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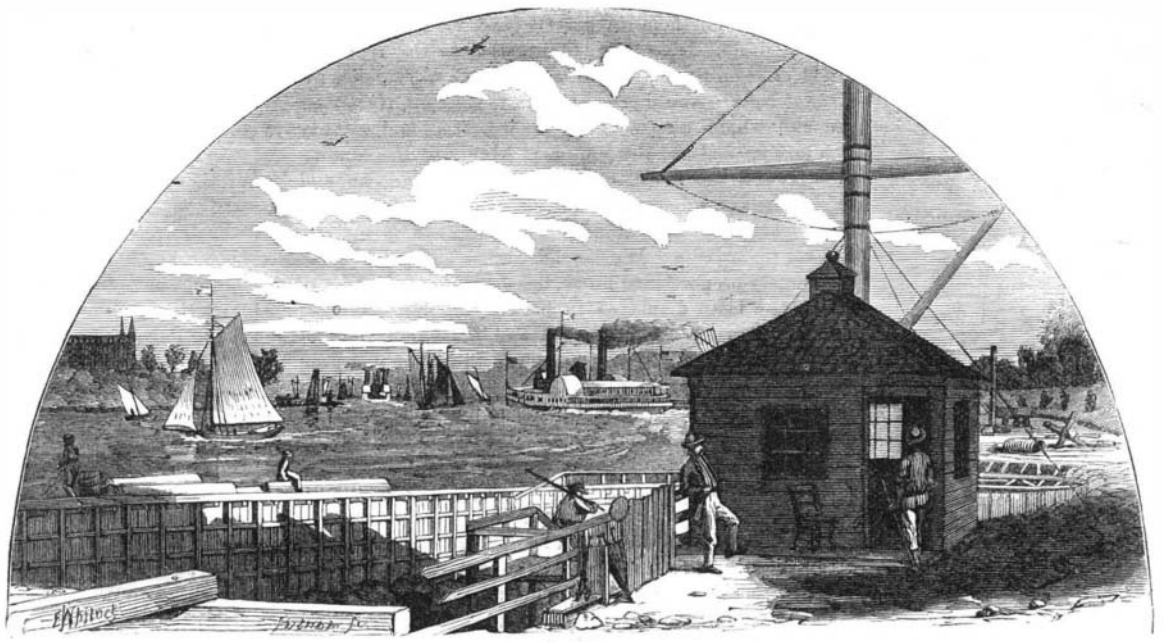
HELL GATE IMPROVEMENT.

During the last twelve months, the work of excavating the rock which forms the great obstruction to entering the East River by way of Long Island Sound has been progressing steadily, but very slowly, on account of an unwise delay on the part of Congress in furnishing the necessary funds. The interest on the money already expended on this important operation amounts to a large sum annually, and hindering the progress of the work, by only doling small sums in a niggardly and parsimonious manner, is surely unwise, and ultimately will be expensive. However, the carrying out of the work, under the able superintendence of General Newton, leaves little to be desired; and as public interest in the matter has been in no way diminished by the delay, a short description of the work will be acceptable to our readers.

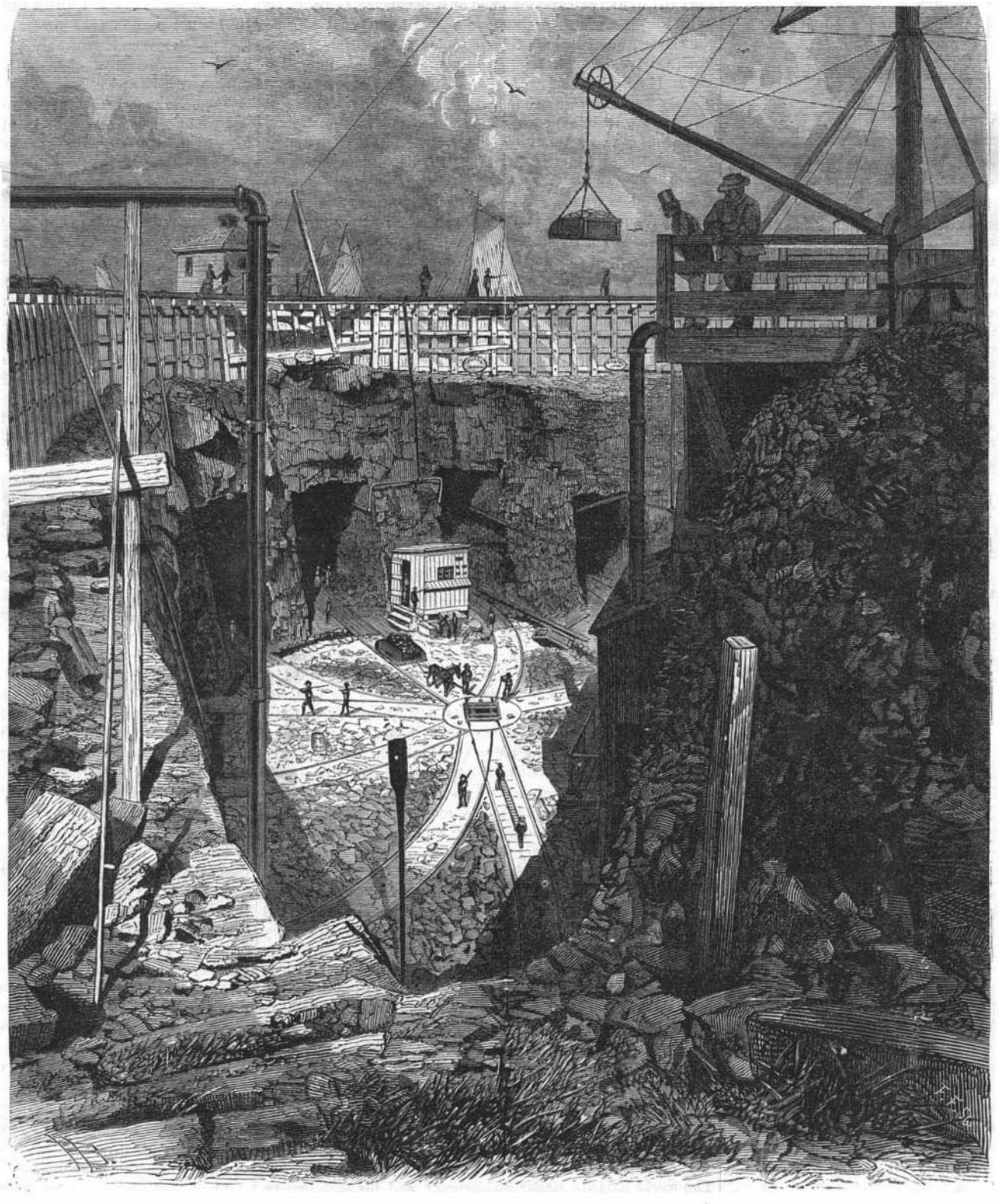


VIEW OF HELL GATE FROM TOP OF COFFER DAM.

The large central shaft, shown in our larger illustration, has been sunk at the extreme edge of Hallett's Point, the rocks of which are bare at low water. The hole is 32 feet deep, and is surrounded by a coffer dam, on the parapet of which persons are shown walking. From this shaft, ten headings or tunnels radiate, under the rock which it is proposed to remove, and these are connected by galleries, circular in form and concentric with the center of the shaft. From these headings and galleries, twenty-eight smaller headings have been driven, and altogether the immense area of twenty-two and a half acres have been undermined, a mile and a half of tunneling having been executed.

To perform this labor in safety, of course the superincumbent rock must be in no danger of falling; and to ascertain its thickness all over the area, soundings at a distance of one foot only from each other have been made all over the rock that is to be removed. Twenty-two thousand times has the lead been sunk in this work; and in places where shale was met with, the sounding instrument was driven through to the bed rock by boring.

The consumption of blasting materials has been very large. Nitro-glycerin has been much used, but latterly vulcan powder, made by mixing 30 parts nitro-glycerin with 70 parts gunpowder, has been employed. Explosives equivalent to 100,000 lbs. nitro-glycerin have already been consumed. For the final burst, which is to rend asunder all the columns and walls of rock between the tunnels, and let the roof fall, 40,000 lbs. nitro-glycerin, it is said, will be required.



THE HELL GATE SUBMARINE OPERATIONS

It is expected that the work will be completed, and the channel open to vessels drawing 26 feet of water, by August 1, 1876.

Remarkable Effects of Arctic Cold on Man.

Lieutenant Payer, the Austrian arctic explorer, has been laying some of the results of his explorations before the Geographical Society of Vienna. Referring to the influence of extreme cold on the human organism, he related that on March 14, 1874, he and his companions made a sledge journey over the Semiklar glacier, in order to make observations of Francis Joseph Land. On that day the cold marked 58° Fah. below zero Notwithstanding this intense cold, M. Payer and a Tyrolese went out before sunrise to make observations and sketch.

The sunrise was magnificent; the sun appeared surrounded, as it does at a high degree of cold, by small suns, and its light appeared more dazzling from the contrast with the extreme cold.

The travelers were obliged to pour rum down their throats so as not to touch the edge of the metal cups, which would have been as dangerous as if they had been red hot; but the rum had lost all its strength and liquidity, and was as flat and thick as oil.

It was impossible to smoke either cigars or tobacco in short pipes, for very soon nothing but a piece of ice remained in the mouth.

The metal of the instruments was just like red hot iron to the touch, as were some lockets, which some of the travelers, romantically, but imprudently, continued to wear next the skin.

M. Payer says that so great an amount of cold paralyzes the will, and that, under its influence, men, from the unsteadiness of their gait, their stammering talk, and the slowness of their mental operations, seem as if they were intoxicated.

Another effect of cold

is a tormenting thirst, which is due to the evaporation of the moisture of the body.

It is unwholesome to use snow to quench the thirst; it brings on inflammation of the throat, palate, and tongue. Besides, enough can never be taken to quench the thirst, as a temperature of 35½° to 58° below zero Fah. makes it taste like molten metal. Snow eaters in the North are considered as feeble and effeminate, in the same way as is an opium eater in the East.

The group of travelers who traversed the snow fields were surrounded by thick vapors formed by the emanations from their bodies, which became condensed, notwithstanding the furs in which the travelers were enveloped. These vapors fell to the ground, with a slight noise, frozen into the form of small crystals, and rendered the atmosphere thick, impenetrable, and dark.

Notwithstanding the humidity of the air, a disagreeable sensation of dryness was felt.

Every sound diffused itself to a very long distance, an ordinary conversation could be heard at a hundred paces off, while the report of guns from the tops of high mountains could scarcely be heard. M. Payer explains this phenomenon by the large quantity of moisture in the arctic atmosphere.

Meat could be chopped, and mercury used in the shape of balls.

Both smell and taste become greatly enfeebled in these latitudes; strength gives way under the paralyzing influence of the cold: the eyes involuntarily close and become frozen.

When locomotion stops, the sole of the foot becomes insensible.

It is somewhat curious that the beard does freeze; but this is explained from the air expired, falling, being immediately transformed into snow. The cold causes dark beards to become lighter; the secretion of the eyes and nose always increases, while the formation of the perspiration altogether ceases.

The only possible protection against the cold is to be very warmly clothed, and to endeavor as much as possible to prevent the condensation of the atmosphere, while the much vaunted plans of anointing and blackening the body are pronounced to have no real value.

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NEW YORK, SATURDAY, AUGUST 21, 1875.

Contents.

(Illustrated articles are marked with an asterisk.)

THE USES OF NATURE.

Nature has kindly filled the world with attractions which are rich enough to suit the tastes of the most fastidious, and varied enough to gratify the wishes and supply the wants of all. These were made for those who need them and would be benefited by them; and it is but justice to such to protest against the practices of those who monopolize the places of popular resort, and uses them only for the sake of personal gain.

At Niagara, for instance, not one of Nature's wonders, that is capable of being concealed can begin to attract attention, before man's cupidity closes it from view, or obstructs the way to it and says: "You can't see Nature's exhibition till you pay me for it." So at Natural Bridge, a grasping individual has built a high, close fence around all the places that command a good view of that grand structure, and he must be paid before the benevolence of the God of Nature can be enjoyed. At every eligible locality on the sea beach, at mineral springs, on mountain peaks, hotels are erected and the appearance of the place is modernized till men have destroyed, as far as in them lies, the primitive beauty and wild grandeur of Nature. But the places are made attractive and convenient for visitors, and should not be too severely criticised

All these instructive and ennobling works of Nature are so manifestly designed for the free benefit of all that no man can appropriate them to private use, to the exclusion of others, without doing a gross injustice to the rest of mankind. The spirit that leads men to such perversion of the gifts of Nature would prompt them to shut up, if they could, the sun which dispenses light, warmth, and vitality to rich and poor alike, the gorgeous beauty of the sunset, the flowers, and the fields, the grandeur of the ocean and its tributaries; and dole them out, by careful measure, only to those who would pay the price which selfishness and avarice had set upon them. We can look upon and enjoy a neighbor's finely proportioned horse, the skillful architecture of his house, the taste displayed in beautifying his grounds, his rich and waving fields of grain and grass, his trees laden with foliage and fruit, and he never thinks of charging us for the delicious pleasure we have received. He would consider it an insult if we should offer to pay him. But by his own skill and toil he has afforded us happiness, and therefore benefit, and would have the right, if the disposition prompted, to receive pay for the benefit given. But what right has any man to extort money from those who enjoy the free beauties of Nature, when he has expended nothing to make those beauties, and when the enjoyment which they give to others does not harm or discommode him? What is it but the very quintessence of smallness and meanness, an abomination in the sight of God and man?

In most pleasing contrast to the devices of those grasping moneymakers at Nature's expense, appear the parks, museums, horticultural and botanical gardens, where Nature, by the skillful and painstaking hand of benevolence, is displayed in all her beauty and instructiveness. And do not those who thus adorn and cultivate Nature to instruct and bless mankind, receive, after all, the richest reward—the most lucrative pay? Is not Shaw, of St. Louis, worthy of all honor for generously opening, free to one and all, and keeping in order at enormous private expense, his gardens, rich in the vegetation of all climes? Will not the great American Museum of Natural History, in the Central Park, when completed, be one of the grandest benevolent institutions ever established? It is doubtless true that the lamented Agassiz, by his enthusiasm in studying and teaching Nature, and by creating popular interest in her revelations, has added greatly to the pleasure and profit of those who spend their vacations at some of the attractive summer haunts. And if any one could justly demand pay for enhancing the delights which Nature affords, it would be he. But instead of that, he spent his fortune and his vigorous life in building up one of the grandest museums in the world, and has thrown open its doors free to every one, whether he wish to spend a pleasant hour or to study for years. And when, on one occasion, he was offered a rare opportunity to make a small fortune, he replied: "Gentlemen, I have no time to make money."

It is possible for an enterprise to pay a large dividend, and yet return but little money to its originator; and it would be well if the world could learn that money is not the only thing worth living and laboring for. It is too true that, by the great majority of mankind, the money maker, if he succeeds, is envied and respected more than he who gives his life to the study of Nature, and reveals her wealth of mystery and beauty to his fellow men. This is emphatically a utilitarian age. Its all-absorbing question is: "Does it pay?" And while this, in its broad sense, is one of the wisest queries a responsible being can make, in its restricted sense it is one of the most shortsighted. One collecting natural history specimens is always sure to attract, more or less, the attention of the curious; and their first questions will be: "Are you hunting for gold?" and: "Can you make much at that business?" And on being answered in the negative (which is correct only with *their* conceptions), there is always certain to follow an ominous silence, when the interrogator is absorbed in deep thought, and—probably for the first time in his life—is seriously moralizing; and the substance of his cogitations, when plainly interpreted, is just about this: "That man must be a fool to spend so much time, and work so hard, for nothing but pieces of broken rock, and insects, and shells, and flowers, just what we should expect a child to be pleased with." Just in point here is an amusing story told of Professor Agassiz. While driving along the road one day, he saw a choice natural history specimen; and calling a boy to hold his horse, he was off, over the fences, through the fields, and into the bushes to capture it. A man passing asked the youth whose horse he was holding. "I don't know," said the lad, "only he is a crazy Dutchman who has run off out of sight after a butterfly."

Most of the great scientific achievements of the world have been simply labors of love; and many a scientist has made an invention or a discovery that would bring him a fortune if he were to patent it; but he declines to use it for any other purpose than to advance the cause of Science. The world is made richer and happier, and his sufficient reward is the consciousness of the good done, and the credit of doing it.

THE UNITED STATES COMMISSION ON BOILER EXPLOSIONS.

The death of the late distinguished Professor Winlock has left vacant the chairmanship of the Commission on Steam Boiler Explosions. This vacancy will probably be filled by the appointment of President F. A. P. Barnard, LL.D., of Columbia College, New York city. The previous announcement of the appointment was premature, but it has now been made by the Secretary of the Treasury, and is expected to have been confirmed by the Secretary of the Navy, who, with the former, constitutes the appointing power. President Barnard has long been known as one of the ablest and most distinguished of those few scientific men who have always been interested in the practical applications of Science, and he will here have one of the noblest fields, in which to exercise his talents and make his scientific attainments practically useful, that could be offered.

The country is to be congratulated that the two cabinet officers making this appointment, Messrs. Bristow and Robeson, have made so excellent a choice. We know of no man in our own country or in Europe better fitted by scientific attainments, by an acknowledged position among the leading men of his class, by official position, age, and experience, for this position. Those of the readers of the SCIENTIFIC AMERICAN who desire to know something of the methods by which scientific knowledge can be made practically available may find pleasure and profit in the study of Dr. Barnard's report "On the Machinery and the Industrial Processes Illustrated at the Paris Exhibition of 1867."

The Commission now consists of President F. A. P. Barnard, Columbia College, Chairman; Professor R. H. Thuston, Stevens Institute of Technology; Messrs. C. W. Copeland (New York city), J. R. Robinson (Boston), and I. Holmes (Mount Vernon, Ohio).

The commissioners are at work, and we shall hope that much good may be done by them in the dissipation of some of the superstitions beclouding the subject in the minds of many, even among professional and practical engineers, in spreading abroad a knowledge of already ascertained facts, and in the acquirement of some additional knowledge. In the latter direction, they can be probably effectively aided by other men of Science, and by such experienced practical men as are numbered by hundreds among our readers.

QUEER CATTLE.

This is a prolific year for insect pests, and among those that have thriven remarkably well are the *aphides*, or plant lice. In some parts of New England, we have seen the foliage of fruit and other trees almost completely destroyed by them, to the great injury if not the total ruin of the fruit: and we have been told that in other localities the orchards have a sere and yellow look as though scorched by fire. Unroll a bunch of the curled-up leaves, and, if they are not wholly dead and dry, you will find the inner under sides of the leaves swarming with lice.

They are insignificant looking creatures, yet they are among the most interesting and most extraordinary of insects. The injuries caused by them are enormous, and their natural history is remarkable in the highest degree. Their generic name *aphis* describes their character; it is from a Greek word, signifying to exhaust. In their wingless state, their appearance is familiar to every one who has ever had anything to do with plants. Their bodies are short, oval, soft, and are furnished at the hinder end with two tubes for the passage of a sweet fluid secreted from the stomach. (It is this honey dew, as it is called, which causes certain ants to domesticate them, as we do cattle.) Their heads are small, and armed with a long, tubular, three-jointed beak, by means of which they attach themselves to succulent leaves and other parts of plants, and suck out their juices. Their eyes are globular; their antennæ long and tapering; their legs slender and long; their feet two-jointed. The males and females are winged, and also the last brood of asexual individuals: but the early summer brood are usually wingless.

The difference between the different broods is perhaps their most striking characteristic, illustrating as it does that anomalous system of generation, known as *parthenogenesis*, observed among a few species of insects and also in the jelly fish. By Steenstrup the phenomenon is called "alternation of generations." In ordinary generation the offspring resembles the parent: in this extraordinary mode there is a series or circle of individuals, with one or more unlike forms always coming between like forms. Among plant lice, the series begins in the fall by the paring of male and female individuals. The males die: the females also, after laying their eggs, which are hatched as soon as sap begins to flow in early spring. This brood is sexless and, in the great majority of cases, wingless. Though with undeveloped sexual organs, these individuals are capable of reproducing their kind by a sort of budding process. Contrary to the rule among insects, their second generation is viviparous: the young lice are brought forth alive, and may be either winged or wingless, or both. The third generation resembles the second, the fourth resembles the third, and so on, the number of successive broods of the sort having no certain limit, but depending, so far as known, entirely upon the temperature and the supply of food. According to Kyber, a colony of *aphis dianthi* continued to propagate for four years, in a warm room, without the intervention of males. On the setting in of cold weather, however, or in some cases on the failure of nourishment, the weather being still warm, true males and females are produced, the females always wingless, the males sometimes with, sometimes without, wings. It is by the paring of these perfectly sexed individuals that the series begins.

The advantage of this method of propagation is thought to be the facility which the summer broods afford for the rapid multiplication of individuals. It is certain that they