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SCIENCE AND SENSATIONALISM.

One of the most astonishing features in the development of modern journalism is the magnitude and successful audacity of the Sunday issues of the great daily papers, and among these there are none quite so successful in self-advertisement, with the unthinking half of the public at least, as those issues which are marked by the distinctive characteristics of yellow journalism.

Now, the yellow journal is nothing if it is not sensational, and in its quest for startling novelties to whet the palate of its readers, it invades every possible sphere of human life and interest and every branch of human knowledge. Science, which, one would have thought, would be severely let alone, is a favorite hunting ground of the reporter, and whole pages of the yellow journal seventh-day editions are loaded down with pseudo-scientific pabulum, upon which the Sunday reader is supposed to satisfy his hunger for scientific knowledge. The reporters for these journals are apparently sent out into the domains of science charged with a commission to magnify mole hills into mountains and use such facts as they may pick up as texts for exuberant essays, in which rhetoric gorges itself with superlatives and becomes positively tipsy with the fumes of its own wild imaginings.

Hence it is by the merest promptings of self-respect that the average man of science shuns the noisy notoriety of a Sunday paper "write-up," and reserves his announcements for the columns of the technical and scientific journals, or a lecture desk in the auditorium of the learned associations. The practice, the etiquette, we had almost said the ethics, of scientific research agree in rebuking the former and approving the latter method of making public announcement of results actually accomplished.

We shall not soon forget the extreme mortification exhibited in our presence on a recent occasion by a medical expert when he discovered, through our application to him for the true facts of the case, that the details of a difficult operation just performed by him had been published, with flattering encomiums and the inevitable inaccuracies, in a certain daily paper, thereby anticipating a paper on the subject that was to be duly presented in the columns of the medical journals.

This is the true professional spirit, and every departure from it tends in some degree to subvert the interest of science, and throw a stumbling block in the way of the honest seeker after knowledge.

We note with considerable regret that subsequently to his first extraordinary interviews, Mr. Tesla has seen fit to place himself at the service of those New York Sunday papers that are more or less notoriously sensational, with the result that the "annihilator" has taken on fresh terrors. It is now illumined by the flaming brush of the artist, and the public is diverted with realistic scenes in which the nine days' wonder is depicted as speeding, now above, now beneath the surface of a sea which is always propitiously calm, under a sky and in an atmosphere that are ever opportunely bright and clear, against a ship that is ever fortuitously within easy range, and always with the inevitable and unutterable result!

Judging from the comments of the scientific and technical press, we are not alone in our expressions of regret that any one of Mr. Tesla's undoubted ability should indulge in such obvious and questionable self-advertisement. That the author of the multiphase system of transmission should, at this late day, be flooding the press with rhetorical bombast that recalls the wildest days of the Keely motor mania is inconsistent and inexplicable to the last degree.

The facts of Mr. Tesla's invention are as few and simple as the fancies which have been woven around it are many and extravagant. The principles of the invention are not new, nor was Tesla even their original discoverer. While the present application of these principles is novel, there is nothing whatever in the device to warrant the sweeping claims which have been made in regard to its destructive powers. The connecting cable in the dirigible torpedo is only one of many insuperable obstacles to its success. Mr. Tesla has removed (or rather believes that he has) this one defect; let him now apply himself to mastering the others. Before he announces his ability to blot the navies of the world out of existence, let him answer a few pertinent questions, as follows:

If the torpedo must be seen to be controlled, and is scarcely visible at a distance of over a mile, even in a calm sea, how, in view of the great range, rapidity and accuracy of modern rifles, is the operator to keep within striking distance of the enemy? If the course of the torpedo can with difficulty be followed in calm weather, how will it be traced when the surface is disturbed even by a moderate sea, to say nothing of more boisterous water? Furthermore, what becomes of its accuracy in thick or foggy weather? The apparatus employed by Tesla is extremely sensitive to shock; how then will it fare amid the terrific concussion of a modern sea fight? If one of these weapons should be lost sight of in its course, does it not at once threaten friend and foe alike, and is not the operator himself in danger of being incontinently "hoist with his own petard"?

Lastly, and most pertinent question of all: What is to prevent the enemy from installing a transmitter on his own ship and himself sending out waves to act upon the receiver in the torpedo? We fail to find any provision made for this contingency, either in the patent or in any of the published interviews of the inventor. With a transmitter in the hands of the enemy the proper sequence of the motions of the torpedo could be destroyed, and the control of it prevented.

THE REMOVAL OF A GREAT ENGINEERING LANDMARK.

Engineers the world over will naturally feel some sentimental regret as they witness the removal of the great tubular bridge across the St. Lawrence at Montreal, which, for half a century, has formed one of the most notable landmarks in the development of the art of bridge construction. At the date of its erection it was unquestionably the largest bridge in existence. No structure of the size, or involving so many or so great untried problems of construction, had ever been attempted in the history of engineering, and an undertaking like this, which would be of the first importance even at this late day, becomes positively daring and colossal when we bear in mind that it was inaugurated when the science and art of modern bridge building were in their very infancy.

Apart from the magnitude of the work in respect of its great length (6,592 feet) and the immense amount of material (10,000 tons of iron and 100,000 cubic yards of masonry) employed, special credit is due to those engineers of half a century ago because of the exceptional difficulties of the site on which the bridge was built. Twenty-four masonry piers had to be built in one of the swiftest of the large rivers of the world, where they were exposed to the double danger of scour from below and accumulated ice pressure from the ice above. That these dangers are real and ever present was shown by the recent collapse of a pier in the Cornwall Bridge, which is now in course of erection across the same river. The building of the piers involved some very difficult cofferdam work, and as there had been but little previous work of the kind attempted by engineers, at least under such trying circumstances, the engineers, Mr. Ross, of the Grand Trunk Railway, and Robert Stephenson, of Menai Bridge fame, had to proceed largely on their own initiative. How well the work was done, both in superstructure and piers, is proved by the fact that, after a lapse of half a century, the iron tubes were carrying safely the heavy trains of the present day, and that the old piers have been found fully equal to the task of carrying a modern superstructure double the size of the one which has been replaced.

The illustrations on another page showing the old within the new structure form an admirable object-lesson in the progress of bridge construction during the past fifty years. The square tubes of solid plate iron represented the accepted theories of construction in the forties and fifties, just as the open, skeleton-like pin-connected trusses of the new bridge embody the latest ideas of long-span structures at the close of the century. The change from the one style to the other has been very gradual. It has been brought about partly as the result of a clearer apprehension of the principles which govern the strains in engineering structures, and it is partly due to the improvement which has taken place in the materials of construction.

In early days the strength of materials had not been determined with the accuracy which marks the modern testing laboratory, nor did they possess that uniform quality which we now look for in the product of our rolling mills. There was a certain measure of distrust inseparable from work which, for want of precedent, was frequently of an experimental character.

The simple wooden beam thrown across a creek is the simplest form of the bridge, and the earliest attempts at building iron bridges, of the beam as distinguished from the arch construction, show a reluctance to depart from the solidity of the prototype. The tubes of the Menai and Montreal bridges were simply hollow beams, and as such contained an excess of material above that which would be necessary to provide the same degree of strength in a bridge of modern construction.

As the advantage of depth in providing maximum stiffness and strength with a minimum of material came to be recognized, we find the ratio of depth to length, which in the tubular bridge was one to fourteen, gradually increasing until one to eight and one to six are to-day common ratios. Thus, comparing the old and the new Montreal bridges, we have for the tubular structure a depth of 18 feet for a length of 247 feet, as against a depth of 40 feet for a length of 254 feet. The shallow depth produced very high strains in top and bottom members of the tubes, and in the Menai Bridge these are massive cellular structures of great weight. The web systems, which in the tubes are solid plating, have given way first to the "lattice" web, composed of multitudinous intersecting bars, then to the "double intersection" web, in which rectangular posts for compression and flat eye bars for tension made their appearance, and these have been replaced in turn by the modern "single intersection" system, in which the last ambiguity as to the strains is removed and the construction is greatly simplified. In place of the single solid plate top and bottom chords, we have each web system associated with its own separate chords—a latticed rectangular construction being used for the top chord, which is, of course, in compression, and flat eye bars for the bottom chord. The moving loads are carried by a system of longitudinal stringers and transverse floor beams, the latter being carried at the panel points.

The modern pin-connected truss bridge is, perhaps, the most perfectly scientific structure in the engineering world. The static stresses to which it is subjected under given conditions of loading are known to within a few score pounds, and not a pound of material is put into it that can be called superfluous.

FLAX CULTURE IN THE UNITED STATES.

The historical records of the United States, says The Journal of the Society of Arts in a recent issue, show that flax culture was one of the earliest of colonial industries, and until comparatively recent years the culture and manufacture of flax in America have been household industries. American colonists brought with them the art of raising flax and of preparing and spinning it by hand, and even fifty years ago the custom prevailed among farmers of growing flax and having it retted, scutched, hackled, and spun by members of their household. In the history of Lynn, Massachusetts, it is stated that about the year 1630, "they raised considerable quantities of flax, which was retted in one of the ponds, thence called Flax Pond." As early as 1662 the State of Virginia enacted that each poll district should raise annually and manufacture six pounds of linen thread. All the records of New England also give evidence of an earnest desire to promote the cultivation of flax and its manufacture.

In a report to the United States Department of Agriculture by the special agent in charge of the office of fiber investigations, it is stated that about 1778 a number of colonists arrived from Londonderry, bringing with them manufactured fabrics of linen, and the implements used in their manufacture in Ireland. The matter was earnestly taken up by the Bostonians, and a vote passed to establish a spinning school. About 1721, at Newport, Rhode Island, "hemp or flax used to be received in payment of interest, the former at 8d., and the latter at 10d. per pound." Pennsylvania offered premiums for several grades of linen thread in 1753, and the Society for the Promotion of Arts, Agriculture, and Economy, of New York, after adopting resolutions to arrest the importation of British goods, offered premiums for linen thread. The early records of Rhode Island develop further interesting facts concerning an association of plantation maidens about 1766. The order was known as the Daughters of Liberty. It is not necessary, however, to go back a hundred years, or even fifty years, to learn the story of American household linen manufacture, for a remnant of the industry still exists in the mountains of Virginia, North Carolina, and Tennessee, and an interesting series of the fabrics made in these localities in recent times has been secured for the United States National Museum.

Sixty years ago, about 750,000 pounds of flax fiber were produced in the United States, and flax was sent to market from Connecticut that was as strong and as good as any raised in the United States at the present time. Very strong and flexible flax also came from northern New York and Vermont, but it was not clean. The poorest flax of those days came from New Jersey, although it is said that that State has been capable of growing flax equal to that of Archangel. At the present time flax is largely grown in the United States for seed, the straw, of inferior quality, when used at all, going to the tow mills or the paper mills, and being worth from 4s. 2d. to 33s. 4d. a ton. In the older States the area under present cultivation is very small and is steadily decreasing. In the newer States, or States where agriculture is being pushed steadily westward from year to year, the area under cultivation about holds its own, taking one season with another. Cultivation for fiber is beginning to attract attention, however, and the

Department of Agriculture is striving to re-establish this important industry in the United States.

By experimentation in fifty or more localities in the United States where flax cultivation was thought possible, the department has proved the fallacy of the opinion widely prevalent less than a decade ago, that flax could not be produced commercially in the United States. By these experiments it has not only been proved that commercial flax production is possible, but that good fiber and good seed with careful culture can be produced in the same plant. The most important results have been obtained on the Pacific coast, where, as in the Puget Sound region of Washington, an ideal flax climate has been discovered. Experiments here have shown that for the flax culture the Puget Sound region is the equal in climate to some of the best flax-producing regions of Europe. The superior quality of straw produced, which resembled the straw of the famous Courtrai region of Belgium, attracted the attention of the Barbour Company, of Lisburn, Ireland, resulting in this firm undertaking a retting experiment in Ireland with a ton of Puget Sound straw. The experiment demonstrated that it is possible to produce very fine fiber and good seed in the same plant.

It is stated that if the flax is grown and manipulated under proper conditions, and by people who thoroughly understand their business, in Puget Sound, the cultivation of it would be of the greatest importance and in a short time would rival the great Belgian district of Courtrai. The flax plant is now widely distributed throughout the world. It is cultivated in portions of South America, especially in Argentina, though more for seed than for fiber. It is produced commercially to a greater or less extent in Great Britain (Ireland especially), Sweden, Denmark, Holland, Belgium, France, Germany, Austria, Spain, and Portugal. It has been introduced into Algeria, and into Natal. In India large tracts are under cultivation, though more for the seed crop than for the fiber.

Japan has introduced its cultivation commercially, and it has been experimented with in the Australian colonies, where there is a wide range of soil and climate suited to its growth. The special agent of the Department of Agriculture says: "There is no doubt about the ability of the inhabitants of the United States to grow commercial flax if the people will only make beginnings, and go to work in earnest with the idea in view first to establish the industry, and to make money out of it afterward. The time is ripe for the establishment of the industry, as is proved by the profound interest that has been awakened in our experiments by foreign manufacturers."

THE LOSS OF THE "MARIA TERESA."

The painful news of the abandonment of the "Maria Teresa" as she was being towed from a Cuban port to Norfolk Harbor has been followed by a report from Captain McCalla, of the United States navy, stating that there is practically no hope of saving the vessel, which, as our readers are aware, was, subsequently to her abandonment, cast ashore on Cat Island, Bahamas.

The "Maria Teresa," it will be remembered, was used by Admiral Cervera as his flagship in the Santiago engagement. She headed the squadron as it issued in single column from the harbor, and she was the first to open the battle and receive the concentrated fire of the American fleet. She kept up the running fight for over seven miles when fire broke out between decks, and she was run ashore.

In the subsequent examination by the naval board it was found that she had suffered less injury from fire and the guns of our fleet than either of the sister ships "Vizcaya" and "Oquendo." The frames above water were practically intact, and while the deckbeams and bulkheads above the protective deck were warped by the heat, the bulkheads, longitudinal and transverse, below this deck were generally in good condition, thus insuring the integrity of most of the watertight compartments. The outside plating, moreover, was in good condition. The effect of gun-fire was less severe upon her than the other vessels, and she escaped the magazine and torpedo explosions which completely wrecked the "Vizcaya" and "Oquendo." The shot holes dangerously near the waterline were made by two 6-pounders, a 4-inch, a 6-inch, two 5-inch, and two 12-inch shells.

In agreement with the recommendation of the board wrecking operations were commenced, and subsequently carried to a successful completion under Lieut. Hobson. The greatest obstacle encountered was a point of rock which had pierced the bottom near the forward turret. This had to be blasted away and a cofferdam built over the hole before the ship could be floated. She was subsequently pulled off and towed to Guantanamo Harbor, where temporary decks were laid and the vessel put in trim for the trip to Norfolk navy yard. She ultimately got away under her own steam and in tow of the wrecking tugs, accompanied by the repair ship "Vulcan." Good headway was made until heavy weather was encountered, in which the "Teresa" began to labor heavily and take in a considerable amount of water. The heavy pumping machinery on board was unable to control the water, the suction becoming choked with coal and the wreckage of the ship. She settled by the head, and the commanding officer, thinking she was about to go down, cut the tow ropes and left the ship to its fate.

The watertight compartments, however, kept her afloat, and she was ultimately driven by the storm upon the coast of Cat Island. Capt. McCalla was immediately dispatched to the wreck, and reported that it was hopeless, in his opinion, to expect the rescue of the ship. He says:

"The wreck is stranded in from sixteen to twenty-one feet of water, and rests on a rocky reef covered with coral sand interspersed with bowlders.

"I spent Sunday on the wreck, examining carefully all the compartments which were not flooded, as well as the ship's surroundings. The evidence showed that after striking the reef the mainmast was driven up and broken off short below the spar deck, the military top lying outside the bilge under the port quarter.

"Seas had gone entirely over her and the inner bottom generally had been driven upward from 1½ to 2 feet. A patch on her bottom abreast the forward turret had disappeared. The air ports had been driven in and the seas had entered through them and the gun ports on the starboard side. The spar deck and deckhouses had been crushed in by seas after the ship struck. Both starboard and port engines have been forced up by from six to eight inches.

"The best way to illustrate the general condition of the wreck is to say that the two sets of engines, boilers, and their foundations form part of the reef itself, around which the rest of the ship works laterally and vertically. The same effect would be produced, in my opinion, if the ship had settled on a pinnacle of rock. I can best describe the condition of the ship generally by saying that she is already telescoped, and I believe that, as the rivets are sheared by the constant working of the ship, the telescopic process must continue. In considering the practicability of rescuing the Teresa, the fact must be considered that she lies upon a coral reef with but a thin layer of sand on the windward side of an island, constantly exposed to seas, due to the trade winds and to the influence of many storms developing to the eastward or southward."

It must be evident to the most sanguine that the "Teresa" will never figure on the official lists of our navy.

Interest now centers in the "Christobal Colon." The government has abandoned its wrecking operations; but there is a possibility that the work of saving her may be undertaken by the Swedish wrecking company that performed the seemingly impossible feat of raising the British battleship "Howe" in Ferrol Harbor.

THE NOVEMBER METEORS.

Some brilliant Leonid meteors were observed on the morning of November 15. Some of the brightest meteors were not far from the constellation Leo. One particularly bright one fell from the constellation Taurus leaving a trail of phosphorescent brilliance. Others came from the direction of Ursa Major. The display was disappointing. In the last Leonid shower in 1866, 8,000 meteors were counted at one observation station, but the shower of 1866 did not compare with the one in 1833, when the number of the meteors made some people think the world was coming to an end. Prof. C. A. Young, of Princeton University, observing with an assistant, reports that he saw 100 Leonid meteors on the morning of November 15. He said, "My assistant, Mr. Reid, and myself conducted the observations, which were much more successful than I thought they would be. Between the hours of 3:15 o'clock and 5 o'clock we saw about 100 meteors which were Leonids, that is, they belong to the meteoric swarm that gave the shower. Perhaps one dozen were as bright as first magnitude stars. The rest were faint and left trains which continued from one to ten seconds. The maximum of the shower was at 3:45 o'clock, at which time there were two or three meteors per minute for about twenty minutes. The radiant point seemed to be in the Sickle of Leo and a little further south and west than in 1866. It was a distinctly meteoric shower, but a very faint one, and augurs well for a good display in 1899."

Prof. Rees, of Columbia University, saw no Leonids. "As a matter of fact," says the Professor, "I saw only two meteors. They came from the direction of Ursa Major, and not from Leo, as had been expected. I watched the sky every hour from sunset to sunrise between the southwest and the west."

At the Yerkes Observatory, Williams Bay, Wis., the shower was also observed. The fore part of the evening the sky was overcast, but about midnight the sky cleared, and in a short space of time, during which they were visible from the observatory, 200 meteors were seen. Dr. William L. Elkins, of the Yale Observatory, photographed 30 meteors. Six cameras were used, two at the observatory, two from the church steeple, and two in one of the suburbs. Prof. Prentiss, of Rutgers College, states that while the display of the meteors was not unusual, this scarcity is not regarded by astronomers as a disappointment; furthermore, they are valuable indications of large showers of meteorites for 1899 and 1900.

LATIMER CLARK.

With the death of Latimer Clark, on October 30, the number of those who are connected with the earlier developments of land and submarine telegraphy has become greatly reduced. We now have only Lord Kelvin, Sir Samuel Canning, and Messrs. Bright, Webb, and Clifford.

Mr. Clark was born in 1822, and in his early youth showed a strong taste for chemistry, and he soon obtained a position in a chemical industry. In 1847 he became assistant engineer to the Electric Telegraph Company, and on the retirement of his brother a short time later he was appointed engineer of the company. His first telegraph work which brought him into notice was the employment of electricity in firing a time gun. He devised an excellent insulator and also a pneumatic system for transmitting telegraph messages. His field of professional activity constantly extended itself and he became engineer-in-chief of various companies. Mr. Clark was the first to draw attention to the retardation of electricity in a covered wire by induction and to insist that a high potential was of no advantage for the transmission of signals through cables. In 1861, Mr. Clark associated himself with Sir Charles Bright, and this firm acted as engineers for the construction and laying of nearly all the early telegraph cables. In the same year these gentlemen read a paper before the British Association on electrical standards and units, in which, for the first time, a definite and practical system of electrical measurement was suggested and adopted. The two engineers conducted many experiments on the effect of temperature on the electrical resistance of gutta percha and deduced from this a formula for correcting the resistance to a standard temperature. They also acted as engineers for the purpose of making and laying the second and third Atlantic cables. In 1868 the partnership was dissolved and the new one was formed, headed by Mr. Clark, and this firm was connected with the laying of 60,000 miles of submarine cables. The Clark standard cell is well known. The year 1898 has been most unfortunate on account of the death of many electricians, including Dr. John Hopkinson, Camille A. Faure, and Latimer Clark.

A USEFUL BEETLE.

Entomologists are interested in the shipments made by Dr. Howard, Entomologist of the United States Department of Agriculture, of beetles to the Department of Agriculture, Portugal. The beetle is known as the Novius cardinalis. Its home is in Australia, and it was introduced in California several years ago by the Board of Horticulture of that State. It was hoped it would prey upon the white or fluted scale, which was ravaging the orange groves of California at that time. A similar case has occurred in Portugal, and the Portugal authorities asked the United States authorities to aid them in exterminating the insects, which were destroying the orange and lemon groves along the River Tagus. Dr. Howard secured about sixty specimens from California, with some larvæ. They were packed in moss, with a quantity of the scale insects, and they were shipped by mail to Portugal. Only five of the beetles survived the trip, and another colony was obtained from California, and was forwarded by direct steamship to Lisbon. One male and five females survived. These beetles are noted for their fecundity, and within a few months their progeny numbered thousands. These were distributed to work upon the scale bugs. The latest advices from Washington indicate that the beetles now number millions and are rapidly ridding the country of the pest. This is only another instance of the good work which this important department of the government is performing. We frequently get inquiries relating to soils, entomology, etc., from correspondents in foreign countries, and invariably we receive answers from the heads of the different divisions of this department which show that their scholarship is only equaled by their courtesy.

"POSSIBLY the wholesale deforesting of the Colorado mountains by the fires that have been raging there for many days may have a useful effect in hastening the time when tree planting on a large scale will be undertaken not only there, but throughout the country," says The Philadelphia Ledger. "The great middle West is already very much alive to the importance of preserving its water supply; and if the destruction of the forests shall have its anticipated effect in diminishing the streams, it will not be long before the people of that section will throw their characteristic energy into the business of replacing the forest growth and extending it as far as may be necessary. From them perhaps we in the East, who have witnessed with so much indifference the destruction of our own forests, may possibly catch the enthusiasm and make some worthy effort to replace our vanished trees. If all this should follow, the burning of the Colorado timber will be a blessing in disguise."