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SCIENTIFIC AMERICAN SUPPLEMENT

No. 540.

For the Week Ending May 8, 1886.

Price 10 cents. For sale by all newsdealers.

OPPOSITION TO NOTABLE INVENTIONS.

Those who by reason of constitution, habit, or ill humor are continually opposing progressive ideas and inventions might learn a profitable lesson, if they would glance for a moment at the history of almost any of our important improvements, and study, through the perspective of several decades, the ungraceful position of those who then maintained a similar attitude toward the advanced projects of their times.

In the presence of electricity, we may find the uncertain gas flame and the harmful products of combustion comparatively objectionable, but for upward of half a century we have considered its illumination a great advantage, after the more primitive methods of lamp and candle. When first introduced, however, our ancestors can scarcely be called enthusiastic about the fluid, if the following curious document represents at all correctly the popular sentiment on the subject. The list of names appended to the petition includes men who were at that time prominent among those most noted for their intelligence.

PHILADELPHIA, Nov. 28, 1833.

REMONSTRANCE AGAINST LIGHTING WITH GAS.

To the Honorable the Select and Common Councils of the City of Philadelphia:

GENTLEMEN: The Subscribers beg leave respectfully to remonstrate against the plan now in agitation for LIGHTING THE CITY WITH GAS, as they consider it a most inexpedient, offensive, and dangerous mode of lighting. In saying this they are fully sustained by the accounts of Explosions, Loss of Life, and great destruction of property, where this mode of lighting has been adopted.

We consider GAS to be an article as IGNITABLE AS GUNPOWDER, and nearly as fatal in its effects: as regards the immense destruction of property, we believe the vast number of fires in New York and other cities, may be in a great measure ascribed to this mode of lighting; the leakage of the pipes and carelessness of stopping off the Gas, furnish almost daily instances of its destructive effects. When we consider that this POWERFUL and DESTRUCTIVE AGENT, must necessarily be often left to the care of youth, domestics and careless people, we only wonder that the consequences have not been more APPALLING. It is also an uncertain light, sometimes suddenly disappearing and leaving the streets and houses in total darkness.

The *Waters of the Delaware and Schuylkill*, now considered the most pure and salubrious in the world, as many long voyages have fully tested, must soon, we fear, experience the deterioration which has reduced the WATERS of the THAMES to the present impure and unhealthy State, for no reservoir will be able to contain the immense fetid drains from such an establishment, and very soon the river must be their receptacle to the destruction of the immense Shoals of *Shad, Herring*, and other fish with which they abound; the same cause must produce like effects. *Salmon, Smelts* and other fish, formerly caught in vast quantities in the Thames have nearly all disappeared. The constant digging up of the streets, the circumstance of the gas pipes which at the intersection of each square must come in contact with the water pipes, are difficulties and evils which we would anxiously avoid.

In conclusion we earnestly solicit that the lighting of our *city with oil may be continued.*

And your petitioners, etc., etc.

P. Syng Physick,	Charles H. Dingee,	Horace Binney,
Jno. S. Warner,	Hartman Kuhn,	Geo. Pepper,
John Sergeant,	Richard Alsop,	Benjamin Chew,
Jacob Ridgway,	Charles Wharton,	E. Styles Ely,
Paul Beck,	John Perot,	Henry Pratt,
Elihu Chauncey,	Jas. C. Fisher,	Roberts Vaux,
Jos. P. Norris,	John Markoe,	Thos. Allibone,
Geo. W. Smith,	Jno. C. Cresson,	Mat. Newkirk,
W. L. Hirst,	Wm. Platt,	Edw. A. Souder,
Wm. J. Duane,	H. Hollingsworth,	Hymen Gratz,
V. L. Bradford,	David Paul Brown,	Wash. J. Duffee,

And several hundred others.

But unreasonable as these apprehensions now appear, they were scarcely comparable with those excited a few years previously by Stephenson's newly invented locomotive. At a time when the commerce between Liverpool and Manchester was absolutely crippled for want of adequate transportation, and a company of gentlemen who had sufficient confidence in the eminent inventor to risk the necessary means stood ready to undertake the construction of a railway between the two cities, so powerful and so prejudiced was the opposition the enterprise encountered that its success for some time remained very doubtful. When the proposition was before Parliament, in 1825, pamphlets were issued offering every possible objection, and the newspapers declared the scheme impracticable and pernicious. It was affirmed that the cows near the line of the road would stop grazing and the hens no longer lay eggs; that birds would die from the poisonous gases discharged from the smokestack, and the preservation of pheasants and foxes be no longer possible.

People were seriously assured that the sparks would certainly set fire to fields and houses, while the air would be polluted with smoke. Prospective passengers were warned that they could not breathe in a train going so rapidly, and that they would be made worse than seasick. Farmers were frightened by the statement that there would be no further use for horses, and with the extension of the system the species would become extinct, and oats and hay would be unsalable. The boilers, it was said, would burst, the country inns be ruined, and the proper caste distinctions be broken down by such indiscriminate traveling. Failing to convince a people threatened with such a series of calamities, the assailants of the new invention took comfort in the belief that even were the railroad ever built, the weight of the locomotive would completely prevent its moving, and that the trains could never be worked by steam. Stephenson's tunnel was found very depressing; it was stated that "the sudden emersion in the gloom of the tunnel and the clash of reverberated sounds in a confined space combined to produce a momentary shudder, an idea of destruction, a thrill of annihilation!"

Yet these statements came from men not altogether unaccustomed to progress. The humiliating failure of their prophecies might well restrain more modern doubters from placing limitations upon the possibilities of the future.

CONDITION OF THE PANAMA CANAL.

It will be remembered that when M. De Lesseps and his party inspected the Panama Canal, in February, they were accompanied by Mr. John Bigelow, as the representative of the New York Chamber of Commerce. He was, by request, a guest of the Canal Company, and went with the special mission of preparing a report upon the present condition of the work, for American publication. Mr. Bigelow has now returned, and the report which he has presented to the Chamber of Commerce furnishes a trustworthy account of the present prospects of the Interoceanic Canal.

The total length of the projected canal is 46½ miles. The depth of navigable water will be about 28 feet. Its course is for the greater part of the way through the valley of the Chagres. A basin 1,600 yards long and 110 yards wide will be necessary at Panama for the accommodation of vessels, and another one, about three miles long, at Tavernilla, to permit vessels to pass each other. The total excavation necessary to accomplish this result is 120,000,000 cubic meters. The excavations made up to Dec. 31, 1885, amounted, by contract, to 11,490,196 cubic meters, and by the company to 1,520,837 cubic meters. During January, 1886, 1,067,823 cubic meters were excavated, giving a total up to Feb. 1 of 14,678,856 cubic meters. This left 105,821,144 cubic meters still to be removed.

These figures make any comment unnecessary. Mr. Bigelow states that it is impossible to say what the final cost of the work will be, or when it can be completed. There were at the time of his visit 15,000 men employed. At the present speed, this force can probably excavate 12,000,000 cubic meters a year. Could the force and machinery be trebled, it would probably be possible to finish the work in 1889. The report mentions as some of the disadvantages to be encountered that the work is in a foreign state, under a weak and unsettled government; in one of the most unhealthy regions on the continent, subject to earthquakes, within 450 miles of the equator, and under a tropical sun, where acclimated labor only is of any service. Everything for the prosecution of the work has to be imported. The country itself supplies absolutely nothing but the site for the canal. So much of the work is experimental that it is believed to be impossible for even the most eminent engineers to make estimates which have greater value than mere conjectures. The most serious difficulties to be overcome may be enumerated under four heads:

First, the control of the waters of the Chagres River, which, in the rainy season, if unrestrained, is liable to flood the larger part of the canal every year. It would be possible to control the river by the construction of an immense dam, or by the enlargement of the derivative channels by which the flood could be carried off, but either work would be very costly.

Second, the cut through the Andes at Culebra. The removal of some 22,000,000 cubic meters of earth and rock at this cut through the Cordilleras has been confided under contract to an Anglo-Dutch Company, which engages to finish the work by July 1, 1889. The contractors are to be paid $32,000,000. But they have not performed their contract more than one-sixth as rapidly as they agreed to, and at the present rate it will take them fifteen years to finish.

Third, keeping that section of the canal which runs from La Boca toward the Island of Perico, in Panama Bay, from being filled in by the ocean and the Rio Grande. The obstacles to be overcome in effecting this result are regarded as very serious, though not insurmountable.

Fourth, securing the amount of labor required at practical rates. The climate is described as one where "life dies and death lives." The natives, having no wants beyond those supplied by nature, will not work, and the difficulty of securing enough men is tremendous. To supply the deficiency, M. De Lesseps has invented a great many machines, so to do away with hand labor as far as possible.

In conclusion, Mr. Bigelow regards the canal as an undoubted possibility if sufficient funds be provided, but he ventures no opinion as to whether they will be, or what sum or what amount of time would be necessary to complete the work. The report shows that from all sources $120,000,000 have been received, but not how much has already been expended. The International Congress of 1879, which was the parent of the present Panama Canal Company, estimated the total cost at $213,500,000. It would seem from the data at hand that at least half of the estimated cost will have been expended by the end of the present year, at which time four-fifths of the excavation, not to speak of the supplementary or precautionary work, will still remain to be accomplished. There is, however, one favorable consideration in the midst of so