Scientific Museum.

For the Scientific American.

Success in Invention.

Sir James Mackintosh says, that were a prize to be offered for the best translation of the Greek Bible, and were there not a Yankee in the world who could read Greek, still he would learn the language and carry off the prize! Enterprise is the trait of character for which we are so much distinguished; and industry lies at its foundation. Perseverance, diligence and industry are essential to success; and this is true, not only in literature, but in the application of "Divine axioms" to the purposes of life. Success in any scheme depends on patient, untiring application. In any undertaking, less reliance should be placed on genius and other accidental things, and more upon the exercise of a diligence which never grows tired or discouraged. "Wishing, and sighing, and imagining, and dreaming of greatness," says Wirt, "will never make you great. If you would get to the mountain top, it will not do to stand still, looking and admiring and wishing you were there. You must gird up your loins and go to work with all the indomitable energy of Hannibal scaling the Alps." Why is it that a few, who have devoted themselves to Science and Art, have risen to such eminence? Some will say, it is genius, a faculty for invention implanted within them; that Nature has been partial and endowed them with peculiar gifts. To show the true cause of their prosperity, we will cite a few examples from the pen of Dr. Taylor, of Dublin:—Cultivated habits of observation and persevering industry were the great elements of Smeaton's success: they were formed in his boyhood, and were not abandoned in his old age. The life of Franklin affords signal proof that moderate talents judiciously directed, when aided by industry and perseverance, will give one a claim to the homage of posterity. His industry and temperance were the sources of his early success; and his philosophical discoveries were the result of patience and perseverance. The great characteristic of Arkwright's mind, and the principal source of his success, was his indomitable perseverance. Sir Humphrey Davy was one of the few men who united the vigorous imagination of a poet to the patient research of a philosopher; he was equally fertile in invention and patient in investigation.

James Watt.

A young man, (says Sir R. Kane,) wanting to sell spectacles in London, petitions the corporation to allow him to open a little shop, without paying the fees of freedom, and he is refused. He goes to Glasgow, and the corporation refuse him there. He makes acquaintance with some members of the university who find him very intelligent, and permit him to open his shop within their walls. He does not sell spectacles and magic lanterns enough to occupy all his time; he occupies himself at intervals in taking asunder and re-making all the machines he can come at. He finds there are books on mechanics written in foreign languages; he borrows a dictionary, and learns those languages to read those books. The university people wonder at him, and are fond of dropping into his little room in the evenings, to tell him what they are doing, and to look at the queer instruments he constructs. A machine in the university collection wants repairing, and he is employed. He makes it a new machine. The steam-engine is constructed; and giant mind of Watt stands out before the world—the author of the industrial supremacy of this country, the herald of a new force of civilization. But was Watt educated?—Where was he educated? At his own workshop, and in the best manner. Watt learned Latin when he wanted it for his business. He learned French and German; but these things were tools, not ends. He used them to promote his engineering plans, as he used lathes and levers.

A Diminutive Plant.

A Homœpathic phial will hold a dozen of duck weed plants, root, stem, fruit, and everything.

History of Propellers and Steam Navigation.

[Continued from page 272.]

MR. EWBANK'S (COMMISSIONER OF PATENTS) EXPERIMENTS.

FIG. 48. FIG. 49.

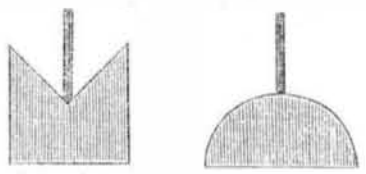


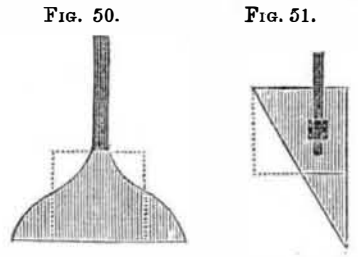
Fig. 49. was a semicircle. Mr. B. undertook to test these. They turned the boat in circles varying (from light winds and tides) from 30 to 150 feet. Four were thought equal, and sometimes superior, to eight of fig. 40. It is demonstrable that these blades are less effective, though in a very small degree, than those marked fig. 44 and, when reversed, more powerful than fig. 41.

Fig. 50 is formed as represented but not tried, as it was evident their value would be nearly that of fig. 44, probably a shade above them, but two minute to be detected, except in perfectly still water.

Fig. 51 is a right-angled triangle, 7 inches across the top, and ending in a point nearly 14 inches below it. These were, as might have been anticipated, more effective than those of fig. 40. "Everything about them," observed Mr. B., "shows their superiority." They of course, entered the water without jarring.

The same were attached to the arms in the position of fig. 52, and were unable to compete with fig. 40. The latter had a slight advantage over them.

FIG. 50. FIG. 51.

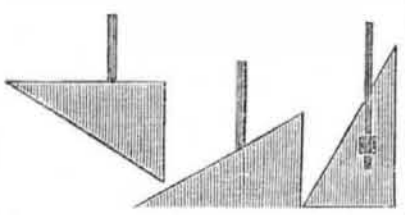


They were next reversed, as fig. 53, when they proved effective as fig. 44, and 49—four being equally so as the eight opposed to them.

There finally changed to fig. 54, when the boat was turned so rapidly, as to make it difficult, with a wide ore, to keep her in one direction. Four were removed, and then she described a circle in less than 50 feet. Two more taken away, leaving only a couple to act against the eight on the other wheel, and to which they proved equal.

From these experiments, it appears that, with equal areas, and equal dip, triangular blades may be rendered twice as effective as ordinary rectangular ones. This is made manifest by figs. 44, 49, and 53,—four of the former equalling eight of the latter. And this, too, while the propelling surface of the smaller number was half that of the greater; for the four were as long in making a revolution, as were the eight. Hence, the speed of a boat may be increased by diminishing the number of her paddles—a fact still further elucidated by fig. 54.

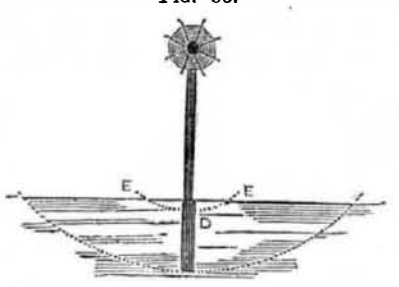
FIG. 52. FIG 53. FIG. 54.



There can, I think, be little doubt, that the greater the velocity of a steamer's wheels, the fewer (within certain limits) should be the blades; and that, at the rate at which some of our boats go, the number might be reduced with advatage. Some have three, others four, and in more than one vessel, without any load on board, I have seen six submerged at each wheel. In these cases, is it not evident that each blade, on entering, plunges, not, as it ought, in water undisturbed, but into that which preceeding ones have already broken up and set in motion towards the stern? It would seem that one in the act of plunging, another sweeping under the shaft, and a third leaving the surface, are all that are necessary to be kept up; and that a great number, as regards the speed of a boat, is positively injurious. Yet under a vague idea of attaining a higher speed, the number of paddles has frequently been nearly doubled.

Snow, as every person knows, causes the wheels of land locomotives to slip upon, instead of rolling over, the rail. They revolve as usual, but the carriages make little progress, hence much of the power spent on them is expended to no purpose. So it is with paddle-wheels: a boat never progresses in the ratio of their revolutions, because of the yielding medium in which, and against which, they act. They slip always—a result, to some extent, inevitable when massive solids wade through fluids. The distance between the Atlantic

FIG. 55.



steamers' docks, in Liverpool and New York, has been calculated at 3023 miles, but their paddles, in each trip, pass over a space varying from 5000 to 8000 miles. In steamers unaided by sails, the disproportion is often greater. Now can this be modified, by giving the paddles a better hold on the fluid they sweep through.? The experiments with blades 42, 43, 44, 45, 46, 48, 49, 51, 53, and 54, furnishes replies to the interrogatory.

The moral of the foregoing experiments is this:—As the propelling power of a paddle is greatest at its lower or outer extremity, and diminishes to nothing at the surface, so its face should enlarge with the dip, and be nothing, or next to nothing above. Let D, fig. 55, represent the end of an ordinary blade, or paddle. Its upper part barely touches the water, and only for the moment it is in the position shown. But suppose it were immersed to the line C C,—say four or five inches—it would even then be no sooner under, than above the surface again, so brief would be its immersion. The lower edge in the meanwhile, would sweep along the extended curve there delineated.

Human Strength.

An active man, working to the best advantage, can raise 10 lb. 10 feet in a second for 10 hours in the day, 100 lb. one foot in a second.

Absolute force of pressure with the hands was found by the dynanometer of Regniel to be on an average equal to 110 lbs. Absolute force of a man lifting with both hands 286 lbs. Greatest average load which a man can support on his shoulders, for some seconds, is estimated at 330 lb.; and it is supposed that he can exert the same force in drawing vertically downwards.

The mean absolute force of a man, in drawing or pulling horizontally is found by the dynanometer to be 110 lbs.; the force of the pull in the strongest man was found to be only 20 lbs. more than the average.

The greatest effect of man's strength in raising a weight will be when the weight of the man is to that of his load as $1 : -+\sqrt{3}$, or nearly as 4 : 3.

Table of Horse Power at Different Rates of Speed.

Let us suppose 15 to represent the greatest unloaded speed, and the square of 15, or 225, to represent the greatest load which can be sustained without moving; the following table gives for each degree of speed, from 1 to 15, the corresponding load and useful effect:—

Speed	0	1	2	3	4	4	6	7
Load	225	196	169	144	121	100	81	64
Effect	0	196	338	432	484	500	486	484
Speed	8	9	10	11	12	13	14	15
Load	49	36	25	16	9	4	1	0
Effect	392	324	250	176	108	52	14	0

Thus, if the greatest unloaded speed of a horse be 15 miles an hour, and the greatest weight he is capable of sustaining, without moving, be divided into two hundred and twenty-five equal parts, his labor will be most advantageously employed if he be loaded with 100 of those parts, and travel at the rate of 5 miles an hour. If he be thus employed it will be found that he will carry a greater weight through a distance, in a given time, than under any circumstances.

A horse, upon a well-constructed railroad, can draw 10 tons at the rate of 2 miles per hour, or 5 tons 4 miles per hour.

The absolute force of the horse drawing horizontally is, on average, 770 lb. From various calculations it would appear when the period of continuance is made an element in the calculation, that the power of a horse working eight hours a-day is on an average not more than an equivalent to that of five men working 10 hours; the most useful mode of applying a horse's power is in draught, and the worst is in carrying a load; it has been found that three men carrying each 100 lb., will ascend a hill ascend a hill with greater rapidity than one horse carrying 300 lbs. The best disposition of the traces in draught is when they are perpendicular to the collar.

When a horse is employed in moving a machine in a circular path, the diameter of this path should not be less than 25 or 30 feet; 40 feet would be better than either.

LITERARY NOTICES.

Parts 1, 2 and 3 of Mr. Gleason's great "Mistake of a Life Time," in paying three thousand dollars for the manuscript of Waldo Howard, Esq.'s, "Robber of the Rhine Valley," has been laid under our olfactories by Messrs. Dewitt & Davenport, Tribune Buildings. The cover is richly embellished with ships, flat-boats, war implements, Neptune in his chariot, horses, cable chains, and children in arms, weaving together such scenes and pictures as form a beautiful panorama, depicting life as fancy hath reflected it—the scene being drawn but *not* colored after nature herself. Price 12 1-2 cents per No.—the end not yet.

We are indebted to Messrs. Berford & Co., Astor House, for the May No. of the Scalpel. It contains a valuable and interesting contents, as usual, after the peculiar, brilliant, and go-ahead style of the Editor, Dr. Dixon. The article upon Hysterics is able, and worthy of a careful perusal. This journal, when fairly brought to the intimate acquaintance of the American people, must stand out as prominent here as the famous London Lancet does in Europe.

Messrs. Hotchkiss & Co., of Boston, have just published an interesting work, called "Evelyn, the Child of the Revolution: by Mrs. Robinson." Price 25 cts.; for sale by Dewitt & Davenport.

No. 15 of Messrs. Phillips, Sampson & Co.'s edition of Shakspeare's Dramatic Works is issued. It contains the "Comedy of Errors," in which the two Dromio's figure so comically. For sale by Dewitt & Davenport.

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