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## FACT AND FANCY.

Mr. Nikola Tesla, of New York, has invented what is known in naval science as a dirigible torpedo, that is to say, a torpedo which, instead of being self-driven and self-steering, like the Whitehead and the Howell, now in use in our navy, is driven and steered by an operator on shore, who controls the torpedo through electrical connections. Of the latter kind are the Sims-Edison, the Brennan, and the Victoria.

The Sims-Edison torpedo is driven by an electric motor carried within the shell of the torpedo, and it is steered by exciting certain magnets which control the steering gear. Current for operating the motor and magnets is supplied through a flexible cable which is wound upon a reel carried within the shell of the torpedo, and has one end connected to the shore. As the torpedo travels through the water, the cable unwinds. The torpedo is maintained at the proper depth by attaching it to a canoe-shaped float. To enable the operator to follow the course of the torpedo, two small flagstaffs are carried at each end of the float, and by keeping his eye on these, the operator is supposed to be able to steer the deadly weapon unerringly on its course. By night two colored lights are carried at the ends of the flagstaffs, and are hooded in such a way that, while they are visible to the operator, they are invisible to the enemy.

The Victoria, an Australian invention, differs from the last-mentioned in being entirely submergible below the water and in using compressed air as its motive power. When first started, it hauls a cable after it, unwinding it off a reel on shore, and the first part of its course is covered at moderate speed. When the operator has guided it to within striking distance of the enemy, a current is sent through the cable, which releases the reel on the torpedo and allows its cable to unwind. At the same time the current starts the air engines at full speed, and the final dash for the ship is made. The Brennan is another torpedo of the dirigible type, which received considerable attention as the result of its being taken up by the British Admiralty and subjected to exhaustive experiments. Like all the torpedoes of the dirigible type, however, it has proved to be only moderately successful, and, in common with them, is not regarded with much favor by naval authorities, the Whitehead automobile being par excellence the torpedo of the present day.

The most characteristic feature in Mr. Tesla's torpedo as distinguished from the others of the dirigible class is that, whereas they use a connecting cable for transmitting the controlling power to the torpedo, he makes use of the Hertzian waves, dispensing with the cable. This method of transmission is more popularly known under the name of "wireless telegraphy," and as such attracted considerable public attention during the recent experiments by the British Post Office with the apparatus designed by the young Italian, Marconi. On another page we reproduce some of the drawings accompanying the patent which has recently been granted to Mr. Tesla, and these, together with the descriptive matter, will render this interesting device clear to our readers.

Regarding the merits of the invention and its practical value, it is altogether too early to make any predictions. The abolition of the connecting cables is, of course, greatly to be desired, and the Tesla torpedo will, presumably, be rid of the liability to accident due to several thousand yards of cable trailing in the water. On the other hand, since the propelling current can no longer be transmitted from the shore, it becomes necessary to provide batteries within the torpedo itself, thereby adding again the weight that was saved by abolishing the cable.

It is true the range of the torpedo is enlarged (according to the inventor, indefinitely); but as the Sims-Edison has an extreme range of two miles, at which distance it would be extremely difficult to follow the motion of the two small flagstaffs above referred to, we fail to see what advantages would ensue from being able to drive and control the torpedo at any greater distance.

Except so far as it dispenses with the cables, it is not evident what advantages the Tesla torpedo possesses over others of the dirigible type, and unless it proves far more effective in actual test than they have done, it cannot be considered as even a formidable weapon.

Unfortunately for its reception by the thinking public, Mr. Tesla's improvement has been introduced to the world with some of the most extravagant rhapsodies that ever threw discredit upon an untried invention. Under the "scare head" title "Tesla declares he will abolish war," one of the leading New York journals quotes Mr. Tesla as saying in an interview: "War will cease to be possible when all the world knows to-morrow that the most feeble of the nations can supply itself immediately with a weapon which will render its coast secure and its ports impregnable to the assaults of the united armadas of the world. Battleships will cease to be built, and the mightiest armorclads and the most tremendous artillery afloat will be of no more use than so much scrap iron. And this irresistible power can be exerted at any distance by an agency of so delicate, so impalpable, a quality that I feel that I am justified in predicting that the time will come, incredible as it may seem, when it can be called into action by the mere exercise of the human will."

Having thus oratorically blotted out the navies of the world, the interviewed descends to particulars, and the reader, whose faith in battleships and cruisers is thus so rudely assailed, is relieved to learn that the mighty agent of this naval cataclysm is no more nor less than our time-honored friend the torpedo (that ever verdant topic of the universal destructionalist); in new war paint and snorting strange and new defiance, it is true, but still—"a torpedo." Unlike its prosaic forbears, however, this prodigy is not content with smiting anything in the way of a warship that may be in sight; for so keen is it on the scent that it could strike, we are told, a vessel that lay at Southampton, England, while the operator was snugly ensconced in the forts at Sandy Hook.

"Mr. Tesla told me," says the reporter, "that some months had elapsed since he had fully developed his device, for which he has applied for a patent. When it was learned that Admiral Cervera was bottled up at Santiago, it was his intention to apply his mechanism to several launches and similar small craft loaded with high explosives and annihilate the fleet at anchor. Admiral Cervera, however, came out and met his fate under the guns of the American fleet before the necessary arrangements could be made. Then Mr. Tesla planned a raid on the Spanish vessels in Havana Harbor, only to be thwarted by the proclamation of the suspension of hostilities."

In view of these facts we can well believe the inventor when, according to the journal in question, he says of his dirigible torpedo:

"My imagination fairly reels when I attempt to contemplate its countless possibilities. Already I hear the knell of the battleship and the monster gun! . . . England is now no stronger than the weakest of the maritime nations. . . . She will be utterly confounded, . . . and France will rejoice."

Now all this extravaganza may or may not express the true state of the "reeling imagination" above referred to. We prefer, charitably, to hope it does not; but the question to be asked in all seriousness is, What possible good can be done either to the inventor himself or to the great cause of science, which he is presumably desirous to promote, by confusing the minds of the public by such unscientific exaggerations as we have quoted above?

The facts of Mr. Tesla's invention are creditable enough in themselves. Their practical value will be demonstrated, we presume, in due course under the fierce searchlight of a test by naval experts. Until that time it would be better to allow the navies of the world to enjoy to the full that short spell of life which yet remains to them.

## GIANT STEAMSHIPS FOR THE ATLANTIC SERVICE.

The modern tendency toward centralization is very manifest in the ever increasing size of the steamships, both freight and passenger, built for the Atlantic service. It seems but a few months since we were recording the truly enormous dimensions of the "Pennsylvania," of the Hamburg-American line, yet in the brief interim she has been succeeded by a sister ship, while others rivaling her in size are upon the stocks or projected. The same company is building for the New York service a vessel that will exceed the "Pennsylvania" (which, by the way, is credited with having carried over 14,000 tons of freight in her hold on a single trip) in every point of comparison. A special feature of her construction will be the fact that the cellular construction known as the double bottom will in this ship be carried up into the sides, giving her practically two complete hulls. This will greatly increase her chances of surviving a collision by providing her with a more elaborate watertight subdivision. Two other large freight steamers are under construction for the New York service of this company and several for the Baltimore and Philadelphia and the West Indian and East African service.

The most interesting of the new vessels, however, is the passenger steamer "Deutschland," which is under construction by the Vulcan Company, of Stettin, the builders of the "Kaiser Wilhelm der Grosse." She is to exceed the latter vessel in size and speed, and with the exception of the "Oceanic," which is shortly to be launched at Belfast, she will be the largest steamship in the world. Her dimensions are: Length, 685 feet; beam, 66½ feet; depth of hold, 45 feet; tonnage, 16,000; horse power, 33,000; and sea speed, 23 knots. Including the "Oceanic" and "Deutschland," the four largest steamships will be the "Oceanic," "Deutschland," "Kaiser Wilhelm," and "Campania." Below we give a comparison of these with the "Great Eastern":

| | Tonnage. | Length. | Beam. | Horse Power. |
|---|---|---|---|---|
| "Great Eastern" | 22,500 | 680 | 83½ | 7,650 |
| "Oceanic" | 17,000 | 704 | ? | ? |
| "Deutschland" | 16,000 | 685 | 66½ | 33,000 |
| "Kaiser Wilhelm" | 14,000 | 649 | 66 | 30,000 |
| "Campania" | 12,950 | 620 | 65 | 30,000 |

The "Deutschland" is to be completed in the spring of 1900, in time for the heavy travel in connection with the Paris Exposition.

## BOILER CAPACITY IN AMERICAN AND ENGLISH LOCOMOTIVES.

The constantly increasing weight of the express trains on English railroads of late years has necessitated the designing of much more powerful engines to cope with the situation. During the past two or three years, particularly, the English designers have been enlarging the dimensions of their locomotives up to the full limit allowed by the small size of their tunnels and by the other constructional features in the way of bridges and station platforms which impose a serious limit upon the dimensions of locomotives and cars in that country. Anyone who follows with interest locomotive development in this country and England must have been struck with the great disparity in size and power between the locomotives in use in the two countries. There is nothing in England to compare with our heaviest ten-wheel express locomotives or with such gigantic freight locomotives as those which have recently been built for the Great Northern Railroad, the Philadelphia Railroad, and the huge 115-ton engine turned out by the Pittsburg Locomotive Works.

It must be admitted, however that even after making allowance for the cramped condition of tunnels, bridges, etc., English engineers have been slow to avail themselves of such opportunities as they had. It has been a common occurrence, and is, indeed, a common occurrence on some lines to-day, for the heavy trains to be hauled by two comparatively light engines under circumstances where a single engine of greater power could have been designed to do the same work with a considerable saving in the expenses of operation. There are many express engines in constant service in England to-day whose heating surface is barely one thousand square feet. In America, trains such as these engines are hauling would be handled by a locomotive of between fifteen hundred and two thousand square feet of heating surface and having cylinder capacity in proportion.

For some reason or other, the English have been slow to increase the size and power of their boilers. The diameter of the cylinders and the stroke have been increased without any corresponding provision being made for a larger supply of steam, with the result that to American eyes many of the English express locomotives look to be very much over-cylindered. Of course, this disparity is somewhat corrected by the fact that the coal burnt on English locomotives is, as a rule, of better quality than ours, and there is, moreover, a certain amount of benefit derived from the copper fireboxes, which are universal over there, and the brass tubes, which, we believe, are still very widely in use.

Another cause which has operated to keep down the size of the boiler is the partiality of English engineers for large driving wheels, coupled with their prejudice against placing the boiler at any great height above the rails. On engines, for instance, like the celebrated eight-foot single drivers of the Great Northern Railway, the diameter of the boilers is restricted to the distance between the drivers, and hence it is impossible to largely increase the heating surface as long as the boiler is kept well down upon the frames without extending it to a length which is not desirable.

In America the tendency to increase the size of the boiler in express locomotives showed itself at about the time when we were also greatly increasing the size of the driving wheels. The difficulty was met by boldly placing the center line of the boiler well up above the wheels, allowing the boiler, if need be, to overlap them considerably. A notable instance of this was the New York Central engine, No. 999, in which the center of the boiler is 8 feet 11½ inches above the rails. Experience has proved that this arrangement presents no objectionable features, and, indeed, it is found that a locomotive with a high center of gravity

is easier in its motion and less destructive to the track and roadbed than one in which the center of gravity lies several feet nearer the rail. No. 999 was provided with a heating surface of nearly 2,000 square feet, or about double that of the average English express locomotive at the time when she was constructed.

The obvious advantages of the large boiler capacity of American locomotives were not lost upon English engineers, and two or three years ago Mr. Drummond designed for the Caledonian Railway a powerful engine, the boiler high above the wheels, whose total heating surface was about 1,500 square feet. Following the lead of this design, other roads, such as the Great Western, the Southwestern, and the Great Northern, brought out some very handsome engines, in which the heating surface has been raised as high as 1,600 square feet, the cylinder capacity in every case being increased in proportion. One of the latest and most successful of these designs is illustrated on another page. We think it is questionable whether such engines as the one in question and the powerful four-cylinder engine recently built for the Southwestern Railway by Mr. Drummond have not about reached the limit of size obtainable on English roads. Hence the rapid increase in size and weight of English rolling stock makes it evident in the course of time the problem of providing sufficiently powerful locomotives will be a difficult one to solve.

## ANNUAL MEETING OF THE SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS.

The annual meeting of the Society of Naval Architects and Marine Engineers took place on Thursday and Friday, November 10 and 11, in the building of the American Society of Mechanical Engineers, 12 West Thirty-first Street, New York city. In view of the excellent list of papers to be read before the society, many of them bearing directly upon the operation and lessons of the recent war, there was an unusually large attendance of members. On the first day the meeting was called to order by President Clement A. Griscom, who delivered an address in which he paid tribute to the designers and builders of the American ships in common with the officers and men who had fought with such brilliant results. He expressed the opinion that our acquisition of distant territory would have a stimulating effect upon our shipbuilding industry, and that it was possible that it would prove the turning point from which we should rise to our former proud position as one of the leading shipbuilding countries of the world.

Assistant Naval Constructor Lawrence Spear read a paper on "Bilge Keels and Rolling Experiments, U. S. S. 'Oregon,'" in which he gave some interesting information as to the effect of placing bilge keels on this vessel. Naval Constructor Bowles read a paper by G. W. Dickie, manager of the Union Iron Works, of San Francisco, on "Torpedo Boat Destroyers for Sea Service, with Special Reference to the Conditions that Prevail on the Pacific Coast." Questions raised by this paper were taken up in connection with the topical discussion on "The Utility of Torpedo Boats, and Has the Submarine Boat a Place?" Communications were read by Secretary Bowles, from officers who had commanded some of the torpedo boats during the war, who claimed that the boats were of great utility, but were handicapped by an insufficient complement of officers and men accustomed to this form of service. An interesting and valuable paper was that read by F. M. Wheeler on the "Steam Economy Test of a Unique Form of Feed Pump."

On the second day of the session the following papers were read: "The Steam Yacht as a Naval Auxiliary," by William P. Stephens; "Designs of the New Vessels for the United States Navy," by Chief Constructor Philip Hichborn; "Methods of Testing Water-tight Bulkheads in United States Navy," by Assistant Naval Constructor H. E. Smith, U. S. N.; "Tests of the Strength of a Longitudinal Bulkhead Separating Two Engine Rooms," by Naval Constructor J. J. Woodward, U. S. N.; "An Electrically Operated 150 Ton Revolving Derrick," by Walter A. Post; and the "Stability of a Battleship under Damaged Conditions."

Commencing with the next issue of the SCIENTIFIC AMERICAN SUPPLEMENT, we hope to publish a series of the above papers.

## COMMISSION TO REVISE THE PATENT AND TRADEMARK LAWS OF THE UNITED STATES.

A commission has been appointed by the President, under an act of Congress, to revise and amend the laws of the United States concerning patents, trademarks, and commercial names, to the limited extent of their interference with the Convention for the Protection of Industrial Property, and the agreements under such convention for the prevention of false indication of origin, and for the international registration of trademarks.

The active duties of the commission, in respect of amending the patent laws, are therefore very limited; but the provision as to the report of the commission is very broad, and enables them to accompany their report by references to such treaties and foreign laws relating to patents, trade and other marks, as may affect the citizens of the United States. The commission, therefore, have the widest latitude for instruction and information to the inventors of the United States.

They have issued a letter addressed "to citizens of the United States interested in inventions and trade marks as related to foreign commerce," which raises a multitude of questions of interest to our people, and which, if properly answered, will enable the commission to make a report of the greatest interest and value.

The letter does not show any bias on the part of the commissioners for or against any particular side in the discussion of the desirability of patent laws by the people of this country, but on the contrary would seem to indicate the bringing together of all the questions which may be raised for the amelioration of our present patent system.

We think that the plan of action adopted by the commission is highly commendable, seeing that it will place them in close touch with the needs and wishes of the great body of inventors and manufacturers who are immediately concerned in the questions at issue. If the commission had drawn up, on its own initiative, a series of amendments that might or might not have commended themselves to the interested public, they would not have worked with such a comprehensive grasp of the problem as they will after the various meetings have been held and the inventors and manufacturers have had an opportunity to discuss the matter in the form of a series of questions or suggestions, as written down in the letter "to citizens of the United States" above referred to.

In pursuance of their policy the commission are holding a series of meetings in the principal industrial centers, to which they are inviting the attendance of inventors, merchants, and manufacturers. The first meetings, held in Chicago on Thursday, Friday, and Saturday, October 6, 7 and 8, were largely attended, chiefly by the members of the Patent Bar Association. Addresses were delivered by Lysander Hill, Judge L. L. Bond, James H. Raymond, Robert H. Parkinson, President of the Patent Bar Association, Lewis K. Gillson, Arthur Steuart, of Baltimore, Paul Synnestvedt, Ephraim Banning and Mr. Pierce.

Mr. Francis Forbes, one of the commissioners, attended a meeting of the Association which was held in St. Louis on October 10, 1898, at the invitation of the Association, and explained the operation of the International Convention, and received suggestions in regard to alterations in the patent laws which would remove existing disabilities under which the various branches of business represented at the meeting were laboring.

The open letter or invitation before referred to has been sent out to the extent of 5,000 copies by one manufacturing association alone in this city, and it is to be hoped that there will be a large attendance by those whose interests are affected. The forthcoming New York meetings will be held at the United States Court rooms in the Post Office building in New York at 10 A. M. on November 19 and 21. These will be followed by a meeting at the Patent Office in Washington on November 22.

The Convention for the Protection of Industrial Property requires in general terms (art. 2) that the citizens of one member of the union created by it shall enjoy in another all the rights which the citizens of the latter enjoy in regard to patents for inventions, trademarks, and commercial names. The open letter of the commission submits a series of questions from which we select the following:

What advantages do the laws of the United States accord to its citizens which the citizens of other members of such union do not "enjoy"? It is pointed out that our patent laws grant the right to file caveats to citizens of the United States only, and the question is asked: "Is this a right which citizens of other members of the Union for the Protection of Industrial Property are entitled to enjoy under the convention?"

We think that as long as the filing of caveats is practiced in this country, there can be no question of the advisability of granting to foreign inventors the same right, should they wish to exercise it. It should be borne in mind, however, that the advantage of filing a caveat is open to some question, and that some practitioners advise against this step, except in certain limited and special cases.

Regarding the "date of invention," the circular calls attention to the fact that in interference proceedings before the Patent Office, the foreign applicant is allowed to carry back the date of his invention to the date of publication of his foreign patent, or of his disclosure in this country, and not to the date of filing his application abroad. It is asked whether this rule should be changed by statute?

It is evident that the foreign applicant is here placed at a great disadvantage as compared with an applicant in this country.

Regarding the application for and obtaining of a patent by a foreign executor, the circular asks, "Should it be provided by statute, that in case of the death of a foreign inventor the executor or administrator authorized to act by a foreign court having jurisdiction of the estate of the deceased inventor, should be permitted to apply for and obtain the patent for the invention of such foreign inventor?" As matters now stand, the foreign inventor is at a disadvantage owing to the fact that a foreign administrator has no standing in our courts. Should an applicant die during the prosecution of his application, his estate is put to the trouble and expense (the latter amounting to about the usual cost of obtaining the patent) of having to take out ancillary letters of administration.

Regarding trademarks, the circular states that each member of the union agrees that "every trade or commercial mark regularly deposited in the country of origin shall be admitted to deposit, and so protected in all other countries of the union;" and the following questions are asked: "Is a national law, which shall be enforceable irrespective of the State laws of the several States of the United States, required by the convention? Must such a law, if granted, allow of the registration of every foreign mark, duly registered abroad, except such as are contrary to morals and to public order? Should the Tariff Act of 1897 be amended so as to afford to manufacturers of other states of the union the same protection that it affords to domestic manufacturers?"

Under the head of "Consideration of Special National Features of Patent Laws" the most important question brought up for consideration is as to whether a provision should be inserted in the law forbidding the grant of a patent in the United States in the case of the prior application for and grant of a foreign patent for any other invention than that for which said foreign patent was granted? The case of Germany (Germany is not a member of the union) is a familiar illustration of the inequality that exists in this particular. If a citizen of the United States or a German subject applies for a patent in Germany for a new chemical combination, the German government allows the grant of a patent for the process only. "Should a German citizen, therefore," the circular asks, "be granted a patent in the United States for both the process and the new chemical combination produced by the process?"

The broad principle of equality which underlies the whole movement of the Protective Union commends it to the people of the United States, and we sincerely hope that the effort on the part of the Revision Committee will be met by a prompt response on the part of the industrial interests in New York city and vicinity.

## DEATH OF D. A. WELLS.

David A. Wells, who was widely known as a writer on economics, died at his home, Norwich, Conn., November 5, 1898. He was born in Springfield, Mass., 1828, and was a lineal descendant of Thomas Welles, Governor of the Colony of Connecticut from 1655-58. Mr. Wells graduated from Williams College in 1847 and became assistant editor of the Springfield Republican. He invented the first successful machine for folding newspapers and books. Journalism did not appear to be to the liking of Mr. Wells, and, as he realized a sufficient sum from the sale of his invention to render him independent, he abandoned newspaper work and took a special course at the Lawrence Scientific School of Harvard. He graduated from this school in 1852, and received an appointment as professor in the school. At the close of the civil war Mr. Wells was brought prominently into public life by his writings on economical subjects. His essay, "Our Burden and Strength," was received with enthusiasm in the Northern States. President Lincoln sent for Mr. Wells in 1865 to confer with him as to the best methods of dealing with the enormous debt which the war had accumulated. In March of that year Congress created a commission of three persons to inquire into the subject of raising by taxation such revenue as was necessary to supply the wants of the government. Mr. Wells' work so impressed Congress that, in 1866, an act was passed making him "Special Commissioner of Revenue." Most of the laws passed between 1865-70 dealing with the whole system of revenue laws were passed at Mr. Wells' suggestion. In 1865 Mr. Wells made a trip abroad to investigate forms of competitive industry with a view of drafting a new tariff. The result of this visit was to change Mr. Wells' views from strong protection to free trade, and on his return he began an aggressive campaign against what he termed "existing evils in the system of revenue taxation." Since that time Mr. Wells devoted his attention largely to writing on economic subjects, and has held positions as a State commissioner for investigating laws relating to legal taxation.

THE best locomotives on steam lines weigh 154 pounds per h. p., but on an electric traction line at Baltimore, which was opened in 1895, the electric traction locomotive weighed 126 pounds per h. p. These locomotives weigh 90 tons, and develop 1,600 h. p., distributed on six independent driving axles.