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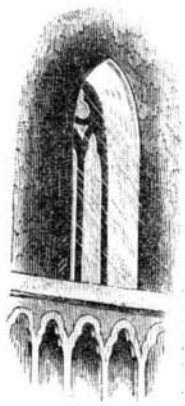
NEW YORK, SATURDAY, NOVEMBER 26, 1859.

ARCHITECTURE AND BUILDING MATERIALS.



IF there is one characteristic more than another for which the city of New York is eminently distinguished at present, it is that of architectural progress. A spirit of intense emulation pervades the minds of her princely merchants, to outrival one another in the erection of splendid structures for business purposes and family residences. We have been informed by several parties who have recently returned from Europe after extensive tours (and we believe their statements), that the buildings lately erected and those now in the course of construction in New York surpass in grandeur and beauty the most of those in any city in the Old World. If the same spirit now exhibited in this department is maintained for 50 years longer (and we see no reason why it may not for hundreds of years), all the cities of ancient and modern times will be as far excelled by the metropolis of the New World as Paris surpasses smoky Liverpool.

The personal independence of our people, and the absence of that blind adoration for *past art* which is peculiar to the older nations, are amazingly displayed in the variety of styles and originality of designs carried out in our new buildings. In the same street may now be seen an elegant structure of red sandstone brought from the valley of Connecticut; adjacent to it, another of snow-white Tuckahoe marble; close to that, one of Dorchester freestone; a fourth of cast-iron, and beside it, a handsome brick edifice. Some persons find fault with this great variety, and contend for more uniformity in the materials as well as in the styles of buildings. Such objections savor of "red tape-ism;" it is variety which imparts the continual freshness to natural scenery; and art fails to reach perfection when it loses sight of the laws of natural beauty. A city of palaces—each an imitation of the other in style and material—would be a dull and spiritless place; it might be rich and grand, but not beautiful. As different persons display their various tastes for clothing by chosing all kinds of colors and materials, so in architecture the same difference of tastes is perfectly natural, and should not be discouraged, but cultivated and extended. This is one reason why we have welcomed every new and useful material for building purposes which has been introduced, and why we have frequently alluded to the employment of iron as a building material. The first structure ever erected with walls entirely of cast-iron was put up this city in 1847; and since that period many buildings of the same metal have been put up in several of our cities. It is worthy of remark that this material was not thus introduced by the regular-bred professional men; they condemned it generally, as being unsuited for the purpose. It was asserted that it would soon rust entirely away, and that being such a good conductor of heat it would expand and contract so much and so frequently, by atmospheric changes of temperature, as to break all its joints and soon fall to pieces. Most of the great inventions have been discovered by men not reared in the arts which they improved, and they were generally opposed at the outset by those whose pursuits were revolutionized. Men educated to a certain profession are very liable to imitate those who have gone before them, rather than strike out bold and original plans for themselves. This may account for the prejudice which has existed against the use of iron in architecture by many professional architects. The first iron building to which we have alluded has just been taken down for the purpose of widening the street in which it was situated; and instead of the predictions being fulfilled which had been made regarding its failure, when erected, they have turned out to be absurdities. Not a joint of it has failed or moved a hair's breadth; not an inch of it has decayed by rust; and after standing 11 years it is as sound as when first put up, and can now be again erected in another part of the city as completely as upon its first site.

We had thought that experience and observation would have convinced our architects that their former notions regarding iron as a building material were incorrect, and that their prejudices would have been removed; but this is not the case. A discussion recently took place on this topic before the American Institute of Architects, in this city; and a periodical devoted to the art reports, with some commendation, some most unscientific and erroneous conclusions, that had been advanced against iron. We will quote a few of these to show the large class of our readers who are engaged in building pursuits, how very unsound and ridiculous are the reasonings put forth by professional architects on this important subject. "It [iron] is combustible in the fullest sense of the word; it not only loses its solidity at a moderately high temperature, but is entirely consumed by exposure to heat for a moderately shortspace of time, say the duration of a fire opposite. The only difference between iron and wood in combustion is, that wood in heat is evolved into gases which mingle with the air, which we call ashes [funny idea]; while iron absorbs a portion of atmospheric air, and when burnt forms a mass of oxyd of iron larger and heavier than its original bulk." More incorrect and unscientific trash could not have been given to the public on any subject. It is plainly asserted that iron not only loses its stability by exposure to a moderaetly high heat, but that an iron building will be entirely consumed by exposure of not long duration, to "a fire opposite," meaning the opposite side of the street we conclude. It is also asserted that iron is as combustible as wood. If what is stated above were true, there is not a stove in the country but would be converted into a mass of brittle oxyd during the first fire kindled in it. We could not have imagined that such nonsense would ever have been published, as coming from professional men. It is evident that they are wilfully stupid on this subject, or are ignorant of the nature of the materials, both chemically and mechanically. If the statements we have quoted are accepted as truths by our architects generally, then they have been guilty to an unwarrantable extent, in the recent employment of iron. If it is so unstable and so combustible, why is it employed so frequently for beams, girders and columns to support heavy walls of marble, stone and brick? If, as is asserted, it will be consumed by exposure to a moderately high heat, during a moderate space of time, why is it now so generally used in such dangerous and important positions as that of supporting heavy arches and floors? This is a serious question for our architects to settle among themselves; for if the opinions quoted are true, then very many of them have proved recreant to the interests of those whose expensive buildings they have designed and superintended.

The following are our opinions regarding the nature of iron as a building material, and we maintain that we are correct. It is not combustible in the common sense of the term, and it does not lose its stability at a moderately high temperature. No comparison should have been instituted between it and wood. It cannot be oxydized by exposure to a red heat for a whole month, except a very small scale formed on the surface. It can only be oxydized at most intense heat, when in a fluid state, exposed to the air and a strong blast in a furnace. Such a thing never can occur with iron in a building; were it otherwise, our fire-proof iron safes, our shovels, pokers, tongs, pots and pans, might as well be made of wood as iron. That such egregious errors as those mentioned were ever published in any periodical professedly devoted to architecture is enough to make the bones of Christopher Wren rattle in their coffin.

We are not pleading specially for iron as a building material. Let marble, stone and bricks have their allotted places, but we assert that iron has done more for ornamental and other improvements in architecture, during the past 10 years, than any other material. We have watched its progress, and attribute much of the ornamental improvements in all the recently-erected buildings to its influence. The richness and variety of its moldings have stimulated the workers in stone and marble to higher efforts of their art in buildings; hence, the increasing beauty of our city structures. It has been asserted that the deep cutting and the "relief" which are produced in stone cannot be effected in iron castings. This is an error; there is not a piece of stone sculpture to be found, for which we cannot find a molder to cast it in metal. Apart from the use of iron for walls and ornamental architecture, for which it is well adapted, its employment for girders, which has become so general of late, has been of great service to architecture. It permits of bold flat and other arches being erected with a facility hitherto unknown, and its great strength enables it to support heavy superincumbent walls in a manner superior to any other known material.

PERPETUAL MOTION

We publish, in another column, a very pathetic and well-told story of an inventor who, for the last 40 years of his life, was engaged in the pursuit of that most intangible of all *ignis fatui*—"perpetual motion." The story is taken from the New York *Journal of Commerce*, and thus commends itself to favorable consideration. We saw the self-same story, substantially as now published, "going the rounds" of the press some 18 months ago; and it is now revived with the sad intelligence of the inventor's death, who is represented as having eked out a scanty support by the proceeds of the exhibition of his machine. As several of our readers have called our attention to the above fact, and have sought our opinion regarding it, we will now offer a few remarks upon a subject which has racked the brain of many a misguided genius.

We have long thought the phrase, "perpetual motion," is remarkably inappropriate for expressing the idea which it is generally used to convey, and that an examination of it would lead to clearer conceptions, not only in regard to its meaning, but also in regard to the general operation of the forces of nature. It is probable that the prevalence of the category of fallacies which are recognized as "perpetual motion" is owing, in no small measure, to a want of distinct ideas of what is meant by the term. The efforts of lexicographers to define it have been singularly unsuccessful, and it is probable that there is no short form of words which will express its meaning as it is understood both by the deluded individuals who have been its victims and by the sound mechanicians who have laughed at their folly. We shall not attempt the task which has baffled the great masters of language—that of giving a brief definition of the phrase; but we may, perhaps, by a more ample exposition, succeed in arriving at a better understanding of its signification.

In the first place, the phrase is not to be understood in a literal sense, as equivalent to the meaning of the two words when taken separately. There is no difficulty in putting matter in motion, and keeping it in motion perpetually. In fact, all the matter that we know anything about—the whole visible universe—is in motion, and is probably destined to continue in motion forever. The thing which it is impossible to do is to *stop* any portion of matter from moving perpetually.

There are known in nature at least seven forces which are capable of moving matter; they are Heat, Gravitation, Muscular Power, Magnetism, Electricity, Chemical Affinity and Capillary Attraction. Whether some of these are identical with each other, and whether light and other forces should be added to the list, is wholly immaterial in this connection. Of all the forces of nature, there are three which have such superior properties for mechanical purposes that they have superseded all others for practical use. These are gravitation, heat and muscular power. It is very easy to apply heat and gravitation to matter under such conditions that they will move it perpetually. The heat of the sun expands water into vapor, which floats away in the atmosphere to the tops of the hills, where it is condensed by the cold, when gravitation draws it down the sides of the hills to the sea. If a wheel is placed so that the running water may properly act upon it, it will cause it to turn as long as

the material lasts; and if the material is indestructible, the wheel will turn forever. Thus is unceasing motion produced by a combination of heat and gravitation. Heat alone will also cause a wheel to turn continually. Delicate clockwork has been so connected with a very long iron bar that the expansions and contractions of the bar, from the varying temperatures of day and night, have kept the clockwork in constant motion. Gravitation also produces a mechanical motion without interruption or end. The tides are caused by the alternate attraction of the moon and earth; the attraction of the moon raising the water, and that of the earth drawing it back to its level. By having a large wheel to pump water into a reservoir during the hours in which the tide is flowing, and by then drawing the water from the reservoir to turn a small wheel, there is no difficulty in constructing a tide mill that will never stop. Even muscular power causes motions which, if they resulted from some of the fallacies which have been tried, would be recognized as "perpetual motion." It is not very uncommon for the human heart to beat day and night, without a moment's cessation, for more than 80 years.

What is it, then, that the seekers of "perpetual motion" have attempted to do? Have they attempted to move matter without exerting any force upon it whatever? Not at all. Probably not one of the most stupid numskulls who have pursued this phantom has ever thought that he could induce a mass of inert matter to start from a state of rest, without directing the action of some force upon it. One of the most common plans for "perpetual motion" has been the swinging of a pendulum; that is, by the simple power of gravitation. Now, motion is produced simply by this power in the case of the tide mill, as we have seen. But the tide mill is constructed in accordance with the laws of motion, and the pendulum of ceaseless vibrations is not. This, then, appears to be the distinction: A continual motion of matter which is effected by arrangements made in accordance with the laws of nature is not, technically, "perpetual motion;" but the phrase is applied exclusively to attempts to produce such motion by means which are *not* in accordance with the laws of nature. Indeed, the phrase is very generally, if not universally, applied to all mechanical fallacies. We recently examined a steam-engine, which had been built at considerable expense, and in which the inventor supposed that he was going to multiply the power of the steam because he applied it at the periphery of a wheel and connected his mechanism with the shaft, thus getting a "leverage." This would no doubt be generally regarded as belonging to the class of fallacies which are all embraced under the term which we are considering. Even the plan for propelling a boat by a man sitting in the stern and blowing with a bellows against the sails will, we presume, be universally regarded (because no motion can thus be produced) as a perfect illustration of the fallacy of "perpetual motion;" although, if motion were thus produced, it would not be perpetual.

If we are correct in our apprehension of the meaning which the term "perpetual motion" has acquired in the community, it signifies *a popular fallacy*—an attempt to produce or increase motion by means which are manifestly absurd or unsound—which are not in accordance with the properties of matter and the laws of nature. Hence, it follows that a machine which does actually operate, may be in motion perpetually, but it cannot be, technically, "perpetual motion." So twisted has the meaning of this word become, that "perpetual motion" actually means motion which will *not* be perpetual. If Mr. Hendrickson (the hero of the story alluded to in the first paragraph of this article) constructed a machine which moves constantly, he has, most assuredly, constructed it in accordance with sound mechanical principles, and has subjected it in a proper manner to the action of one or more of the forces of nature; and, in doing this, he has done no more than wise mechanics have done for thousands of years. But if he has been wasting many years in building a machine which he supposed would operate, but which will not, then has he been a victim to the pursuit of "perpetual motion."

SUBSCRIBERS who write to us for information will please to observe our rule to give us their names—not for publication, but as an evidence of good faith on their part. We will not answer letters of inquiry unless this request is observed.

A REMARKABLE METEOR.

One of the largest and most brilliant meteors ever seen passed directly over this city at 9½ o'clock, on the morning of Nov. 15th. Its course was in a S. S. W. direction, and was observed for more that 150 miles—from the neighborhood of New Haven, Conn, to that of Absecum, N. J. It seems to have thrown off red-hot scales in its flight till it arrived over the south-east corner of New Jersey, when it exploded with a shock that shook the ground like an earthquake.

The passengers in the stage between Middletown and New Haven, in Connecticut, saw a fiery ball descend to the earth, apparently a few hundred yards from the stage. Search was made for its traces, but none were found. In the upper part of this city it was witnessed by several policemen and by numerous other persons.

Sergeant Clinton states that he was engaged in writting at his desk, near a window in the station-house in Eighty-sixth-street, about 9½ o'clock on the above morning, when suddenly a flash of light, as from an ascending rocket, was reflected upon the desk, which caused him instantly to cast his eye from the window, when he perceived an immense ball of fire of striking brilliancy, and in size as large as a cannon ball, with a tail some 30 feet in length, resembling that of a comet, which, while passing through the air, left behind a fiery trail. It appeared to be shooting in a direction from the north-east to the south-west, and instantly disappeared, apparently striking the earth some 200 yards from the station-house. Officers Cavanah and Wright, who were within a few feet of the station-house at the moment, also saw the meteor, the appearance of which struck them so forcibly with amazement as to cause them to alarm others who were within the building, but who, of course, did not perceive it, owing to its sudden disappearance. The officers who, to the number of four or five, went in search of the spot where the meteor is supposed to have fallen, state that the excitement among the residents of that neighborhood (many of whom witnessed the occurrence) was very great, and that it was impossible to arrive at any correct conclusion as to the precise place where it fell, from the conflicting accounts given on that point. Mr. C. H. Reed, acting in the employ of the Commissioners of the New Reservoir, states that he was on the pier at the foot of Ninety-first-street (E. R.), unloading lumber, when his attention was attracted by the singular appearance of a ball of fire shooting swiftly through the air, apparently in an E. S. E. direction. He called the attention of the workmen to it, who appeared to be struck speechless with wonderment. Officer Flynn, of the Central Park Police, states that he was patroling the "promenade" within the park at the time, when he perceived what appeared to him to be a ball of fire, having a tail like a comet. He says he saw it disappear behind the trees, but thinks it fell within the park enclosure. John Berry, one of the laborers in the park, confirms the above statements as to the appearance of the object and the time specified. A man in a schooner on the North river saw a fiery ball strike the water about 50 yards from his vessel.

About the time above-mentioned (9.30 A. M.), a rumbling noise, accompanied by a perceptible trembling of the ground, was experienced all along the line of the Camden and Atlantic Railroad, from White Horse station to the beach. The noise was heard for about two minutes, and some persons thought it resembled a heavy powder explosion. A passenger, who got on the train at Absecum, stated that he had seen a large red ball, which flew across the sky and burst into fragments.

IRON AND WOOD FOR SHIPS.

In directing attention recently to the rapid increase of foreign iron steamers, we stated that they cost less than wooden steamships; and we exhorted all those interested in this very important question to look to this field for regaining our lost commerce. Since the article referred to was published on page 305 of the present volume of the SCIENTIFIC AMERICAN, we have received several letters from shipbuilders (some of whom are highly distinguished for ability) in which some exceptions are taken to our remarks. They contend that wood is both cheaper and better than iron for constructing vessels. They say: "Iron is cheaper than timber in England, and is therefore the most economical material for building steamers in that country; but the reverse is the case here—we import our iron, our wood is cheaper, and it is therefore the best material we can use."

The opinion we expressed was that iron screw steamers were built in England cheaper than wooden vessels of the same character anywhere. We had been told that this was the case, and were somewhat cautious in accepting the information; and from further inquiries, we are convinced that no mistake was committed. The important question for consideration is, not that wood is now cheaper than iron in New York, for such purposes, but is iron cheaper anywhere? and if so, then it becomes us, as a progressive and enlightened people, to see if we cannot get it as cheap as the people of England. We know that wood never can become cheaper, but will always be rising in price; whereas, we are aspositively certain that great improvements may be made in the manufacture of iron, to render it much cheaper than it is at present. Unless our naval architects and shipbuilders embrace such views, we shall make no progress—we will go behind.

It is somewhat singular that, during the time we were penning our remarks on the article in question, a letter from our distinguished shipbuilder, Donald McKay, of Boston, was on its way from England, containing views very similar to those which we had published. This letter will be found on another page, and we invite attention to the information contained in it.

SEWING-MACHINES AND THE AMERICAN INSTITUTE.

MESSRS. EDITORS:—Some of our friends not seeing the Wheeler & Wilson sewing-machine named in the premium list of the American Institute, published in your last issue, inquire what position it occupied. We beg to inform them through your columns, that the Institute, as usual, awarded our machine the highest premium for family use and for manufactures in the same range of purpose and material. To be sure, no medal was awarded to our machine this year, for the reason expressed in your last number, that the Institute award the same class of medal but once on the same machine, and ours has received medals at previous exhibitions. The committee arranged the machines in four classes, according to general merit, and accorded us the first place in the first class.

This award has been so general and uniform at various fairs throughout the country, for several years, that it may be regarded as embodying the well-established public opinion.

WHEELER & WILSON MANUFACTURING CO.

New York, Nov. 16, 1858.

REMOVING MILDEW FROM LINEN.

MESSRS. EDITORS:—I observed, on page 283, present volume of the SCIENTIFIC AMERICAN, a call on your lady readers for an efficient and simple remedy for removing mildew from white clothes. Let me observe, in the first place, that clothes do not mildew except in what are generally termed "dog days," at which time the remedy is always at hand. First steep the clothes in salt and water for a few minutes, then take as much of the juice of tomatoes as is sufficient to cover the parts affected; steep 24 hours, then wash out with soap and water, and let the clothes dry. The same remedy will also remove the stains of copperas-water.

Mrs. H. S.

Carnelton, Ind., Nov. 20, 1859.

GREAT STORMS AND SHIPWRECK.—By recent news from Europe we learn that the British coast had been visited by very severe storms, by which many vessels had been wrecked. One of the most heart-rending on record was that of the steamer *Royal Charter*, which had made a most successful and rapid passage from Australia, with about 500 passengers and 79,000 ounces of gold. Everything went well until she had nearly reached Liverpool, when she was overtaken by the tempest and driven upon the rocks. Out of the whole number of passengers only 39 were saved; all the rest perished; it is said, within only *ten* yards from the shore! The scenes on board during the last hour were painful beyond description.

TURNING IRREGULAR FORMS.—It having been claimed for old Sir M. I. Brunel that he had invented a machine for turning irregular forms, as stated on page 241 of the present volume, a correspondent, writing to us from Boston, asserts that it has been decided in several patent suits that Brunel's machinery, erected at Portsmouth, England, for turning ships blocks, as described in English encyclopedias, cannot turn irregular forms.