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VOL. III., No. 6.....[NEW SERIES.]....*Sixteenth Year.*

NEW YORK, SATURDAY, AUGUST 4, 1860.

THE SEVEN WONDERS OF THE WORLD—AND THE LAST.

THE *Great Eastern* has been called "the eighth wonder of the world," but a brief comparison with the others and a consideration of the several elements which enter into its structure will show that it is a far greater wonder than any of the marvels of early days. The seven great works which so excited the admiration of the ancients that they called them "wonders of the world" were as follows:—

1st—The Egyptian Pyramids. The largest of these is 693 feet square and 499 feet high, and its base covers 11¼ acres of ground.

2d—The Mausoleum, erected to Mausolus, a king of Caria, by his widow, Artemisia. It was 63 feet long and 35 feet high.

3d—The Temple of Diana at Ephesus. This was 425 feet in length and 220 feet in breadth.

4th—The Walls and Hanging Gardens of Babylon. These walls are stated, by Herodotus, to have been 87 feet thick, 350 feet high, and 60 miles in length; and this statement is deemed credible by modern antiquarians.

5th—The Colossus of Rhodes. This was a brazen statue of Apollo, 105 feet in hight, standing at the mouth of the harbor of Rhodes.

6th—The Statue of Jupiter Olympus, at Athens, which was made of ivory and gold, and was wonderful for its beauty rather than for its size.

7th—The Pharos of Ptolemy Philadelphus. This was a light-house 500 feet high, on the island of Pharos at Alexandria, in Egypt. A fire of wood was kept burning on its summit during the night, to guide ships to the harbor.

As mere masses of matter, a small mountain surpasses any or indeed all of these works combined, and of course, the only reason why they excite our admiration or interest is in the circumstance that they are the work of *our race*; they are splendid triumphs of human intelligence and power. But in this point of view how completely they sink into insignificance when compared with the *Great Eastern* steamship! How vast is the mass of accumulated knowledge that has been used in the construction of this fabric! It is said that $500,000 were expended in experiments to determine the proper thickness of the iron plates to be used in the several parts of the Menai Bridge; and that bridge was very literally the harbinger of the *Great Eastern*. But these experiments furnished but an inconsiderable fraction of the knowlege of materials which has been employed in this structure. The engineers would have deemed it an unpardonable neglect for them to have been ignorant of the results of any of the numerous experiments which have been made in various parts of the world to test the strength or any of the properties of any materials which might possibly have been nsed in any part of the fabric. None but those familiar with inventions in this department can form any idea of the immense amount of study and experiment which have been devoted to the smelting, the hammering, rolling, heating, bending, punching and shearing of iron. With all this accumulated knowledge, how great was the mental labor required to determine the form and dimensions of every one of the numerous beams, and of the thousand plates in this ship! Such would be the comparison of the great vessel with other works, if she were to remain stationary on solid foundations; but the 12,000 tuns of iron of which she is composed are destined to *float* on the liquid ocean; she is to plow her way through the billows, to rise and fall with the tide, and to pass her life as a drop of the sea! It is in the knowledge and thought which have been combined to produce and direct this motion, that the *Great Eastern* leaves the works of ancient wonder entirely out of comparison. In order to determine the size of the boilers, conducting pipes, valves and air-pumps, how numerous, careful and laborious have been the experiments upon the evaporation of water, the pressure of steam at various temperatures, the absorption of incondensible gases by water, and the hundreds of other matters which we have not space even to enumerate.

The perpetual interest and wonder excited by the *Great Eastern* is in the vast volume of embodied thought that is embraced by her iron ribs. And yet all this is surpassed by the knowledge of the stars which are to direct her course. How enormous has been the amount of intellectual labor, devoted by the greatest minds that the world has ever known, to those investigations of astronomy which have brought the art of navigation to its present state of perfection! In the bold genius which conceived the enterprise—in the long accumulations of money which furnished the capital—in the acquisitions of knowledge and grasp of mind which planned her complicated structure—and in the sublime science which, by observation on the distant heavenly bodies, is to guide her pre-determined way over the pathless ocean—the iron ship which now lies at the foot of Hammond-street, in this city, is the greatest conquest of intellect over inanimate matter and the blind forces of nature that has ever been achieved by the human race.

METEORS—WHAT ARE THEY?

There is no room left for reasonable doubt that meteors, such as the one which passed over this city on the evening of the 20th of July, are small planets, rushing through space and probably revolving around the sun. Of the several explanations which have been suggested, no other has the slightest degree of plausibility, while this is in accordance with all the facts and is confirmed by every new observation. There are records of the appearance of hundreds of these bodies, large numbers of them having exploded and sent fragments to the ground. It is estimated that the one which passed over Ohio on the 21st of April last, was three-eighths of a mile in diameter. Of the several fragments which it cast to the earth, the largest weighs 103 pounds, and others 40 and 50 pounds apiece.

The one which passed over this city on the 20th ult., will be forever memorable in the history of these remarkable bodies. In the first place a better account will be procured of it than has been obtained of any of its predecessors. It appeared in the evening of a clear night when it was most likely to be seen—it passed at a great hight so that it was visible over a wide area—and it came within the observation of the most intelligent community in the world. There is hardly a village from which it was seen that does not contain one or more persons competent to collect the testimony from the spectators, and thus ascertain its distance from the zenith at its greatest elevation. From these numerous and scattered observations its distance from the earth will no doubt be ascertained with a degree of accuracy which has never before been equaled, and a judicious sifting of the testimony will probably permit a pretty close estimate of its size. From the best accounts that we have yet seen, we calculate its hight at 38 miles, and its size at a little more that three-fourths of a mile in diameter, but these results are to be verified by comparison with all the other statements. It was probably the largest meteor that has ever been seen.

If the statement of its zenith distance, given in the Providence *Journal*, is correct, it would seem to have been rapidly approaching the earth, and may have fallen either into the Atlantic Ocean or upon the continent of Africa. People have been repeatedly hit and killed by the falling fragments as they struck the earth: and if the whole mass of one, half a mile in diameter, should hit a great city in its diagonal descent, what awful havoc it would make! The danger of this calamity it is true is very small indeed, but if one of our elderly real estate owners could have seen this huge mass of matter of the 20th, when it was a million of miles away on its apparently straight flight exactly towards us, he would have thought that it was pretty close shooting, and would probably have drawn a long breath when it had passed. It will be remembered too, that this is the second of these flying rocks that has passed directly over the city within a year. The one of the 15th of November, 1859, would have attracted as much notice as the last had it passed in the evening instead of at half-past nine in the morning. Its light was so intense that it made a bright flash in the clear sunlight, and its explosion over the southern part of New Jersey was mistaken for an earthquake.

If the meteor of the 20th did fall into the Atlantic Ocean, the effect ought to have been observed in the self-acting tide registers of the Coast Survey, if in no other way.

It has been supposed, heretofore, that the heat of these little planets was produced by the resistance of our atmosphere as they traversed it with their immense velocity; though such rough observation as has been made of several would seem to indicate that they became luminous and exploded beyond the limits of our atmosphere. As these explosions were accompanied, however, by loud reports, which it was impossible to believe could have been propagated where there was no air or other medium, a natural suspicion was thrown on the accuracy of the observations. This discussion causes great interest to attach to the problem of ascertaining positively the hight of these bodies above the earth, and makes it desirable that all spectators who chance to see one should make the proper observations for this purpose.

The most important of all circumstances to be carefully noticed when a meteor is seen, is either its distance from the zenith, or its distance above the horizon, at its greatest elevation. This may be obtained with considerable accuracy whenever the meteor chances to come in a line with any terrestrial object, such as a tree or building, by noting exactly the part of the object with which it ranges and carefully remembering this, to be measured with instruments afterward. A person who knows the principal stars may adopt a still better plan, by observing the stars which it passes in its flight, especially at the point of its greatest elevation above the horizon. This is the most valuable of all observations of meteors which can be made, for if only two such are made at the same distance on each side of the meteor's track, they will give its hight from the earth with accuracy and certainty. If the size is given as compared with any terrestrial object, as a man's hat, the apparent distance from the earth in feet or miles should accompany the statement, as the former without the latter has no meaning. The time of day, the direction of flight, the color, and everything connected with the startling phenomenon should also be noticed coolly and accurately, carefully written out, and forwarded either to the SCIENTIFIC AMERICAN, *Silliman's Journal*, Professor Henry, of the Smithsonian Institute, or to the nearest college. In this way the American people will contribute their share towards obtaining a full knowledge of these mysterious bodies which so frequently come in close proximity to the earth, or in actual contact with it, in their swift flight through space.

SELF-ACTING CONTINUOUS RAILROAD BRAKES.

On page 40 of the present volume of the SCIENTIFIC AMERICAN we published an illustrated description of a self-acting continuous brake for railroads, by which all the cars in a train could be arrested by the engineer without the assistance of brakemen. A case has lately been decided in England, in which the value of such a brake is made evident to our minds. On the 30th of May last, an excursion train (consisting of 35 carriages), on the Great Northern Railroad, returning from Liverpool, when it came to the London terminus, instead of stopping, dashed along at full speed through the station and actually leaped on the platform at the end of it, a hight of six feet, carrying with it the tender and two carriages, and, proceeding on its fearful and precipitous course, ran down the inclined plane, immediately under the dock, and across the old St. Pancras road, where it burst through the inclosure of the Metropolitan Railroad

Works. The engine, tender and brake were completely destroyed, and the other carriages more or less injured. Many of the passengers sustained serious wounds and contusions. It was found that the guard had firmly applied the first brake, but the second brake showed it had only been partially applied. It was then discover d that the guard was in a state of intoxication, and he was taken into custody. One of the sufferers in this case has obtained damages amounting to about $13,000. The brake to which we have referred, had it been on this train, could have been applied effectually by the engineer, altogether independent of the drunken brakesman.

THE AMERICAN ENGINEERS' ASSOCIATION.

On Monday evening, July 18th, the fifth monthly meeting of this association was held at its room in the Cooper Institute, this city; H. E. Rhoeder, chairman *pro tem.*; John C. Merriam, secretary.

After the transaction of considerable miscellaneous business, the members proceeded to the examination of some

NEW INVENTIONS.

Improved Cut-off.—Mr. Hopper exhibited what he considered an improvement on the Stevens cut-off. The peculiarity and advantage of this cut-off is that it is successful in lifting the valve more rapidly than all others, and that it can be easily changed while the engine is in working condition. Mr. Hopper affirmed that the Stevens cut-off was never properly adjusted, excepting in one instance, on the frigate *Mississippi*, and that he regarded in the light of an accident.

Anti-pressure Valve.—Mr. Beech exhibited what he considered an improved valve for locomotives. The great advantage claimed was, it was so peculiarly arranged that it had no weight bearing down upon it besides that of the pressure of the atmosphere, and that, in its application to the reversing of an engine, it would be superior to any in use. To demonstrate its utility, Mr. B. explained that experiments had placed him in possession of some facts, in relation to the power requisite to move the common long D-valve at different pressures, that were highly interesting. A force of 20 lbs. was required to move the valve without pressure; at the pressure of 60 lbs. steam, it required 1,350 lbs.; and at 100 lbs. pressure, it required 3,700 lbs. He said the valve by which the experiments were made possessed an area of 9½ by 17 inches.

Both of these inventions were referred to the appropriate committee, and, when reported upon, will receive further attention from us.

The subject of "Expansion" was then introduced, and the following is the *gist* of the

DISCUSSION.

Mr. Merriam—I have a question to ask the members, which is not to be answered to-night, but only upon mature reflection. It is this:—If steam, at 60 lbs. in a cylinder, be cut off at one-half stroke, what will be its pressure at the end of the stroke, not taking into consideration any loss for condensation or friction?

Mr. Koch—I presume the gentleman means this as a theoretical question. I consider it one of some importance, and hope the members will earnestly ponder upon it, and give us, at next meeting night, the results of their individual deliberations.

Mr. Merriam—It is a purely theoretical question.

Mr. Beech—For the information of members, I will state what I am confident is a fact, my observations extending through a series of 10 years. If you have 40 lbs. of steam in a locomotive boiler, the water occupying a space equal to one-half its cubic contents, and you blow-off this water, you will, upon examination, find from 25 to 30 lbs. of steam remaining after the entire body of water has been run out.

Mr. Montgomery—I have had occular demonstration that when the cut-off of a locomotive engine was used, the speed of the engine would instantly increase, and again diminish when taken off.

Mr. Beech—I coincide with Mr. Montgomery in this particular, as it is proved to me almost every day.

A remark was made that the Polytechnic Association had approved of the results arrived at in the late experments at the Metropolitan Mills, where it is claimed that cut-offs are useless appendages, which remark called forth—

Mr. Johnson—In behalf of the Polytechnic Association, I disclaim the assertion that the society has accepted the idea that cut-offs are of no value. The association have merely referred the question to a special committee, who will report at the first meeting in September.

After a few more unimportant remarks, the meeting adjourned.

RECENT AMERICAN INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

SEPARATOR.

This invention relates to that class of machines for scouring, cleaning and separating grain from impurities, and also detaching and separating the hulls therefrom, in which the fan is used to produce an exhaust or suction blast. This class of machines as heretofore constructed are imperfect in many respects. First, the scouring devices have been so arranged as to operate in a very inefficient manner, some grains or kernels escaping the action of the scourer, while others would be subjected to an undue action of the same, and be bruised or broken. Second, the use of materials contrived or arranged in such a way as to produce bad results, as for instance the employment of French burr stone for a scouring surface, without the employment of suitable flues to carry off the dust and prevent clogging or choking. Third, a defect in the arrangement of the air-passages, whereby the blast is made to act in an inefficient manner in passing through the machine. Fourth, due provision not being made for the taking of the machine apart so as to render all parts accessible for the ready repairing and cleansing of the same, and to facilitate transportation. The object of this invention is to obviate these difficulties by a simple, durable and economical machine, the credit of which is due to A. J. Vandegrift, of St. Louis, Mo.

TERRESTRIAL GLOBES.

James Monteith, of New York City, has just received a patent for an invention designed to aid teachers in explaining the influence of the attraction of gravitation, and this invention consists in the employment in combination with a terrestrial globe, of one or more figures attached to the center of the globe, each with an elastic cord or spring of proper length to pass through the shell and hold the figure against the outer surface of the globe.

Simultaneously with the above patent, the same inventor has received another for a mode of constructing either a terrestrial or celestial globe in hemispheres, hinged together in such a manner as to be capable of being thrown open for the exhibition of the world or firmament in the hemispheres side by side, or closed for the exhibition of the world in its natural condition, or the firmament as a perfect sphere at the pleasure of the teacher. It also consists in a certain mode of combining a suspending cord with the so-divided globe whereby it may be suspended either in an open or closed condition and kept in either condition by means of the said cord.

PUNCHING MACHINE.

This invention relates to certain improvements in machines for punching metal plates, and is more especially designed for making hoop locks, for connecting or fastening the ends of metal bale hoops. The invention, however, may be applied to all punching machines, and will be useful in all cases where metal is operated upon by punches. The invention consists in a novel means employed for compensating for the wear of the dies, whereby the usual trouble attending the raising and adjusting of the dies is avoided. The invention also consists in a peculiar means for rendering the punches inoperative without stopping the driving shaft of the machine, and thereby facilitate the manipulation required in presenting the work to the machine. The inventor of this improvement is Charles Hughes, of New Orleans, La.

BRIDLE-BIT.

This invention has for its object the restraining or controlling of vicious horses and other animals which are used with a bridle and bit, by checking respiration. To this end there is made a bit of jointed cross bars, having at one end arms provided with buttons, which, when the bit is adjusted in the mouth of the animal, will be just above the ends of the nostrils; the opposite end of the cross bars having the reins attached. By this arrangement, the buttons may at any time, by pulling sufficiently hard on the reins, be made to bear on the nostrils of the animal and close them, thereby effectually checking respiration, and placing the animal under the complete control of the rider or driver. This improvement was designed by W. F. and W. R. Johnson, of Wetumpka, Ala.

MOLD FOR NEEDLE-THREADERS.

Needle-threaders, or devices for the purpose of facilitating the threading of needles, have heretofore been made of ivory, and the price of these neat and handy implements has been so high, that it has been impossible to sell them extensively and to introduce them amongst the poorer clases of the people where they are most needed. The object of this invention is to produce needle-threaders in such a cheap manner that the poorest seamstress can afford to buy one of them, and this invention consists in arranging a mold with sliding pointed pistons and with suitable cores and core-pins, in such a manner, that a needle-threader with all its recesses and holes can be cast, and that nothing remains to be done but to fasten a small metal plate in front of the threader in order to render it complete and ready for use. This device has been patented to S. S. Burlingame, of Warwick, R. I.

WATER METER.

The object of this invention is to arrange all the parts necessary to effect the change of the valve or valves in the interior of a closed cylinder so as to require no packing, and dispense with all the stuffing boxes, with the exception of one on the end that serves to operate the registering apparatus. With this object in view a single piston is arranged in the interior of a closed cylinder which contains a series of levers arranged in such a manner that the piston as it arrives at either end of the stroke, by pulling on or pushing against said levers, causes the valves to change. The levers are arranged on the principle of toggle arms, and they connect with the valves so that whenever the piston acts on the levers, the change of the valves is made instantaneously, thereby cutting off the water from one and admitting it to the other side of the cylinder. Four valves are used, which are secured to the same stem, and which perfectly balance each other. The inventor of this device is Gerard Siekles, of Roxbury, Mass.

WATCH.

We omitted last week to mention an ingenious improvement in watches &c., patented by O. H. Woodworth, of Coffeeville, Miss. This improvement consists in enclosing the movement of a watch or other time-keeper within a case which is permanently air-tight not only during the ordinary running of the movement, but while it is being wound up or regulated or having its hands set. The principal object of the invention is to exclude dust from the movement; but by producing a vacuum within the movement, the oil used for lubrication is prevented from becoming dry or gummy.

A Novel Method of Preserving Fish.—Mr. Brown, of Troy, N.Y., has discovered a rather novel and sure method of preserving fish, sweet, and with their original flavor, during the excessive heat of summer. He takes a large cake of ice, and after having bored a hole large enough to suit the purpose, he deposits the fish in it, and closes up the aperture made by means of a plug of ice. This shortly freezes, and makes the whole a solid mass, ready for transportation to any desired point. Fish preserved in this way will last for ten or twelve days, or as long as the ice will remain in an unmelted state. This method of preserving fish and game is of great use when they are about to be sent away, and will probably supersede the old method of packing in ice and sawdust.

Bread Excitement.—There is at present considerable excitement in Savannah, Ga., because of the refusal of the bread-bakers of that city to comply with a city ordinance which requires the City Treasurer, at the beginning of every month, to ascertain, from the best authority, the average price of flour in the city for the month previous, and thereby to regulate the size of bread for the month ensuing on such terms, in all instances, as shall secure a profit of $4.50 per barrel to the bakers. The bakers rebel against the enforcement of the law, and continue to make their loaves of the size which will give them the greatest profit.