men: for there are skulkers and drones to be found in all shops and in all countries. The system of discipline by which American machine shops in general are carried on is an extremely good one, for it conduces directly to the interest of all parties—the young apprentice and the employer. Time is money; and if by personal attention and a free access to all details of the trade, and an opportunity to acquire a thorough insight into the management of tools, our apprentices learn more quickly, it must be laid to the plan and not wholly to individual or national superiority. It seems not a little singular that a manufacturer should debar a youth from the privilege of learning as much and as fast as he desires. Such a course is directly opposed to reason and common sense.

THE CROPS OF THE YEAR.

The first momentous question for a nation to consider is securing an abundance of food. Nations and tribes once numerous and powerful have perished from the face of the earth by famines. From the first appearance of the potato rot in Ireland, nearly twenty years ago, the population of that island has diminished from above eight to a little over five millions. Thousands perished from famine, because of the failure of a root which formed a chief portion of their food. This took place in our own day, and is a sequel to many cases of a similar nature which occurred in other portions of the globe. All the arts connected with civilization are dependent, not only upon an abundant supply of food, but a surplus supply from those who pursue the art of husbandry. If every man was compelled to till the soil to obtain a scanty supply of food for himself and family, civilization, as we understand the subject, would be unknown. There would be no books, no institutions of learning, and none of the fine arts practiced; in fact, no cities, and no community in the whole earth of a higher type than the Bedouins of the desert. The very rapid advancement in population, in wealth and power of the United States, has been due in a great measure to the fertility of the soil and the favorable nature of our climate. Since the great West was opened up to culture by an energetic people, the vast surplus crops of the soil have tended to multiply manufactures, and advance education and all the arts with a rapidity unparalleled in history. The nature and quantity of the crops raised annually should, therefore, form the most prominent consideration for the people. For several years these have been wonderfully abundant, and large surplus supplies have been furnished for the populations of Europe, especially those of Great Britain, when the crops there had in a great measure failed for about three years in succession. As these surplus supplies of food chiefly furnish the sinews for war, as well as the arts of peace, considerable anxiety was felt respecting their condition and quantity the present year. This anxiety was experienced because a severe frost had visited extensive sections of Ohio, Michigan, Illinois, Indiana and Wisconsin, during the month of September last, and it was reported that corn, potatoes and buckwheat had suffered to an alarming extent. Statistics collected and furnished by the Agricultural Department at Washington afford information on this subject of an instructive and deeply interesting nature. The total wheat product of the loyal States for 1863 is estimated at 191,068,239 bushels; oats, 174,858,167; corn, 449,163,894; buckwheat, 17,193,238; potatoes, 97,870,035. In 1862, the product was as follows:—Wheat, 189,993,500 bushels; rye, 21,254; barley, 17,981,464; oats, 172,520,997; corn, 586,704,474; buckwheat, 18,722,995; potatoes, 113,533,118 bushels. There has, therefore, been an increase of the wheat crop amounting to 1,074,739 bushels; of oats, amounting to 2,327,170 bushels, but a very large decrease in all the other crops, especially corn and potatoes—in the former amounting to no less than 137,540,580 bushels. About 40,000,000 of wheat and 11,680,000 bushels of corn were exported of the crop of 1862; but the crops in Europe this year have been very abundant, and the foreign demand for our surplus will thereby be diminished

in proportion. The domestic consumption of corn is set down at 575,024,132 bushels annually, and at this rate there will be a deficiency this year of 125,869,000 bushels, and the hay crop is deficient about 1,624,000 tons. This quantity of corn allowed for home consumption is large and in a certain sense hypothetical. Many millions of bushels of the crop of 1862 are still in storehouses, and millions have been wasted annually in the fields. Economy, with respect to corn or wheat, is an obsolete word in the great West, as is well known to all who have visited there. The total supply of grain and potatoes this year, with all the deficiency, amounts nearly to a thousand millions of bushels, or about forty-five bushels to each person, and is sufficiently abundant for domestic consumption, with an overplus to satisfy a considerable foreign demand.

ARMSTRONG GUNS RIDICULED.

We recently gave (page 233, current volume, SCIENTIFIC AMERICAN) an account of the vast sums—amounting to more than ten millions of dollars—which the British Government had expended on Armstrong guns, and that they had at last been condemned. On this subject the *Examiner* (London) indulges in the following amusing piece of criticism:—

"It is a perfect anomaly to send our armor-clad fleet to sail round our islands and visit our ports without an effective gun on board any one of them which could make a hole in the side of its neighbor. We are thereby reminded of the brave knights of old, who were so encased in steel as to fight half a day without hurting anybody, unless some of them fell down, and, not being able to flounder on their legs, were smothered in their armor." And one of its correspondents grows that "two years have given the Americans forty or more 200-pounders, which have beaten down a strong fortress at a distance of two miles. Sir William Armstrong's 210-pounder, at that distance, could hardly knock an old duck off its nest; and no gun that was ever cast or forged, with a charge of twelve pounds of powder, could do that which Parrott's guns have done."

The London *Telegraph* indulges in the following bitter sarcasm on the same subject:—"Instead of calling all scientific England to put their heads together and watch events with the Ordnance Office, Sir William Armstrong was shoved up the ladder alone; his own committee approved his own guns; his own factory at Elswick turned them out, on his own evidence, without sufficient proof and trial; and 'the first hundred of the 110 pounders were served out before the experiments upon them had been concluded.' In a country full of founderies and inventors, Elswick alone drew £1,067,794 between 1859 and 1863, and Woolwich, under the orders of the 'retired partner,' spent another £1,471,753."

If all these statements are reliable respecting the Armstrong guns, the Government officials—such as General Peel, Secretary of War, and others who patronized them, deserve condemnation for stupidity and cupidity. A few years ago this gun was proclaimed to be the wonder of the world, and those very papers which now pelt it with their sarcasm, were as loud in its praise as they are now voluble in its censure. And who was like its great fabricator? He was held up to be the right arm of Britain's defense, and was dubbed with knighthood for his great achievement in the production of such incomparable war dogs. And now, after expending over two million pounds sterling, and arming the navy with them, they are found to be incapable of "knocking an old duck off its nest."

THE GREAT ORGAN.

A very full and interesting account is given in the *Atlantic Monthly*, of the great organ which will soon be completed in the Boston Music Hall. It is stated that this great organ is "a choir of nearly six thousand vocal throats." Its largest wind pipes are thirty-two feet in length, and they are so wide that a man can crawl through them; while at the same time the finest tubes are as small as a baby's whistle. It contains several distinct systems of pipes, capable of being played alone or in connection with one another, by four manuals or key-boards. These systems are called the solo organ, the choir organ, the swell organ, the great organ, and the

plano and forte pedal organ. It is stated that in absolute power and compass this instrument ranks among the four greatest of the kind ever built, and in the perfection of its parts and its whole arrangement it challenges comparison with any other in the world. The wood of which it is constructed is beautiful black walnut covered with carved figures in relief. A richly ornamented central arch contains the key-board and stops, the pediment above is surmounted by a bust of Johann Sebastian Bach. Behind this rises the lofty central division containing pipes; and crowning it is a beautiful statue of St. Cecilia holding her lyre. On each side of her is a griffin sitting as a guardian. The center is connected by harp shaped compartments filled with pipes to the two grand towers at the sides, each containing three colossal pipes. These towers are stately, and produce a commanding effect. This organ is placed upon a low platform; its whole height is sixty feet, its breadth forty feet, and depth twenty-four. It is a majestic, beautiful, and wonderful piece of art, and before it stands Crawford's noble bronze statue of Beethoven. The Boston Music Hall is of ample dimensions to give play to the waves of harmony that will proceed from this majestic instrument. It is one hundred and thirty feet in length, seventy-eight in breadth, and sixty-five in height. Its dimensions are all multiples of the number thirteen, the length being ten, the breadth six, and the height five times this number. This is in accordance with Scott Russell's recommendation, and has been explained by the fact that vibrating solids divide into harmonic lengths separated by nodal points of rests, and these last are equally distributed at aliquot parts of its whole length. This hall is therefore a great sounding board constructed according to the principles of acoustics. Boston is indebted to the President—Dr. J. Baxter Upham—of the Music Hall Association, for this great instrument. It was built at Ludwigsburg, Germany, by Mr. Walcker; the architectural frame with its elegant carvings was completed in New York, by Mr. Herter; the most important figures being executed at Stuttgart, Germany. This instrument will be one of the great attractions of the city of Boston, creditable to the musical taste and cultivated feelings of her citizens.

NEW BOOKS AND PUBLICATIONS.

APPLETON'S UNITED STATES POSTAL GUIDE. Published Quarterly by authority of the Postmaster General.

All persons engaged in extensive business transactions must have felt the inconvenience entailed upon them by careless correspondents, who date their letters sometimes with the name of the town and no county, or else omit both, expecting that all the world must know just where their important communications originate from. When funds accompany such documents it is particularly embarrassing, as no disposition can be made of them until the correspondent writes again, and more carefully. This evil is remedied by the little volume which we have made the subject of this notice. It contains a full and complete record of all post towns and stations in this country; said list being revised frequently, so that it shall be found correct. In addition to the above, there are full directions for mailing foreign letters, postage on them, time of arrival of the mails at different towns and cities in the Union, time occupied in the transmission of letters from different points to New York city, date of sailing of foreign steamers and other information of a miscellaneous character, highly interesting and important not only to business men, but to every one who writes fifty letters a year. The "Guide" is afforded at a low price (25 cents), and will be a valuable auxiliary in the transaction of business.

CATECHISM OF THE STEAM ENGINE, by John Bourne. D. Appleton, 443 Broadway, New York.

The familiar title of this work will strike many persons, and they will be apt to turn away from this notice under the impression that it is nothing new. Hasty judgement is always censurable, but specially in works of this character, and the engineering student, the mechanic, or even the superintendent, will each and all find information in this new edition of the Catechism, which will be invaluable to them. The general scope and character of the original book

is well known, and in this—the fourth edition—Mr. Bourne says that he has not only corrected the few errors which the first work contained, but added new and interesting matter to bring the information up to the advance made in engineering science. This is a very great improvement, as the chief fault with the first Catechism was its conventionalism, or adherence to old-fashioned plans of construction. English and American engineering practice is widely different both in detail, management, and construction, and to render the work popular in this respect the American edition has been altered in some parts to suit our own practice. The table of contents embraces a wide range of information; among the different subjects are to be found heat, combustion, and steam, expansion of steam and action of the valves. Modes of estimating the power and performance of boilers; proportions of the same; also of engines. Manufacture and management of engines, &c. The book is well printed, and handsomely bound, and the illustrations of American steam fire, stationary and other engines, confer additional value upon it as a work for reference and study. No mechanic, or indeed any person, whether engaged in manufacture or not, should fail to procure a copy.

THE REJECTED WIFE; By Mrs. Ann S. Stephens. Published by T. B. Peterson, Philadelphia; for sale by H. Dexter, Hamilton & Co., 113 Nassau street, New York.

Although works of fiction are in many cases injurious in their tendency, we do not condemn all of this class as pernicious, in a moral sense, or a waste of time to read and of money to buy. In the "Rejected Wife" there are a great many clever bits of description, extremely felicitous. Mrs. Stephens is always happy in delineations of this character. The mechanical execution is highly praiseworthy, the publisher having put the matter into large clear type, as easy to read as a merchant's sign.

COMBE'S MORAL PHILOSOPHY. Fowler & Wells, 308 Broadway, New York.

We have received a work under this title, which considers the duty of man in his moral, individual, and social capacities. We have not read the work attentively, but it doubtless affords instruction and edification to the careful reader. The small type and solid matter in the pages is rather forbidding than inviting to closer acquaintance, otherwise the book is well printed and neatly bound.

Preservation of Fruit by Cold.

On two previous occasions recently, we have described modes of preserving fruits by boiling them and then closing them air-tight in suitable vessels. Our attention has just been directed to another mode of preserving fruit upon a different principle, which is thus described in the Philadelphia Ledger of the 17th inst. —

"A new way of preserving fruit has begun to be practised in Greensburg, Ind., which will probably do much to render the best fruits attainable at all seasons of the year in our large cities; and this at but a trifling increase of expense for storage above the usual cost for them while in season. They can be preserved in this method from one season to another without the expense of sugar, or boiling, or cans; and preserved more perfectly in their natural state and flavor. The process, as detailed at length by the *Agriculturalist*, is in substance as follows:—

"The new plan proposed, and tried apparently with success, is to reduce the temperature below 40°, without, however, allowing it to reach 32°, the freezing point; while within those 8° fermentation cannot go on. This done, with proper care as to one or two points, the fruit sustains no injury. . . . The first and chief thing is to get a room or storehouse constructed in such a manner that one can have complete command over the temperature, so far that it shall never rise above 40° or sink below 32° from one year's end to another. To those who are accustomed to build ice-houses this will present no formidable difficulty. By surrounding almost any apartment with charcoal and saw-dust, or any other non-conducting substance, and with the aid of ice on the one hand and a little furnace heat on the other, the conditions of non-fermentation are easily thus secured. Excessive moisture of the atmosphere is averted by the use of chloride of calcium. This, and

some attention to the action of light, seems to be all that is necessary to preserve even the most delicate fruits in their natural state. Apples and grapes keep perfectly and with the greatest ease. With care, strawberries, and all of those fruits most difficult to preserve in their full flavor, can, it is believed, be regularly kept from season to season."

The advantages of this system of preserving fruit are pointed out at still greater length, and it is intimated, that wherever fruits and vegetables are kept in large quantities in stores arrangements should be adopted to carry out this system. It affords us pleasure thus to hear of the application of this mode of preserving fruits on a large scale by dealers in such articles. This system was illustrated and described on page 356, Vol. X. (old series) of the SCIENTIFIC AMERICAN, and was patented by W. D. Parker, of this city, who gave a very extended account of the best mode of gathering fruit and preserving it on pages 43 and 50, Vol. XI. (old series) of the SCIENTIFIC AMERICAN. By consulting these volumes our readers will obtain full and accurate information respecting the mode of constructing such rooms for preserving fruit.

Immense Trade in Small Hardware.

There are an infinite number of household articles in use at the present time made entirely from cast-iron, and the saving in time and labor resulting from their introduction is very great. Not only this, but the taste of the people is improved, and a love for the beautiful in art fostered, by the use of graceful, and even elegant, forms in the most simple and humble utensils employed in domestic life; as, for instance, stands for sad-irons, fender-guards, foot-scrappers, clothes-racks and other things which belong to the furniture and gariture of our dwellings. In the ancient days, when the axe was the only tool at hand, our forefathers were pardonable for the clumsy furniture which cumbered their houses; but at the present time there is no excuse for badly-designed or poorly-made iron furniture, when so many skillful mechanics and enterprising manufacturers are busy in designing new and beautiful patterns, and affording the same at low prices. The statistics of the whole number of tons of iron annually made up into iron furniture in this country would be something enormous, if procurable; but as there are a large number of factories in different parts of the country at work on this kind of merchandise, it would be a difficult matter to obtain the exact figures. The New England Butt and Hinge Company, in Providence, R. I., use upwards of one thousand tons of iron per annum, and about six hundred tons of coal in making hinges, sad-irons, iron-scrappers, &c., and they employ a large number of mechanics the year round in the production of these small, but very necessary articles.

The cast-iron hinge commonly used on doors involves much more labor before it is completed than an uninitiated observer would think necessary. Some three weeks elapse before the hinges arrive in the packing room from the foundry, having been all that time in the various stages of manufacture; no foreign hinges have been imported for many years. In the item of sad-irons alone about two hundred tons of iron are consumed; or counting each iron at 7 pounds, the usual size, nearly 60,000 smoothing irons are yearly turned out at this establishment—enough, one would think, to polish all the shirts and collars in christendom. The braiding machines at these works are used in hoop-skirt manufactories, and also for general braiding purposes; as for making veins, &c., and they are so constructed that the breakage of the thread, in the larger sizes, causes the stoppage of the machine before it can go more than three inches. The English sixteen-carrier braider costs \$50, but the American one is furnished at \$12. In the former there is a great deal of wrought-iron, while in the latter there is more cast-iron, which accounts, in part, for the vast difference in the prices; the American tool, however, is fully equal to the English one in point of durability and efficiency. Some idea may thus be formed from this short article of the immense trade carried on in small wares of the kind alluded to; where they all go is a mystery to us. 18,000 butts per day is a goodly number, and would hang a good many doors, and 50,000 sad-irons in the course of a year would