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Progress of Useful Science.

We have just received an address recently delivered before the Faculty and students of La Grange College, Ala., by the Professor of Physical Sciences—Rev. Wm. G. Williams—on the subject of "the physical sciences; their importance and relation to each other." In it we find many beautiful thoughts happily expressed; and we agree with its central doctrine, viz., "man, as a philosopher, is an interpreter and not a dictator in the realm of nature." Respecting this doctrine it says, "ignorance of this great truth, on the part of the ancients, is the grand reason of their almost utter failure in the cultivation of the natural sciences." We do not dispute the correctness of this statement respecting the cultivation of the "natural sciences" by the ancients, but it suggests the query "how can we account for the low state of practical mechanics among them?" for it cannot be said that man is merely an interpreter, and not also a dictator in the invention of machinery. We do not find a single animal on *terra firma* that moves itself on wheels like a locomotive; nor a single fish in the sea that propels itself with wheels, like a steamship. This shows that man is a dictator in mechanics, which is a branch of physical science. We have no doubt that had the Greeks, with their powerful imagination, devoted themselves to the really useful branches of mechanics, they would have invented many notable machines which were left for modern inventors to plan and construct. But in the dark days of old, the learned Greeks scorned those that labored at the useful mechanic arts, and looked upon them as mere appendages of a State, not the source of its wealth and power. This is the reason why we find the names of so many poets, painters, sculptors, orators, and warriors inscribed on the pages of ancient story, but none of great mechanics, like Watt, Fulton, Arkwright, and Whitney, of modern times. The ancient mechanics had no hopes to inspire them, and consequently no heart to plan and construct. Grecian song and ornamental art have never been surpassed; but in practical mechanics—useful machinery—the Greeks were little better than some tribes of savages.

We are grateful that we live in better times—times when the wisest statesmen and greatest philosophers appreciate and acknowledge the worth of inventors and mechanics. This feeling, however, has been of slow and gradual growth, for we find that such a man as Pope—one hundred years ago only—called Newton "a mere maker of spectacles," because he was fond of mathematics and machinery. It is evident that in proportion as a correct appreciation of inventors and mechanics has grown up among the nations, *all* the sciences have advanced. Intelligent men know and feel this to be true. Kings are now nursing fathers, and Queens nursing mothers of the useful arts. The great London Exhibition of 1851, and the great French Exhibition of 1855 are examples of this. Ancient history tells us of no such glorious pageants. The inventors and mechanics are no more held to be mere appendages of a State; they are felt to be the main stay of its wealth and greatness. At the meeting of the British Association for the Advancement of Science, held in Glasgow last month, the subject of the English patent laws was discussed, and the hearts of all the *savans* present seemed to gush out in gratitude to inventors. Sir David Brewster stated that even "a new machine which failed of success effected some good, inasmuch as it showed that some one felt a want."

In our own country, the moment the first tree was felled in the forest, the value of labor-saving machines began to be appreciated, and from that time to the present there has been a mighty outgrowth of American inventions. At the meeting of the above-named scientific association, Fairbairn, the celebrated engineer, gave an account of the useful machines at the Exhibition in Paris, from which he had just arrived, and paid a marked compliment to the many new and useful inventions which he found there by American contributors. Our inventors and mechanics always have been (and are now more than ever) felt to be a great power in the State. No one can visit the New York Crystal Palace, at the present time, without coming to this conclusion. It has given us pleasure to witness the movements of the many new machines of real substantial merit there displayed. These afford evidence that man is both an interpreter and a dictator in the useful arts. He bids iron fingers weave and knit, and they do it. He commands a rough piece of timber to advance to the revolving blade of peculiar construction and then come forth from it carved into many bounding lines of beauty, and it does so. He dictates to iron fingers how to sew his coat, and his boots, and they obey his bidding; in short, a hundred machines on exhibition prove to us that man's progress in the mastership of the physical sciences, so far as they relate to the useful arts, is in accordance with the measure of public appreciation and encouragement that his efforts receive.

Reminiscences of the Paris Industrial Exhibition. No. 3.

Turbine Water Wheels.—The opinion that "no more than fifty per cent. of the water power could be obtained from a wheel discharging its water in a contrary direction to the wheel's motion" was at one time current among hydraulic engineers. This notion operated prejudically to improvements on the re-action water wheel; hence, for a great number of years after the breast and overshot wheels had become very perfect, the re-action wheel only existed in the form of the "Barker Mill," viz., a central tube, and two horizontal hollow arms on a vertical shaft, from the extremities of which the water was discharged, and gave motion to the shaft by recoil. We believe that the world is much indebted to French hydraulic engineers for directing attention to old errors, and pointing out the advantages to be obtained from improved re-action wheels, to which they gave the name of *turbines*, because of the peculiar construction of their buckets, and the spiral form of the water shutes. It is generally believed in America, however, (and from what we know of the subject, we think the belief is founded on correct data,) that improved turbine water wheels were in use in the United States before they were employed in Europe; but be that as it may, the French hydraulic engineers deserve much praise for what they have done in improving them. We therefore expected to find quite a number of turbines on exhibition, but in this we were disappointed, for we only saw a double one, and all the novel features embraced in it were simply a vulcanized india rubber shute, and draft boxes, stiffened with wooden plates. These were perfectly water and air tight—desirable qualities, no doubt, but wooden flumes and draft boxes are much cheaper in America, and may be made to answer every purpose. Seventy-five per cent., we were given to understand, was the amount of power derived from the best constructed French turbines; this falls short of the results obtained by the turbines at Lowell, still it is equal to those obtained from the common breast and overshot wheels. We hope the reports of the performances of this class of wheels are correct, because they are much less expensive to construct than other kinds.

New Surveying Instrument.—An apparatus for delineating sections of surveys for railroads, canals, &c., and for computing the solid contents of cuttings and fillings, was exhibited by M. Collin & Wagner. It consisted of a standard three feet high, supported on a carriage having three wheels. From this standard there was suspended a pendulum, the rod of which extended beyond the suspension point and there actuated a series of levers as it vibrated. When it was desired to delineate a section of a railroad survey, it was drawn on the ground, on the proper line, and, of course, the undulations gave a proportionate amount of vibration to the pendulum, which again actuated the series of peculiarly combined levers mentioned. One of them operated a pencil, and traced the undulating line of the road on a piece of prepared paper, which was wound off a cylinder. The other two moved counters constructed on the principle of a calculating machine, which showed the actual amount of solid contents to be excavated, from elevations, and the fillings-up to be made in depressions of the road to a specific level. This machine was of light form, easily carried, and for excellent workmanship surpassed by none on exhibition.

Demonstrating the Laws of Gravitation.—Galileo, the father of modern mechanical philosophy, was the first person who really discovered the true action of gravitation in the accelerated velocity of falling bodies, although the discovery of the *cause* was left to the genius of Newton. The philosophy of Aristotle, which long swayed the minds of men regarding the velocity of falling bodies, was wrong in essence and principle, inasmuch as it assumed that of two like bodies, the one weighing twice as much as the other, if dropped from an elevation, the heaviest would fall with twice the velocity of the smaller body. Galileo demonstrated the true law of falling bodies, by the inclined plane, and he also showed that the path of a heavy body projected obliquely was a parabola. A beautiful apparatus in the Exhibition, by M. Morin, demonstrated the path, the time, and velocity of falling bodies with perfect accuracy. It consisted of a cylinder covered with ruled lines of *ordinates* and *abscissa*. A style or tracer having a relative motion with a falling body, traced upon the ruled paper on the cylinder, a curve, by which it was verified, that the abscissa representing the speed is proportional to the times, and the ordinates proportional to the square of the times, and that the curve is parabolic.

Ingenious Gold Coin Scales.—M. Deluil, of Paris, a distinguished mathematical instrument maker, exhibited a number of very ingenious apparatuses; and among the number, a pair of curious scales for weighing gold coins, particularly attracted our notice. It was operated by clock-work, and weighed ten coins at once. The number of pieces were placed on a receiver, and made to pass through different sloping grooves or channels into the basin of a pair of scales. Every single coin as it reached the scale was weighed, and according to the *length* of the oscillations of the beam, the weight of each was determined. But the most curious part of the operations of this scale consisted in a separator trap being opened by the oscillation of the beam for each coin, according to its weight, and the coin thereby deposited in a drawer below. This coin detector recorded the most minute difference of weight in each, and separated them from one another according to the gravity, in the manner described. All the weigher had to do in weighing a quantity, was simply to place ten at a time on a receiving plate. We witnessed one thousand gold coins weighed in nineteen minutes, and the weight of each was determined with the utmost accuracy.

Constant Supply Electric Battery.—We noticed an electric battery which, from the method adopted to renew itself with fresh exciting liquid, we conceived might be useful to many of our electrotypists. It was similar to our common ones, in which is used a solution of the sulphate of copper, but in order to avoid the frequent renewal of the solution, a spherical bottle, filled with dissolved sulphate of copper, was placed in the battery with its neck dipping under the liquid in the cup, thus forming an elevated supply fountain. As the liquid lowers in the cup, by the decomposition of the zinc, it flows out of the glass, and thus the battery may be fed at once with liquid to last a month.

Mining Implements.—France has very few coal mines, but on this very account they have received the fostering care of the Government, and next to those of England, have the best mining implements in the world. Some of the mines are very deep, and in this respect they greatly differ from those of the United States, hence they require to be worked in a different manner. The mines, generally, are more than 600 feet deep—holes bored into the earth so deep, that they would receive two Trinity Church steeples placed one above the other, without leaving a single inch projecting above the surface.—Away down in these subterranean regions the toil-worn miners drudge out a weary life. Some of the mines have stairs for the miners to ascend and descend, but the toil of ascension is so severe—that the more common plan is to raise and lower them in metal buckets, operated by the power of a steam engine. Each pit is divided into two open sections or mouths, by a central partition, and by a *double tow*—a large flat hempen belt—running over pulleys above the pit, the buckets are elevated and lowered. While one bucket is ascending on one side filled with miners or coal, an empty bucket is descending on the other side. Many accidents, in spite of great care, have occurred by belts breaking, and dashing the ascending and descending miners to pieces down the terrible declivity. In order to avoid such accidents, a new and ingenious apparatus was exhibited by V. De Brunelle. It consisted of two upright iron shafts, the one alongside of the other, secured in the pit or mine, and extending from the top to the bottom. About every three feet apart there was a little balcony on each shaft from top to bottom, and when a miner stepped on one balcony to ascend, on the one side, it was elevated by an intermitting motion, and then a balcony on the other shaft descended the same distance, and thus a perfect rotation of ascent and descent was performed by these balconies on the two shafts. Buckets of coal were placed on these balconies, and elevated in the same manner as the miners, thus forming a complete and entirely different plan from working the pit with endless belts running over pulleys. The plan struck us in a very favorable light as being much the safest, although the most expensive. Some of our American mines will yet be as deep as those in Europe. When this takes place, we hope our mine owners will not forget to adopt this humane invention.

GREAT FAIR OF THE AMERICAN INSTITUTE

Second Week.

In continuing our notes of the Exhibition we would remark, that since our last publication many new and important additions have been made to the stock of contributions, and that the appearance of the Fair throughout has been much improved. The attendance of visitors has also become very large, and is constantly increasing. At first, only a few persons, comparatively, ventured within the doors. But they were so highly pleased, and so agreeably surprised, that, we suppose, they went home and are now returning with all their families and neighbors. The exhibition opens every day at 9 A. M., and closes at 10 P. M.—The evening attendance of ladies and gentlemen is very great.

It is to be regretted that the Managers did not avail themselves more liberally of the facilities afforded by the public press in announcing the prospectus of the Exhibition. There are thousands of people resident in the rural districts, who will only begin to hear of the excellence of the display when the Fair has closed: and who, had they known of it in time, would have been glad both to attend and contribute. It is by far the most interesting Industrial Exposition ever conducted by the American Institute.

The Mechanical Department.—[Continued]

Several new contributions have been added since last week, and others, it is said, are yet to arrive. In our opinion the mechanical division of the Fair is already superior, in point of real novelty, to the Exhibition of All Nations, as originally held at the Crystal Palace. This is saying a great deal but we think that examination will sustain our conclusions. Judging from the large number of recently patented machines that are there collected, the present season has been exceedingly prolific in its crop of new inventions; indeed, the country has been as much blessed, proportionately, in its inventive harvest as in its cereal products.—The largest proportion of all the operating machines on show are patents of 1855.

So far as our observation goes the general value of patents, regarded in a monetary point of view, is steadily on the rise. If we look back for only a few years, we find that inventors often had difficulty to inspire confidence among capitalists, as to the worth of their inventions. It was not uncommon for a lapse of two, three, and even more years to occur after a patent was granted before the necessary funds could be raised for its public developement and introduction. The times have greatly changed in this respect. Plenty of money is now usually at hand for investment in new inventions, provided they are really good, and the working