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SUCCESSFUL PROGRESS OF THE GREAT JETTIES.

Captain Eads' improvements at the mouth of the Mississippi river having successfully progressed to a point at which, under the act of Congress relating to the subject, a second installment of half a million dollars falls due to him, Generals Barnard and Wright, of the United States Engineers, recently made a thorough examination of the new channel. The substance of their report is given below.

It is safe to say that no engineering work of similar magnitude has ever been maintained and conducted with such splendid success, under so many unfavorable conditions. From the very outset Captain Eads has met with opposition none the less bitter because it came from official sources. He was confronted by adversaries who would neither support his plan nor agree among themselves upon the feasibility of any other project, and the prospect was that the Mississippi would remain unopened to commerce indefinitely into the future. With a boldness born of perfect faith in his scheme, Captain Eads broke through the deadlock of conflicting opinions by himself assuming the entire expenses of putting the same into practice, and asking no reimbursement or pay until the officers of the United States should themselves testify to the successful attainment of various points in the progress of operations. Congress at length passed the requisite act, and Captain Eads began the apparently unpromising work of building his great jetties out into the open sea.

Certainly no engineer has ever before undertaken such a task under such auspices. Executing a great enterprise of the first national importance, he has been entirely without Government aid; on the contrary, at the outset, officers of the Government, if not active opponents, did not in many cases hesitate to predict the failure of the scheme. Still Captain Eads has labored on, always successfully, until now large ocean vessels may safely pass through the channel he has made, and his title to the gratitude of the people rests on an unassailable foundation.

We have published, both in these columns and with much detail in those of the SUPPLEMENT, information concerning the steadily successful progress of the work; and from the beginning the SCIENTIFIC AMERICAN has been among the few steadfast supporters of the correctness of Captain Eads' theories and plans. It is therefore with no small gratification that we now congratulate Captain Eads on his triumph. Generals Barnard and Wright in their report state that there is now a channel nowhere less than 200 feet wide and 22 feet deep from the South Pass between the jetties to the deep water of the Gulf of Mexico. The width between the 22 feet curves varies from 200 feet to more than 500 feet. At the head of the Pass a channel 264 feet wide and 22 feet deep exists, and a practicable channel 23 feet deep was also found. No more complete announcement of the success of Captain Eads' work, or one which at the same time emphasizes more strongly the error of his opponents, can be made than is embodied in the following words from the report of the above named distinguished officers:

"If we look at the actual facts presented by the prosecution of this work, we find that while two and a half years ago there was a bar at the mouth of the South Pass, over two miles in extent, measured from twenty-two feet of water inside to the same depth outside, over about a half a mile of which there was eight feet of water, a wide and deep channel exists; and a result inferior in physical magnitude, but of no less importance, has been attained at the head of the Pass. This result is so exclusively due to the jetties and auxiliary works, that the auxiliary aid of appliances, if in such we include dredging machines, is utterly insignificant. About 2,500,000 cubic feet of material were excavated by the current, against 200,000 by dredging."

UNSCIENTIFIC SCIENTISTS.

Mr. William Crookes, F.R.S., is an English scientist of reputation and of no small ability. He is the inventor of the radiometer, and a very close investigator of so-called spiritualistic manifestations. We mention these two peculiarities in preference to many other very excellent and useful rôles which Mr. Crookes has assumed, because, on account of them, he is at present involved in controversies which are remarkable in their way, for bitterness on one hand and absence of production of definitely settled fact or theory on the other.

We suppose that as an originator of experiments for testing spiritual mediums in such a way that the latter always come out apparently triumphant, Mr. Crookes is unrivaled. Not that we mean to assert for a moment that the gentleman allows his belief in things supernatural to influence his actions, or that he approaches his investigation with anything but a sincere desire for simple truth, but it so happens that, by the aid of Mr. Crookes' ingeniously contrived apparatus for crucially testing them, mediums withstand remarkable trials, whereas, when people with not half the scientific acumen of Mr. Crookes apply their tests, the same mediums egregiously fail or are exposed in their fraud.

Mr. Crookes' arch enemy just at present seems to be Dr. Carpenter, another English scientist of high standing. Others have entered the arena, but the battle of the giants is waged between these two. In the *Nineteenth Century* a while ago, Dr. Carpenter attacked Mr. Crookes for jumping at the conclusion that the radiometer is actuated by impact of light, while commending the series of investigations which led to the discovery of the instrument, and then, in order to exhibit the "duality" of Mr. Crookes' mental constitution, he shows up his unscientific course with relation to the spiritualistic Home and the phenomena, supposed to be the work of the latter, which culminated in Crookes' hypothesis of Psychic Force. In a later number of the same periodical, Mr. Crookes defends himself, charges Dr. Carpenter with misconception in the matter of the radiometer, insists that he did not attribute the movement of that apparatus to light, and answers the strictures with reference to Home by explaining his precautions, etc., to eliminate chances of fraud in the experiments, and virtually demands any reasonable explanation for the phenomena observed other than that which he has adduced, and which involves the existence of an unknown and apparently supernatural force.

The drift of Mr. Crookes' line of argument seems to be summed up in some such demand as "either explain my conclusions in a way that will convince me that they are wrong, or else accept them and don't criticise," which, after all, is nothing but the song which the perpetual motionists, circle squarers, spiritualists, and their kind have sung from time immemorial. It so happens, however, that neither of the subjects in controversy are in that condition which admits of the proposing of definite explanation, and there is thus a species of false analogy between them which is apt to lead to their consideration as of like nature; whereas, while the one is a legitimate object for scientific investigation, which will in the end, if properly pursued, conduct to absolute truth, the other is simply an illusion which, when investigated, can terminate in the exposure of nothing but untruth. Theories as to the radiometer are numerous, and although it is now reasonably well settled that heat is the motive power, yet there are abundant conflicting hypotheses as to how the actuating force is exerted. No new phenomenon was ever discovered that did not undergo like stages, and the fact of theories conflicting at any period of its existence is no proof but rather assurance that in the light of constant progress they will react one upon the other, eliminate one another, and ultimately a hypothesis on which there will be agreement will be reached. On the other hand, nothing of this kind can be predicated as to so-called scientific investigations of spiritualistic manifestation. Such investigations are eminently unscientific because they aim to disprove that for which not even a shadow of foundation is assumable. A scientific investigation is simply a questioning of nature, and its object is to find the hidden laws which connect or underlie certain definite results. The fabric of truth reared, that of untruth falls by contrast—not by direct assault—just as popular errors are eliminated, not by diatribes and denunciation, but by the unswerving progress of knowledge among the people.

It goes, therefore, without saying that Mr. Crookes' line of defense is illogical. It is not for his defenders to say, "Here is an effect; we assume it to be due to a miracle; prove that it is not;" but, on the contrary, it is for them to show conclusively that it is utterly unaccountable under every known natural law; and this they have never done. Mr. Crookes' argument becomes still further weakened when those who have withstood his tests are exposed or their tricks repeated by easily explicable means, as has been frequently the case. Mr. Robert Heller, the conjuror, is exhibiting "manifestations" in this city, which are more mystifying than any we ever saw a spiritual medium execute. The cabinet business and other performances are done under the full glare of the gas, and submitted to the closest examination, and with a celerity that is astonishing. He says that spiritualists have insisted that he is an extraordinarily powerful medium, which fact they accuse him of concealing for sordid ends. He says further that he only produces effects—it is for the audience to find out how—and the name of his mysterious power is Hellerism. There is a curious analogy between his argument and that of Mr. Crookes; and we are not quite certain but that Hellerism is not as good a name as Psychic Force.

A NEW SYSTEM OF ARMOR PLATING NEEDED.

The trials of the 100 ton gun at Spezia, Italy, demonstrated quite conclusively, and to the no small astonishment of the adherents of heavy wrought iron armor for vessels of war, that iron plates were inferior to steel as a means of stopping shot. Prior experiments on steel plates were not wanting, and their results showed that steel had a tendency to split under the impact of shot. Curiously enough, with the enormous bolt of the 100 ton gun the conditions seem to have been entirely altered, and the conclusion was apparently reached that iron plates had had their day, that the contemplated 40 inch iron armor would never be rolled, and that the ironclad of the future would be encased in steel. The prematurity of this view, however, was soon after proved by the fact that steel plates broke and split up under the shot of smaller guns which produced little effect on the iron plates. The advocates of armor plating are therefore at the present time in rather an anomalous position. If vessels must be protected against the heaviest guns, then steel is required, but this can be shattered by light guns; if protection against the latter is deemed preferable, then it is certain that the armor will be riddled by the more massive projectiles. What is wanted, consequently, is some new kind of armor capable of resisting projectiles from both large and small guns, and the search for this bids fair to be as protracted and expensive as the long continued experiments during which wrought iron armor plating gradually grew in thickness from 4 to 24 inches.

Two plans are now before the English Government for so-called compound armor plates, by means of which it is hoped that all the advantages in both steel and iron may be secured

without the corresponding disadvantage of either. Mr. Wilson's system consists in a plate made of layers of steel and iron united by fusion. The plate is 9 inches thick, having steel on the outer face to the depth of 5 inches, the remainder being wrought iron. Tests made of this armor have shown that it breaks the shot of 7 inch guns while splitting and starring through its steel portion, but that the latter is held together by the iron.

Sir Joseph Whitworth has invented a new plate constructed on a different principle, which consists of a solid shield of comparatively soft steel, in drilled holes in which plugs of harder steel of high quality are inserted. These plugs are very closely distributed over the plate, and their object is to break the projectile and to prevent the extension of star cracks. This plate has also been fired at and has stood well. A competitive trial of the two systems has recently been made in England, which has led to no very definite results owing to the inferior manufacture of some of the competing plates, but the general indications go to show advantages in the compound steel and iron shield.

CONFIDENTIALLY, WITH OUR READERS.

At this season of the year very many of our subscribers in renewing their subscriptions take occasion to express their opinion of our journals. We are always glad to receive these comments—in fact, it invariably affords us gratification to hear from any of our subscribers on any subject within the scope of our field which interests them; but we take, perhaps, more especial pleasure in noting the criticisms or praises which those to whom our work is addressed bestow upon it. Whether the opinions be adverse or otherwise, they indicate something more than a mere passing interest, and evidence a degree of appreciation which goes to prove that our efforts are regarded, at least, as intended to be beneficial far beyond the affording of temporary entertainment through the presentation of merely what is new in the great world of science and mechanical industry. It so happens, however, that adverse criticism rarely—very rarely—finds place in the letters we receive. Once in a while we receive a "hauling over the coals." but we can see the good nature under it all, although occasionally we are tempted to point out that a paper run to suit each individual preference would probably satisfy nobody, not to mention the fact that it would have to be a colossal publication to contain all we are asked to insert. Besides, and although we are quite willing to admit that many of our excellent readers who send us their strictures are much more capable to conduct the SCIENTIFIC AMERICAN than we are, still, while that task is left in our hands, a conscientious sense of duty impels us to continue our possibly mistaken course by the light of the thirty odd years' experience we have had in doing so.

As for commendatory letters, which are brimful of kindness and good wishes, and which abound in such praises that really our innate modesty sternly prohibits our publishing them, their number is legion. They come in the plain words of men who know far better how to produce marvels with the hammer and chisel than with the pen, and in the earnest language of workers in science who stand foremost among intellectual minds. Inventors, mechanics, men of business, and professional men—in a word, the true brain and muscle of the country unite in these encomiums, and afford us encouragement such as would spur even the least appreciative to constantly improving efforts.

We shall make an extract from but one of these letters—and it may stand as a type of all—and this because it expresses the unsought opinion of an engineer whose achievements are so well known that every body will respect his judgment. After renewing his double subscription to both of our journals, Captain Eads says:

"I heard one of the most eminent engineers of the United States Army declare in the presence of several other highly intelligent gentlemen, a few months ago, that he considered the SCIENTIFIC AMERICAN to be the best scientific journal published in America. To this there was no dissent among those who heard him. It is my own opinion; and wishing you continued success, I remain,

Very sincerely yours.
JAS. B. EADS."

GOVERNMENT TESTS OF MAGAZINE GUNS.

A board of army officers, under the presidency of Lieut. Colonel J. G. Benton, is to convene at the Armory, in Springfield, Mass., on the 3d of April next, for the purpose of testing magazine guns. Inventors will soon be requested by the Secretary of War to provide sample arms for trial, all guns to be of caliber 45, the same as that of the Springfield rifle now in use, and to carry the United States service cartridge. It is stated that the Secretary is authorized to spend $20,000 in the conducting of these tests. The board will probably be in session until midsummer. No special rules governing the trials have yet been decided upon, and Lieut. Colonel Benton informs us that probably none will be made until the board convenes.

The terrible execution done by the magazine gun during the present Russo-Turkish war has shown the superiority of that weapon over the single fire breech-loader, and indicated the prominent part which it is destined to take in future conflicts. The main requirement is now to simplify the gun, to reduce the number of parts, and render their interconnection so plain that the soldier can easily take the weapon apart or put it together, and make his own repairs on the field. We shall probably publish full descriptions of the competing weapons when the test begins.

A REMARKABLE AND DISASTROUS EXPLOSION.

At about 5 P.M. on December 20th last, the throngs of people who were passing through Barclay street, in this city, near Broadway, on their way to and from the New Jersey ferry, were horror-stricken to behold the entire front of a large five story building fall into the street. The dull sound of an explosion was simultaneously heard, portions of the ruined edifice were hurled against buildings many feet distant, and almost instantly a fire broke out which speedily consumed a large part of the block. Twelve persons were killed, others are still reported missing, and many were wounded. The structure was used by the Messrs. Greenfield as a candy manufactory, and work was in full progress, owing to the holiday season, when the disaster occurred.

The prevailing impression at first was that a boiler explosion had taken place, but examination of the generators proved this not to be true. Numerous other theories have since been suggested, including illuminating gas explosion, formation of an explosive mixture of carbonic oxide and air in the flues from the boiler, explosion of chemicals, and others. A correspondent sends us the following interesting letter on the subject, which suggests a very plausible and probably the true cause of the casualty. The fire authorities and other official investigators have thus far failed to reach any definite conclusion on the subject. Our correspondent says:

The cause of the Barclay street fire still remains a mystery, and it having been proved beyond reasonable doubt that neither steam, gas, nor kerosene caused the catastrophe, the experts appear to have lost the scent, and are now following the hunt with blind uncertainty as to the direction they should next follow.

It may therefore be convenient at this moment to mention certain conditions that may result in explosions among substances usually regarded as perfectly harmless.

It is perhaps not generally known that many substances when reduced to a very fine powder, and thus diffused in the air of a room, will under certain conditions explode with terrific force. Among other substances may be mentioned cork. This material, which burns in bulk with a very slow combustion, becomes highly explosive when reduced to an impalpable powder and in this state distributed in an atmosphere.

The Linoleum Company of Staten Island have had unpleasant proof of this fact. In the manufacture of linoleum, cork in a very fine powder is employed to a large extent, and in its manipulation becomes dispersed about the room, causing the air to become highly charged with it.

Not very long since, the cork in one of their rooms exploded with great force, blowing off the roof of the building. On this occasion the ceiling in the room where the explosion took place remained intact, the whole force of the explosion passing through an opening in the ceiling to the room above, the roof of which chamber was carried away.

It should be noticed in this instance that the explosion traveled to the spot which presented the least resistance, and that the damage occurred in a room that was not the scene of the original explosion.

This experience may be useful in directing attention to new channels of inquiry in regard to the Barclay street fire; it certainly offers two links that may be followed with advantage, for it teaches us in the first instance, that the cause of an explosion may be remote from the spot where its effects were most apparent, and secondly that explosions may result from substances which are not within the category of explosive compounds. The subject might be carried one step further by making the inquiry whether any substances used in the candy manufactory could explode under the same conditions as the cork, but that is a matter to be handled by those making the investigation.

There is also another point that has passed unnoticed. Candy manufacturers at Christmas time make a large number of pull-crackers, folded in fancy papers with candy. What quantity of detonating powder was held at the time of the explosion?

These remarks are merely suggestive, and as such may be valuable in giving a wider range to the present inquiry, there appearing a desire to force the conclusion that the building must have fallen down if not blown up by steam, gas, or kerosene. J. M.

THE AMERICAN EXHIBIT AT THE PARIS EXPOSITION.

Commissioner General McCormick, on January 10th, stopped the reception of applications for space at the Paris Exposition, and none further are to be entertained. It is stated that 625 applications have been made, the majority coming from Pennsylvania and from this State. Fully five times the amount of space allotted to the United States has been asked for by exhibitors, so that it is therefore a certainty that disappointed applicants will be in the majority. The Commissioner General has full control in the matter of selection, and his decision is final. He is proceeding rapidly with the consideration of applications, and his selections will shortly be made known.

New Fast War Steamer.

The Iris has been constructed as a twin-screw dispatch steamer for the English Government. At a recent trial trip of six hours' full power run, which extended to about 120 knots, 96 were completed during the official six hours. The mean pressure of steam in the boilers was 62 lbs. The starboard engine made 91 and the port engine 89½ revolutions per minute. The mean total horse power developed was 7088·52, the contract being for 7000. Sixteen knots per hour was the speed attained; consumption of coal was 2·7 lbs. per indicated horse power per hour. The following are the principal dimensions of the Iris: Length between perpendiculars, 300 feet; over all, 333 feet; extreme length, 46 feet 1 inch; depth in hold, 16 feet 3 inches. The armament is to consist of ten 64-pounders. She is bark-rigged with wooden masts, and is steered by hand gear. The ship is propelled by direct-acting, horizontal, compound four-cylinder engines, designed to turn twin screws. There are four high pressure cylinders, having a diameter of 41 inches, and four low pressure cylinders, with a diameter of 75 inches, the stroke being 3 feet. Steam is furnished by twelve boilers of slightly different dimensions. The total weight of the machinery, with water in the boilers and condensers, is about 1,000 tons. The contract price is £93,000. The engines have been manufactured by Messrs. Maudslay, Sons & Field. At the trial trip the mean draught of the vessel was 15 feet 8 inches forward and 20 feet 7 inches aft.

Keely or a Rival.

The "Bradley Promethor," says a Baltimore contemporary, is a vessel propelled by "a certain kind of gas, which is evolved by mechanical disintegration, the water being forced through solid silver by hydrostatic pressure, which is automatic and is operated by the engine. This product is introduced into small cells of one inch internal diameter, made of the best decarbonized steel, and there quickened into gas by heat, which does not need to be over the ordinary temperature to produce steam. There is no water introduced as water into the generators.

"The apparatus, he claims, contains nothing but pure gas, without any likeness to a steam boiler. Three hundred pounds pressure can be had from a thimbleful of water, and the pressure can be raised any degree to thousands of pounds to the square inch by regulating the supply of water. The gas frequently reaches so intense a state as to show great signs of electrical action, but before being admitted to the cylinder of the engine it is oxidized, which fully prepares it to act with all the smoothness of steam on the piston."

We are not sure but that this is a bare-faced infringement on Keely's great conception, though the remarkable discoveries which the inventor (or the writer of this description) appears to have made incline us to the belief that the Keely brain has here also been at work. No one else is so competent as he to wrench from unwilling Nature the great truths of the aqua-disintegrating properties of solid silver, the smooth behavior of oxidized gas, or to accomplish the wholly unparalleled feat of producing "pure gas without any likeness to a steam boiler."

Water Supply of New York City.

From the report of the Department of Public Works of this city, Mr. Allan Campbell, C. E., Commissioner, it appears that the total amount expended for works, structures, aqueducts, pipes, etc., connected with the water supply for the city, including maintenance and repairs, from the period of its inception in 1842 to October 1, 1877, has been $34,692,103.73; the total revenue, $30,105,338.80. Cost over revenue, $4,586,764.93. The growth of the city has rendered an increase in the size and arrangement of the distributing mains necessary. Under a recent contract, straight pipe of the very best quality has been procured at $22.75 per ton of 2,240 lbs., probably the lowest price at which such pipe was ever brought to this city. This unexampled low price of iron pipe makes it very desirable that the necessary additions and alterations should be made at the present time. Small mains of former years will in course of time be replaced by large ones on the principal streets and avenues, and in connection therewith a sufficient number of fire hydrants will be added. The report maintains that the supply from the Croton river system, including the Housatonic river, is the proper mode to be pursued. This plan contemplates an additional aqueduct, when increasing population shall have taxed the present one to its fullest capacity.

A "Momentum" Torpedo.

Commodore John A. Howell, U.S.N., has invented a new movable torpedo, which is driven by the energy stored up in a heavy rotating wheel in its interior. The apparatus is a cylinder with two conical ends, and at each extremity is a two-bladed screw. Inside beside the fly wheel is the explosive charge. By an outside gear wheel on the screw shaft, which connects with a motor on board ship, the fly wheel is set rotating; then the contrivance is slid down a boom and into the water, it being supposed that the momentum of the fly wheel will keep the screws rotating long enough to drive the machine ahead for 300 feet or so, in a straight line. Recent trials at Newport were unsuccessful, the rudder not acting well and the torpedo going in every direction but the right one.

TO OUR SUBSCRIBERS.

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