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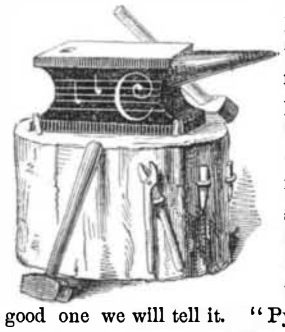
THE FATHERS OF PHILOSOPHY--IV.



CERTAINLY as some of the early classic authors make the statement, and pertinaciously as many of their commentators endeavor to enforce the manner in which Pythagoras discovered or made the *octave* in music, we must be allowed to doubt the story; but as it is a good one we will tell it. "Pythagoras, while one day meditating on the want of some rule to guide the ear, analogous to what had been done to help the other senses, chanced to pass by a blacksmith's shop, and observing that the hammers, which were four in number, sounded very harmoniously, he had them weighed, and found them to be in the proportion of the numbers 6, 8, 9, 12. Upon this he suspended four strings of equal length and thickness, fastened weights to each of them respectively, in the above-mentioned proportions, and found that they gave the same sounds as the hammers had done, viz: the fourth, fifth and octave of the gravest tone." This last did not make part of the musical system before; for the Greeks had gone no further than the heptachord, or seven strings, until that time. The frontispiece to a very celebrated history of music represents the Samian sage busy at work weighing the hammers. Notwithstanding that the hammers and anvils have been "swallowed" by some very great men, with an ostrich-like digestion, upon experiment it appeared that different hammers would no more produce different sounds on the same anvil than bows or clappers of different sizes will from the same string or bell. Galileo showed by experiment the fallacy of the whole story.

But though Pythagoras has been robbed of the honor of discovering musical ratios by accident, he has been given the still greater glory of discovering it by meditation and design, and there is no doubt that he did discover the harmonical canon or mono-chord, which was an instrument of one string well stretched on two bridges with a movable bridge in the center; and in applying this at various points of the line the sounds were found to be in the same proportion to one another as were the divisions of the line cut by the bridge. The common "hurdy-gurdy" is a similar instrument. It was by this invention that music took its rank among the sciences, as capable of being equally as well expressed in numbers or symbols as in sound.

He also added an eighth string to the lyre, which, as we have before stated, had previously had but seven. It is said by the writers of his life that the Samian sage regarded music as something divine, and that it had such a power over the human affections that he ordered his disciples to be lulled to sleep every evening and awakened every morning by the sweetest sounds. He preferred stringed instruments to the flute, because the performer could convey instruction to the mind while playing it, by accompanying it with the voice.

As a geometrician he was a distinguished man, and had studied astronomy while in Egypt. All his knowledge on these subjects he gave to his more exclusive followers, who were called "Mathematicians," and who were permitted to take notes of the lectures in writing, and to propose questions and make remarks on the subject of the discourse. Others of his followers he instructed in morals, social economy and politics; and he sent them into the cities of Greece to instruct the people in the principles of government, and to assist them in framing laws for the common good. He discovered the following theorems in geometry: that the interior angles of every triangle are together equal to two right angles; that the only polygons which will fill up a space about about a given point are the equilateral triangle, the square, and the hexagon; the first to be taken six times, the second four times, and the third three times; and that, in rectangular triangles, the square of the side that subtends the right angle is equal to the two squares of the sides which contain the right angle.

From his astronomical doctrine it has been inferred that Pythagoras was really the first person who was in possession of the true idea of the solar system which was revived by Copernicus and and fully established by Newton. His theological ideas were a wondrous mixture of reverence for a pure and holy Great First Cause or Essence, and a mass of symbolic superstition which he had not either the courage or knowledge to cast away.

In conclusion, it may be asked, "What good did Pythagoras do to the world?" He taught the value of numbers, promulgated an improved astronomy, introduced music as an ornament and necessity to civilized life, and lastly, told the people that to be a great man required goodness, and that there were no philosophers who were not virtuous. He and his followers were patterns of temperance, soberness, wisdom and chastity; and his voice was ever elevated in the cause of human freedom and of manhood's rights. In short, he was an Example for the Ages.

EXPERIMENTS WITH SCREW PROPELLERS.

A series of trials with screw propellers lately concluded in England are the most important that have taken place since the introduction of the screw for impelling steamships. The trials were undertaken to test the relative qualities of the common screw, with Griffith's propeller, which was illustrated on page 352, Vol. XII., SCIENTIFIC AMERICAN. Experiments had been made in 1853, having the same specific objects in view, but they were not so complete, especially as it related to the vibration and steering of the vessels. The common screw used by the British Admiralty consists of a sixth part of the whole helix; Griffith's propeller has a spherical central base, one-third the diameter of the screw, with the blades made tapering. The driving surface of the former is at the extreme ends of the blades; that o. the latter lies towards the center, nearest the sphere.

The first trial was with a common screw, which had a diameter of 18 feet; the speed obtained was 11,823 knots per hour. On a second trial, with its diameter increased to 20 feet, the speed was 11,826 knots, but there was a great increase of vibration. The leading corner of each blade was now cut off, and on the third trial, with this change, a speed of 12,032 knots was obtained. Both corners of the blades were now cut off, and a fourth trial made; but even with a greater number of revolutions, less speed—12,012 knots—was secured. The highest speed was, therefore, achieved with the leading corner of the screw cut oft. With a Griffith's propeller of 20 feet diameter and 32 feet pitch, the first trial gave 11,981 knots per hour; on a second trial, with an alteration of pitch to 26 feet five inches, a speed of 12,269 knots was the result; on a third trial, with a still further reduced pitch and 43¾ revolutions per minute, there was much less vibration than on former trials, but the speed was only 12,158 knots.

It was found during these trials that the leading edge of the screw is the part which affects the steering of a vessel most, and causes the greater part of the vibratory acion. It was also demonstrated that an increased diameter of the common screw was better than an increased pitch to reduce the speed of the engines, with an augmented speed in the vessel, but it had the effect o promoting the vibration, which is an evil to be avoided if possible. By increasing the diameter of the Griffiths' propeller additional vibration was not experienced, because its chief acting surface is not at the extremities of the blades. These experiments seem to have established the fact, that a propeller having a sphere at its central portion, combined with tapering blades, gives better results with less power than the common screw propeller.

A paper was recently read before the United Service Institution, in London, by James Reddie, Esq., on flexible screw blades, in which he stated that several successful experiments had just been made with a propeller which had wrought iron tapering blades, somewhat flexible in their character, and his object was to point out the advantages of such propellers. Our own attention has been several times directed to such devices, because they are the very agencies which have been provided by nature for the swift-moving tenants of the sea. Thus, if we examine the shape which the propeller (tail) of a swift fish assumes as it moves through the water, it will be observed to describe the figure 8, the one flexible lobe bending to the one side and thence to the other alternately, describing a helix, and acting efficiently during the whole length of the sculling stroke. Now why not imitate nature in ships, by the use of a flexible propeller, and a vibratory instead of a rotary motion? Among the earliest propellers that were tried was the duck's-foot reciprocating paddle of the Earl of Stanhope; but it was not a scientific device, because it only acted efficiently during the forward thrusting motion, and required to be collapsed on the return of the stroke. Could a propeller be constructed and operated like that of the swiftest fishes, it might or it might not be superior to all others. A ship is not a fish, and the same device to propel the one may not be so well adapted to propel the other. We advance this idea because it seems to have been overlooked by most persons who have treated and who now treat this subject. This is a most important question to our shipping merchants, because foreign screw steamers have recently taken away a vast amount of their business. Every improvement suggested for propelling vessels should engage their earnest attention; at the same time, we must tell them that it is not from mere speculation, but reflection and experiment, that most improvements result.

CHEAP SEWING MACHINES WANTED IN GERMANY.

The government of Wirtemburg writes to us (through M. Steinbeis, the Manager of the Board of Trade and Commerce at Stuttgart) as follows:

MESSRS. MUNN & CO.:—On page 193, Vol. XIV., SCIENTIFIC AMERICAN, there is an interesting article on "Sewing Machines," setting forth the immense number of these machines which are manufactured annually by various houses in the United States.

We are already in possession of sewing machines of the larger and more expensive kind, but of the smaller, at the price from $5 upwards (of which mention is made in the said article), we have as yet not seen any specimens. We would therefore be much obliged to you if you would have the kindness to send us the address of such American houses as chiefly manufacture small and low-priced (though perfectly well-working) sewing machines, and to also add their price-lists, as well as the price-lists of the large machines, both of which lists undoubtedly explain the size, power and other particulars of the machines and their use. It would, without doubt, be in our power to recommend those articles in this as well as in other countries of Germany, and to procure some orders for your friends or to the branch establishments which they may possess in Europe.

Signed (for the Board of Trade and Commerce of the Kingdom of Wirtemburg): STEINBEIS.

Stuttgart, June 23, 1859.

[We would suggest to our sewing machine makers that the opening here presented for introducing their machines into Germany seems to be a favorable one; and we would advise them to correspond with M. Steinbeis (addressing him at Stuttgart, Kingdom of Wirtemburg), and to send him their pamphlets of descriptions of their machines.

THE STEREOSCOPE AND FORGED NOTES.—A cotemporary states, that by means of the stereoscope, forgery can be readily detected in the case of bank-notes. If two accurately identical copies of ordinary print be placed side by side in the stereoscope they will not offer any unusual appearance; but if their be any, the *slightest* difference, that difference will at once be made manifest by the elevation into relief, or the reverse, of the corresponding space above the adjoining marks, and by this simple process a forged bank-note can at once be detected.