Scientific American.

ESTABLISHED 1845

MUNN & CO., - - - EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, - - NEW YORK.

TERMS TO SUBSCRIBERS

One copy, one year, for the United States, Canada, or Mexico $3.00
One copy, one year, to any foreign country, postage prepaid. £0 16s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845).....$3.00 a year
Scientific American Supplement (Established 1876) ..... 5.00 "
Scientific American Building Edition (Established 1885)..... 2.50 "
Scientific American Export Edition (Established 1878)..... 3.00 "

The combined subscription rates and rates to foreign countries will be furnished upon application.
Remit by postal or express money order, or by bank draft or check.
MUNN & CO., 361 Broadway, corner Franklin Street, New York.

NEW YORK. SATURDAY, JUNE 29, 1901.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

BIGGEST IN THE WORLD.

Is it because we never entirely lose some of the strong characteristics of childhood that, in describing an event or an object, we seem to consider that the last touch of dignity and importance has not been put upon it until it has been designated as the biggest or most superlative something or other of its kind in the world? It is really surprising how much heart-burning may be caused by a journalistic inadvertency, actual or supposed, in placing the coveted honor where it does not belong. A curious instance of an imagined injustice of this kind has lately reached the Editor's desk in the form of an editorial from our esteemed contemporary, The Daily Eagle of Poughkeepsie, N. Y., in which the writer takes us to task for having stated that the new double-track railway viaduct over the Des Moines River, Iowa, is in some respects the most notable railway viaduct in existence. This structure is 2,685 feet in length, and its rails are 185 feet above the water. The peace of mind of our Poughkeepsie contemporary has been rudely disturbed by our stating that this structure, "in point of the total weight of metal employed in its construction, is fully three times as heavy as the next largest bridge of the kind in the world." The statement is unpardonable in the eyes of our critic, who hastens to remind us that he lives beneath the shadow of a double-track railway bridge, which is 6,767 feet and some inches in length, and 212 feet above high tide, and contains a dead-weight of over 21,000 tons of steel as against the insignificant total of 5,680 tons that was built into the structure over the Des Moines River. The trouble with our contemporary is that he is comparing two horses of an entirely different color, namely, a viaduct and a cantilever, the Des Moines crossing being of the first and the Poughkeepsie crossing of the second type. In bridge engineering parlance it is customary to classify a bridge according to the predominant feature thereof. In the case of railway bridges, such as the Loa viaduct in Bolivia, and the Kinzua and Pecos viaducts in this country, where by far the greater part of the crossing is made up of short spans carried on steel bents or braced towers, with or without a truss span thrown across the main channel, or gorge, as the case may be, the structure takes its name from its predominant feature and is known as a viaduct, this term being generically applied to any tower-and-short-span structure of the kind described. On the other hand, a bridge of the character of the Forth cantilever structure in Scotland, or the Poughkeepsie crossing of the Hudson, in which the cantilevers form the predominant feature and the viaduct approach, great as it may be, is entirely subsidiary, the structure is generically known as a cantilever bridge. The same may be said of the new East River bridge, which, although it is approached by a viaduct several thousands of feet in length—of an aggregate length indeed much greater than that of the suspended structure—will nevertheless be known as a suspension bridge. For all its 4,000 and more feet of viaduct, the splendid structure at Poughkeepsie will ever be known as one of the great cantilever bridges of the world.

EXTRAORDINARY SPEED IN THE PARIS-BORDEAUX AUTOMOBILE RACE.

From Paris to Bordeaux by road is a distance of 348 miles, and when the great chauffeur Charron covered this distance in the race of 1900 in 11 hours 4 minutes and 20 seconds, at an average speed of 31.4 miles per hour, it was justly considered to be a most remarkable performance. This year, however, has witnessed a feat which is not only the most sensational in the annals of automobilism, but one of the most remarkable speed performances of any kind whatsoever, whether by road, rail or sea; for the same distance was covered by the winner in 8 hours 44 minutes and 44 seconds, at an average speed of about 40 miles an hour. The significance of this performance is only understood when we bear in mind that the Paris-Bordeaux course involves a reduction of running speed to about 7½ miles an hour in passing through ten different towns and cities along the route. If the 18 miles on which there is a speed restriction be deducted, we find that Fournier covered 330 miles in 6 hours 11 minutes and 44 seconds, at an average speed of more than 53 miles an hour. Remembering that in climbing the hills and on certain parts of the road where curvature or other local conditions would necessitate it, the speed must have been brought down very much below this average, we can see that, on certain stretches, the automobile must have been running at a speed of from 70 to 75 miles an hour—and this, be it remembered, upon a country macadamized road and not upon a carefully aligned steel track, fenced in from all the risks and dangers of miscellaneous traffic. Interest in this performance centers both in the man and the machine. The latter was a Mors vehicle of 35-horse-power, and, unprecedented as was this capacity, it was excelled in some of the other machines that were present at the starting line, the English automobilist Edge, for instance, being on hand with a 70-horsepower machine, which was disqualified on the ground that the tires, which had been substituted on account of a puncture, at the last moment, were of French and not of English make. The machine thereby failed to meet the conditions of the race, which demanded that each machine should have an absolutely national character. Judged on purely technical and mechanical grounds there is, of course, no reason why an automobile provided with sufficient horsepower should not maintain such high speeds and even higher speeds for as great and greater distances; and we say this without wishing to detract from the great credit which is due to the builders of the leading vehicles, several of which made better time than that accomplished by the winner of last year's race.

The most remarkable feature of the whole performance is the nerve and skill possessed by the chauffeur Fournier, for at the terrific pace achieved, it is evident that the slightest error in judgment could easily have precipitated disaster. Full details of the race will be read with considerable interest, particularly as regards the special policing, which must surely have been carried out at crossroads and elsewhere to maintain some kind of a clear track ahead of machines that were sweeping along at speeds faster than those of the average express train. Fournier is well known in this country. Only a couple of years ago he was a conspicuous figure upon the bicycle track at Madison Square Garden, where he exhibited a motor-cycle and introduced motor-pacing to the American public.

It is noteworthy that the leading automobiles were all heavy vehicles of great power, the first five being in the class weighing over 1,430 pounds. The winning machine was, as we have said, a Mors, and the second, third, fourth and fifth were Panhard vehicles. The sixth and seventh contestants to finish were 8-horsepower De Dion motor-cycles, the first covering the distance in 8 hours 1 3-5 minutes and the second in 8 hours 3 minutes. An average speed of over 40 miles an hour for 330 miles for a motor-bicycle is a scarcely less remarkable feat in its way than that of the winning machine.

THE LESSON OF THE RECENT FERRYBOAT DISASTER.

It is to be feared that the relatively small loss of life in the recent ferryboat collision in New York Harbor, small, that is to say, compared with the loss which might easily have occurred, may result in our too readily forgetting the lesson which this accident teaches. Had the Staten Island ferryboat been rammed by the "Mauch Chunk" when she was far from her berth, instead of being fortunately within reach of shoal water, the list of fatalities would probably have run up into the hundreds.

It is not for us to enter into the question of culpability in this accident: that will be decided by the proper authorities and the blame, if there be any, will be placed where it rightly belongs. Moreover, when we bear in mind the enormous number of passengers carried every year by our ferryboats, the crowded state of the New York waterways, and the fact that the ferryboats make their trips directly across the line of travel of incoming and outgoing ships, we must admit that the freedom from accident is something truly phenomenal and reflects the highest credit upon the skill of our ferryboat pilots. Shipping men from all over the world have commented upon the extraordinary care required in the navigation of the stretch of water that embraces the southern end of Manhattan Island, and have spoken in the highest terms of the skill which is shown by the captains and pilots of our local craft. Having said this much, however, there is one lesson of the "Northfield" disaster upon which we would lay very special emphasis, and this is that in view of the ever present possibility of collision, all ferryboats at the port of New York should be built with a view to their possessing a wide margin of flotation, their hulls being so subdivided by bulkheads that they would be incapable of being quickly sunk, as was the "Northfield," by a single blow beneath the water line. The more modern ferryboats, of course, are constructed on this plan; but there are some of the older boats around New York, which, if they should be run down, would have great difficulty in reaching shoal water before they sank. We trust that one result of this disaster will be the enactment of even more stringent regulations as to the construction and subsequent inspection of all craft employed in the ferry service around this city.

THE NEW CLYDE LINE STEAMSHIP "APACHE."

It is probably due to the great size and high speed of the transatlantic liners, and the interest of the American public in their performances, that we are in danger of forgetting that our American coastwise steamship companies are adding steadily to their fleets and putting some very serviceable and thoroughly up-to-date new boats upon the various routes. There sailed from this port last week the Cramp-built liner "Apache," the first of two sister ships which have been built by that company for the Clyde Line for service on the route between this port, Charleston, S. C., and Jacksonville, Fla. The "Apache," which is the seventeenth steamship of the company's fleet, is slightly larger than the "Comanche," "Algonquin" and "Iroquois," of the same service. She is 310 feet long, 46 feet beam and 31 feet deep. She is driven by triple-expansion engines with cylinders 25, 43 and 70 inches in diameter and 36 inches stroke, and is built to steam 15 knots when loaded to her full capacity of 3,000 tons of cargo. The staterooms are characteristically American, that is to say, they are spacious, well lighted and airy, and they are free from that too-profuse decoration with which modern passenger ships are apt to be overloaded. There is accommodation for 200 passengers, all of which is above the upper deck.

RECONSTRUCTION OF GERMAN CRUISERS

The German navy has recently undertaken an important piece of work, which consists in modifying a series of eight cruisers which form part of the fleet so as to increase their tonnage and bring the construction up to date. This is to be carried out in a somewhat novel fashion by lengthening the hull by some 25 feet, cutting it in the middle and adding a central portion. This has already been carried out with the first of the series, the "Hagen," and the results have proved so successful that there is little doubt that the remaining seven will be treated in the same manner. The series of cruisers includes the "Hagen," "Frithjof," "Beowulf," "Hildebrand," "Siegfried," "Heimdall," "Aegir" and "Odin." They are coast defense cruisers which were designed at a period when the German navy was mainly occupied with the defensive, and in consequence these boats, which were to navigate along the coast and keep within a short distance from supply points, carried only a small provision of coal, this being about 220 tons. Their displacement was reduced as much as possible, this being just sufficient to comply with the requirements of this class of boats. Six of these cruisers proved quite satisfactory in service, and gave proof of remarkable nautical qualities, and it was thereupon decided to increase the number from six to eight; the latter two had a displacement somewhat greater than the others, and the power and coal supply was thus increased. However, with the recent increase of the German navy and a new order of ideas, these boats were judged to be quite insufficient to figure in the present fleet. But if their radius of action was limited, their other qualities showed that they were fitted to perform the duties of first class cruisers, and it was accordingly decided to transform them by increasing their coal-capacity and thus add a series of boats to the fleet at a relatively small cost, and as the oldest of these dates only from 1889, they will be still quite modern. To increase the coal capacity, the displacement, and consequently the length of the boat, was to be increased. This operation, which is comparatively easy on an ordinary steamer, presents certain difficulties in the case of an armored vessel; in order to cut it in the middle and add the amount required for the increased displacement, it is necessary that as few of the parts as possible should be dismounted in the two halves, which should be left in their original condition, thus leaving in place the engines and boilers, etc. It was decided to commence the work with the "Hagen," and this was begun at the Kiel docks in September, 1899. The section was made in front of the engines, and the rear part was drawn back about 26 feet; the operation of moving the mass required less than an hour. The intermediate portion which was added represented a weight of 500 to 600 tons. In October, or about a year after the commencement of the work, the "Hagen" proceeded with its trials, with very satisfactory results; the engines and boilers acted well, and developed 5,230 horse power, the number of revo-