Scientific American

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Progress of Discovery and Invention During 1852.

Since the first of January, 1852, no startling discovery has burst upon the world; no striking nor very extraordinary invention has been made, yet for all this, the march of improvement has been steadily onward. As peace is necessary to nations for consolidation and quiet developement, like the ripening of corn in warm, mellow moonlight nights, so the same law prevails in respect to progress in the arts and sciences.

At this time, we believe, it will not be unprofitable to our readers to listen to us while we briefly speak of what we have done in discussing and introducing improvements in machinery, and bringing more prominently before our people useful information about things new and old, from many storehouses of knowledge.

From the commencement of the past year, to the close of our last volume, we presented a greater amount of information, well illustrated, about boilers, furnaces, and smoke apparatus, than is to be found in any single book, periodical, or in any encyclopedia ever published in this or any other country, and as standard information, inventors will have to refer to those articles for years to come. A great amount of useful information about circular saws from practical men, in different parts of our country was also presented in a number of letters; much reliable and useful information was also presented about rifle shooting, and a series of articles on the "Geology of the Lead Mines," by an able and scientific gentleman in Galena, Ill., stand out as standard information, for reference to all interested in geology and mining. Those who wish to know what has been done among our tailors in the shape of inventions, will find McGinnis' Geometric Measurer illustrated on page 148, and Wells' measurer on page 308, and a pair of improved shears on page 253. There is an aerial bridge on page 167; for those who wish to know how to transport railroad trains above the masts of the tallest ships; and those who desire to make their own gas—the real bona-fide—in a small way, will find an apparatus for that purpose on page 172. Our millwrights will find Finlay's governor for wheels on page 196, and a new overshot wheel on page 308. But here we must stop, or we will have to fill columns merely in refering to the several pages where useful machines are illustrated. We hope our readers will turn over those pages and take a retrospective view for themselves. We can safely say that many very useful improvements have been made during the past year, and we expect that our inventors will add many more this year. The experience of the past illumines our pathway for the future; Hope stands on tip-toe pointing her finger to the sunlight breaking upon distant spires and glittering domes, to wreaths of laurel and crowns of gold.

It is stated that Archimedes asserted he could elevate the world with his lever if he had a fulcrum whereon to place it. Our inventors are the worthy descendants of the Grecian sage and mechanic; they have already, by their inventions, elevated our world, from its barbarism in Art to its present advanced and noble position in all that relates to real science and practical mechanics. We look upon all inventors and discoverers as reformers according to the value of the new treasures which they bring into the storehouse of art. The usefulness of the mechanical classes is universally acknowledged; we are determined to toil and labor more ardently to make them exert an influence in proportion to their usefulness.

We hope that every one of our readers has made up his mind to do better during the present than the past year. It should be the ambition of every man to leave his mark—a good one—on the pages of time.

"In the world's broad field of battle,
In the bivouac of life,
Be not like dumb driven cattle,
Be a hero in the strife."

The Ray Premiums Again.

It is well known to our readers, that F. M. Ray, of this city, offered $3,000 to be divided into four premiums for railroad improvements. We published *his* advertisement on page 159, of our last volume, where all the conditions are set forth. The improvements were exhibited (that being one of the conditions) at the last Fair of the American Institute held at Castle Garden, this city. The Committee of Examination was appointed by the American Institute, in whose charge the whole matter was left; they were to examine, report, and award the prizes. The offer of these prizes drew out an amount of talent which was exhibited in the greatest amount of railroad inventions ever brought together since railroads were invented, and we are sure that those offered prizes were the means of drawing many to the fair, both as exhibitors and spectators, who otherwise would not have gone there; perhaps the American Institute drew no less than five or six thousand dollars extra on that very account. We hoped and said that those prizes would be the means of doing good, and no doubt they would, if the business had been conducted honorably by an Institute governed by verity and manly dignity. But the manner in which the whole affair has been conducted by the American Institute deserves the scorn and contempt of all honorable men. Not a report on those railroad inventions which competed for the respective prizes has yet been made, and not a single prize awarded. We have received a great number of letters from exhibitors who live in different parts of our country, and one now before us says:—"I travelled 1,200 miles, and was detained in New York under heavy expenses for one month as a competitor, in the expectation of winning a prize, or of being satisfied (as I would have been) to see a better invention get it." Was Mr. Ray made a dupe himself in offering these prizes, and was it intended to dupe the exhibiting inventors? If not, why have those exhibitors been treated and are now treated like dupes by the American Institute? We make no charges, we only state facts and ask questions which naturally arise from the circumstances of the case. As the Scientific American is the defender of our inventor's rights, we dare not be silent in such a case as this; the rights, the honor, and the integrity of our country is involved in the public, broad, and extensive principle of a public award offered to a competing public through a chartered institution which pretends to be founded on, and governed by the principle of encouraging American industry. The fair fame of Mr. Ray is also involved, and the public demands some explanation about the conduct of the American Institute, in whose charge he placed the whole business. We cannot charge any person with fraud, because no evidence of this has been presented, but we cannot speak truth and use less strong language than to say, "the business has not been justly nor honorably performed by the American Institute."—We do not call upon that body of men to do anything; they know their duty but they do it not.

Critical Dissertation on Steam, Air, and Gas Engines.

In our last article on this subject we pointed out the reasons why the gas engines which had been invented to supersede steam had all failed to compete with it. We will now proceed to give the reasons why *Hot Air* has hitherto failed and must continue to fail in competing with steam as a force to move machinery.

All bodies in nature exist in either of three conditions, viz., solids, liquids, and gases. Different laws govern these three different conditions of matter, and many bodies can be easily converted into any of these three conditions. A certain amount of heat applied to ice will change it into a liquid, and the application of a greater amount of heat will change it into vapor—steam. All bodies suffer a temporary increase of dimensions when heated, and contract again into their original volume on cooling. It is this feature of the expansion of bodies by heat, which enables man to employ them to move machinery. Thus by heating bars of iron the walls of a building in Paris were brought straight—thrust from an incline to a perpendicular;—thus by heating air in a balloon, Montgolfier was enabled to force his way upwards against the pressure of the atmosphere, and by heating water till it became steam, Hero was enabled to whirl round his primitive rotary engine. Now the question which we are to discuss, is what body in nature is the most economical as a motive force, whether a solid, liquid, or gas.—There is no use in losing time speaking of the solid, therefore we will speak only of liquids and gases, and only of one liquid and one gas—water and air.

The principle of any chemical force to propel machinery depends on the nature of the substance employed; thus water by heat being applied to it, expands to 1,728 times its bulk; it is this elastic force—water combined with heat—which moves the piston in the cylinder of an engine. Air by having heat applied to it also expands, and this expansive force admitted under the piston of an engine, will also move it. Now, if water and air expanded equally with the same amount of heat applied, and were otherwise alike easily condensed to their original bulk no one could doubt the propriety and economy of using air in place of steam as a motive power, but this is not the case. *Steam* and *air* alike, come under the law of Mariotte in expanding their bulk equally with the same amount of heat applied, namely, doubling their volume for every 491° of heat applied. A cubic foot of air at 32° cannot move the piston of a cylinder, but if 491° of heat are applied it will occupy double the space and lift 2,160 lbs. one foot high at the pressure of the amosphere, that is exerting a pressure of 15 lbs. on every square inch of a piston of 144 inches area. But a cubic foot of water at 212° sensible heat converted into steam at the same pressure will lift 3,732,480 lbs. one foot high. Air is not for a moment then to be compared to water, bulk for bulk, to exert elastic force by the application of heat; this is evident, for the latent and specific heat of steam is only 1,184°. Allowing it to be safe to employ heated air (but it would not) about 491° to double its original volume, it will require 864 cubic inches of air, at 32°, to which 491° have been applied, to equal one cubic inch of water raised into steam from 32°. Thus there is a vast difference between a liquid and a gas to which heat have been applied, in the expansion of their bulks—their elastic force. To make air triple its volume, it would require to be heated to 982°—a low red heat. In its very nature, steam seems to have been designed by a Wise Providence, as a mighty power suited for the propelling of machinery, for while it contains 1181° of heat (latent and specific combined) yet it has only 212° of sensible heat, and in this respect combines a heat (and consequently a force) of an intensity and in such a form as dare not be applied to air.

The boilers of the steamship Atlantic evaporate 7½ lbs. of water by one of coal, that is 207·36 cubic inches of water, which by such a small amount of coal is converted into 358,-318·08 cubic inches of steam. Will one pound of coal thus expand 207 cubic inches of air to 1,728 times its original bulk at 32°? Unless it does it is more expensive than steam, and besides steam can be condensed at an expence of only three fifteenths of the power of atmospheric resistance, and air cannot be condensed at all to its original volume, until the whole of its heat is abstracted. Thus from its very nature water has many advantages over heated air—the fluid over the gas. No wonder all the Hot Air Engines hitherto invented have failed to compete with it.

We have not said anything yet about the exhaustion of expanded gases from engines, the principle and cause by which they are enabled to act; we will do so next week. It would extend this article to an undue length, to add what we have to say now, every article, however, is complete in itself.

Mechanics' Lectures.

On Tuesday evening of last week (28th ult.,) Gen. John Dix delivered a most able and appropriate lecture before the Mechanics Institute of this city. The subject was, "The Influence of Government upon the Industrial Classes." Our New York Mechanics did themselves no great credit by having so many empty seats in the lecture room.—Gen. Dix is one of the most chaste and clear speakers in our country. He sketched the history—the rise and progress—of the mechanical classes from the days of Athens' fame and Rome's glory up to the present day. He showed the importance of our mechanics having a knowledge of law and political economy, but we regret to say the intelligent few only were there to appreciate. The mechanics in New York City are not united, their efforts are conflicting, separate, and therefore feeble. If they were united in one thing, they could support one of the finest Institutes in the world.

Mechanical Papers---A Deceased Cotemporary.

We have this week to chronicle the decease of our old cotemporary, the "Farmer and Mechanic," at the end of the tenth volume. As it was of old so it is now, "the house of Saul waxed weaker and weaker, while the house of David waxed stronger and stronger." We experience no feeling of joy and none of regret in seeing that paper wrapt in the habiliments of "that sleep which knows no waking." It offers a theme to say a few words about the difficulty of sustaining periodicals devoted to any department of mechanics.—Since the Scientific American was ushered into the world, a great number of mechanical papers have come and gone. Our cotemporary just named, The Eureka, The Engineer, the Scientific Mechanic, and a number of other such papers in this city alone, have come into existence and gone out of it. "The Mirror of the Patent Office," the "Mechanics Advocate," and a number of other periodicals of the same fraternity in other places have come into being and gone out of it within the same period. It is no easy matter to establish and maintain a periodical devoted to science and mechanics, the readers of such papers are a select class—a special few in large communities. They are generally intelligent, and possess logical minds, they are the judges of what is sound and what is worthless in science, hence we have a clue to one cause why so many periodicals professedly devoted to such subjects have partially succeeded, then failed. It requires capital, talent, and great industry to make such periodicals successful. A manly dignity, independence, fearless honesty, and fairness are also characteristics which should distinguish such papers, for readers of a scientific taste cannot be fed on husks, they must have choice food or none at all. It has been our custom to pursue the even tenor of our way, without regard to what was said about us; we have never attacked a cotemporary, nor have we ever published a single letter reflecting on one of them, although we have received many to that effect; to do so would have been ungentlemanly, and we have always felt strong enough to fight our own battles. This course, with scarcely a single exception, was not pursued by our cotemporaries towards us; they seemed to gloat over a communication reflecting upon us, and always seemed to rejoice in giving the same (and they were universally false or incorrect,) a prominent place in their columns. This was oftentimes done by our deceased cotemporary, and done by an editor of a magazine who has recently vacated such a position. These things, however, never moved us, and we hope never will. We are gratified for our success, and we would have rejoiced at the success of any of our deceased cotemporaries, if they had been well conducted, but as they were conducted, they advanced no useful interest, and could not compete with superior intelligence, enterprise, and assiduity, hence they have gone down to the grave without a friend who walked by their cradles to weep over their tombs.

Reports of the Commissioner of Patents.

We are obliged to Mr. Ewbank, ex-Commissioner of patents, for copies of his reports—mechanical and agricultural—for 1851 and 1852. We have not space to notice their principal points this week, but they will afford subjects for more than one future article.

Geographical Society.

Five hundred dollars have been voted by the Board of Underwriters to the Geographical Society, at its solicitation, to be devoted to a series of magnetic observations to be made under the direction of Dr. Kane, the Arctic Explorer on his next expedition.