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 9, 1900.

ATMOSPHERIC RESISTANCE TO RAILROAD TRAINS.

In our issue of July 15, of last year, we illustrated and commented at considerable length upon the remarkable speed of over sixty-two miles made by a bicyclist paced by a locomotive over a mile of measured track. In speaking of the lessons in air-resistance taught by this performance, we referred to the proposal of Mr. F. U. Adams to sheathe a railroad train, and give it a cross-section similar to the shield used in this bicycle trial—this with a view to proving the correctness of his theory that atmospheric resistance could be greatly reduced, and the speed proportionately increased, by building a train with something of the wedge-shaped ends and smooth and continuous lines that characterize the models of steamships.

Thanks to the enterprise of the Baltimore and Ohio Railroad, a full-sized train has been equipped on the lines suggested, and a series of trials is now being made under working conditions, and under a system of chronometer timings which should preclude all possibility of error. On another page will befound an illustration of the train and an account of the trial run of forty miles between Baltimore and Washington. We are free to confess that, unless there has been some error in the timing or the distances, the results are without a parallel, and may be taken as establishing a record in high-speed railroad travel.

While it is true that forty miles has, on other occasions, been run at a higher average speed than sixty-four miles an hour, the record has never been made under such unfavorable circumstances. The present run was made from start to stop with one slow-down to twenty miles an hour, and the line, on account of its grades and curvature, is not to be compared with the straight and level stretches of track over which phenomenal speeds have been hitherto attained.

The most surprising records on this trial (which are such as may well strain the credulity of railroad men) were obtained over the 20·1 miles from Annapolis Junction to Trinidad, which were covered at the rate of 78·6 miles an hour. This would be a remarkable performance for a 57-ton engine if it were hauling a train of 170 tons over a level road; but when we bear in mind that the first 7 miles was on an up-grade of from 25 to 55 feet to the mile, and that to maintain the high average the last 5 miles of downgrade was run at the rate of 102·8 miles per hour, it is evident that some abnormal conditions must have been present to render such a feat possible. There is no authentic record of such a speed having been attained, even for one mile; for although a speed of 112 miles an hour was claimed to have been made by the Empire State Express, the officials of the New York Central Road have rejected the record as being doubtful.

It has been pointed out by Mr. Rous-Martin, who spends most of his time upon the footplate of express engines, and is the accepted authority on the subject, that a liberal percentage must be deducted from most of the so-called record speeds of trains (particularly where the distances are a mile or less than a mile in length), because an error of a very small fraction in the timing will make a very large error in the estimated speed per hour. We are informed by Mr. Adams that error was guarded against in the case of the Baltimore and Ohio train, by providing five timekeepers and taking the average of the times recorded by the stop watches as each station was passed. There was a close agreement between the watches as to the time occupied in running from Alexander Junction to Trinidad, and if the distance is, as stated, exactly five miles, the record of over 100 miles an hour must be taken as established.

The results of this most interesting experiment are not so surprising, if we bear in mind what the wind-shield has done for the bicyclist. The fastest riders can barely cover a mile, unpaced, in two minutes; but with a moto-cycle to pace him a rider has made the distance in one minute and nineteen seconds, and behind the more complete shelter of a locomotive and car the mile has been done in fifty-seven and four-fifths seconds. It is natural to suppose that by smoothing out the train, as it were, and preventing the air from closing in upon platforms and trucks, a proportionate increase of speed would be realized. At the same time it cannot be denied that the results are so unprecedented as to lend extraordinary interest to the trials which have yet to be made.

THE TOTAL ECLIPSE OF THE SUN.

It is safe to say that the total eclipse of the sun of May 28, 1900, has attracted more attention, at least in the United States, and been more widely observed by both professionals and amateurs, than any previous eclipse. The increasing interest in this always instructive phenomenon and the great improvement in the modern instruments for taking accurate observations account for much of this, but the main and controlling reason was the convenient locality of the moon's shadow on the surface of the earth, generally known as the path of the eclipse. This path extended in an almost straight line about 50 miles in width from the southeastern part of Louisiana to the capes of the Chesapeake, passing over portions of Louisiana, Alabama, Georgia, North and South Carolina and Virginia, including New Orleans and other cities of our Southern States. This location of the path of the sun not only afforded to the inhabitants of this section of the country an easy opportunity to see the eclipse, but made excursion parties a special feature of the occasion, and the President left Washington on the dispatch boat "Dolphin" with a party in order to view the eclipse near Norfolk, Va.

There was, however, nothing novel or striking in the general nature of the eclipse, and it resembled in many respects its immediate predecessors. The corona was very similar to those of the eclipses of 1878 and 1889, and like them extended on one side of the sun in the shape of a long pointed streamer, and on the other side like an enormous fish tail, in the extreme end of which was the planet Mercury. It has also been described as consisting of three principal streamers of about equal length, and one of about half the length of the other three, and of curved rays from the poles of the sun, which were very conspicuous. Another observer says that he saw fifteen streamers in the north polar region of the sun, of even and regular structure, with bright centers. In the south polar region the streamers were rolling from a point not near the center of the sun, but near its limb, and were of a finer structure, and some of them crossed.

The corona was bluish green in color, and some described it as having a silvery hue. The solar prominences or the chromosphere, instead of the usual carmine or light crimson, was remarkable for being light pink, which, according to Prof. Eastman, is a very unusual thing.

One reason given for the great similarity of the corona in the eclipses of 1878, 1889 and 1900 is the fact that these years were all years of minimum sun spots, and it is supposed to bear out the theory that a relation exists between the sun spots and the corona.

But while the corona was a beautiful and awe-inspiring sight, it was not considered to have equaled its predecessors. It was fainter than in 1878 and dimmer than usual; the prominent white places were entirely wanting and the streamers were not quite as active as formerly.

SCIENTIFIC TRANSLATION.

Glancing over the list of scientific books which are published each year in ever increasing numbers, one finds that not a few of them are translations of German and French works, which have been deemed of sufficient importance and value to warrant a reissue in England or the United States. The introduction to English-speaking scientists of works whose writers are respected as authorities is undeniably praiseworthy; but the ragged English in which the thoughts of these foreign authors have been clothed must give us pause and cause us to reflect whether engineers and chemists would not do well to brush up their German and French, mildewed by long disuse, and to read in their undefiled native language those works which are now presented in uncouth dress.

The translation of a scientific treatise is both more difficult and more readily accomplished than the translation of a novel or essay; more difficult because it requires in addition to a mastery of two languages, a reasonably thorough knowledge of the subject under discussion; more readily accomplished because elegance of expression must give place to accuracy of translation. Indeed, exactness is the prime requisite of a rendering of a foreign scientific work.

But sometimes it happens that a scientific writer is not only a man of thought, but also a man of considerable literary ability, who clothes his thought in phrases and sentences artistically formed and grouped. The translation of the writings of such a man, ceases to be merely an intellectual task; it becomes an undertaking in which the feeling and good taste of the translator are called into requisition to reproduce as faithfully as possible the style as well as the intellectual traits of the original. A Frenchman, who would construe into his mother-tongue the lectures of Huxley and Tyndall, would seek to convey in his version something more than the mere thought of his original. He would endeavor to reflect the style as well—not that he would ever fully succeed, for the idiomatic grace of one language can never find an exact counterpart in another; but he would deem it necessary to convey to his readers something of the color, the music, and the suggestiveness of the English work. In short, he would attempt to reproduce the man, even to his mannerisms, as well as the thought of the man.

That most scientific translators fail to catch the style of the foreign author is too often due to a deficient knowledge of their own language. A well-known and most successful translator of novels, a woman who has presented to Americans many of the most popular works of German fiction, once remarked: "Anybody can find out the meaning of a French and German text; that is simply a matter of using a grammar and a dictionary. The secret of making an acceptable translation lies in the ability to express that meaning in good English."

But granting that the dictionary is a matter of secondary importance to the translator of novels, it can not be denied that it is well-nigh indispensable to the man who is rendering into English the works of a foreign scientist. As the late Master of Balliol was wont to say, no one is infallible,—not even the youngest of us. No translator can be expected to know the English equivalent of every foreign technical term; he must of necessity have recourse to a good lexicon in which he is sure to find reasonably accurate translations of technical phrases. But unfortunately the dictionaries at present in use are most dangerous things. That they are for the most part old is pardonable; but that their definitions should often be inadequate and sometimes inaccurate is inexcusable.

Few works become so quickly antiquated as scientific dictionaries. An invention frequently requires the coining of an entire terminology to define the new contrivance and its functions. The introduction of the phonograph and telephone, the invention of the steam engine and dynamo-electric machine, the discovery of the Roentgen rays, have each been the means of enriching our scientific vocabulary with words that have been immediately seized and absorbed in the technical speech of the day. Although of new mintage, these terms are as commonly used as any in ordinary mechanical parlance. Obviously the dictionary in which they are not contained is incomplete. And yet most of the purely technical dictionaries are so lamentably deficient in this respect that, for example, many of the terms used in electrical engineering for the last fifteen years, find no place in their pages. For this reason the task of the scientific translator is rendered doubly difficult. In order faithfully to render a scientific treatise into English he must, in a measure, be independent of the lexicon; he must be sufficiently conversant with the topic under discussion to supply, when his dictionary fails him, a correct translation of a term, and to select from a number of meanings that which adequately fills his needs. We shall not readily forget a translation of an article on a German airship, published in a prominent American newspaper, in which the German word for "car" (Gondel) was literally translated by "Gondola," an example either of a too slavish adherence to the original or a lack of judgment on the part of the translator.

The habit of consulting a good technical dictionary is one of the means of cultivating a nice appreciation of distinctions in scientific synonyms. One acquires, moreover, an excellent understanding of the possibilities of one's mother tongue as well as a knowledge of its defects and of its advantages over other languages. The English translator will tell you that, of all languages, French is the most idiomatic; German the least. And although he has not the blessed German privilege of compounding words *ad libitum* to meet his special requirements, he rejoices in that wealth of synonyms which enables him to render a foreign sentence into good Anglo-Saxon with much of its original vigor and idiomatic connotation, and to give to his translation all the marks of an English work, with no trace whatever of the foreign idiom.

THE CENTRAL LONDON TUNNEL ROAD.

A number of details have been recently published as to the new underground electric railway of London. This road, which is called the Central London, commences in the city, near the Bank of England, at a point where the circulation is greatest; it traverses the city in a nearly straight line, its route following mainly Holborn and Oxford Street, ending at Shepherd's Bush, not far from the Uxbridge Station of the Metropolitan; it has 12 intermediate stations. The line is formed of two tunnels, with metallic lining, at 80 feet below the street level, having an interior diameter of 11 feet. At the stations the tunnels are enlarged to 20 feet diameter over a length 370 feet. The stations are reached from above by three pits; one of these is 18 feet in diameter, and has a spiral staircase, the two others, of 23 feet diameter, being each provided with two electric elevators, these having a capacity of 100 persons each. The tracks of the road are laid with steel rails of 100 lb. to the yard; a third rail placed in the center serves to bring the current for the motors.