# SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO., - - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

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One copy, one year, for the United States, Canada, or Mexico ..... $3.00
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*THE SCIENTIFIC AMERICAN PUBLICATIONS.*

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

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MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, OCTOBER 17, 1903.

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.


## ONE HUNDRED AND TWENTY-FIVE MILES AN HOUR—A NEW RAILROAD RECORD.

The speed of one hundred and twenty-five miles an hour, attained the other day by an electric car on the military road extending from Berlin to Zossen, means something more than the hopeless outdistancing of the best record ever made by a steam locomotive and the outdoing of anything that has hitherto been attempted in the way of fast railway traveling. To electrical engineers it means that it is possible to construct an electrical equipment capable of driving a car at almost any speed a roadbed can bear.

Train acceleration has been studied by engineers ever since railroad engineering became something of an exact science. For that reason many have doubted the ultimate value of this Berlin-Zossen undertaking. But the mere duplication of train acceleration figures was something far beyond the purpose of the engineers by whom the speed trials were conducted. Mr. Bion J. Arnold in this country has conclusively shown the superiority of the electric car to the steam locomotive in getting up speed; but no engineer as yet knows the comparative efficiency of steam and electric traction at high speeds, and still less the cost of driving an electric train at the rate of one hundred miles an hour. It was for the purpose of determining these very questions that the Berlin-Zossen experiments were undertaken, and not simply for mere record breaking. Science is not a sport; it is the gathering and classifying of facts for practical use.

The speed of one hundred and twenty-five miles an hour represents the culmination of the experimental work of two great German electrical companies, who, in the interests of electrical engineering, were willing to sink commercial rivalry, to give up all prospect of gain for the time being, and to determine by a series of carefully conducted scientific trials just what an electric car can do at high speeds. Probably nowhere in the annals of modern engineering is there to be found an example so characteristic of German patience and thoroughness. We hear much these days of syndicates formed for the purpose of cheapening the productive cost of goods; but this is surely the first instance of the formation of a syndicate for the sole object of solving a much-discussed problem in electrical engineering.

The history of this Berlin-Zossen scheme is not without interest. Begun some two years ago with practically the same rolling stock used in the recent trial, the experiments had to be temporarily abandoned when a speed of ninety miles was reached, the track proving far too light to withstand successfully the enormous strains imposed by a swiftly-moving vehicle. Electrically considered, however, these early trials were anything but failures. The motor equipment proved well-nigh faultless; dangerously high tensions of thousands of volts were handled with comparative safety. With a roadbed vastly improved, tests were resumed a short time ago at ninety miles an hour. The speed was successively raised from ninety to one hundred and from one hundred to one hundred and seventeen miles, until at last a velocity of one hundred and twenty-five and four-fifths miles was attained, for which the undertaking was originally planned.

It is to be regretted that the military road from Berlin to Zossen is far too short to realize all the advantages to be obtained from high speed. The car could hardly have traveled any great distance at its unprecedented rate when it became necessary to slow down, as the end of the line was near. Still, the results obtained will serve to clear up many a doubtful point in electric traction. Something of the braking power required to stop this one-hundred-mile-an-hour car will surely figure in the reports of the tests.

To the man who has an eye for dramatic effects, the Berlin-Zossen record lends itself well to striking comparisons. If electric expresses traveling at the rate of one hundred and twenty-five miles an hour were as common as sixty-mile-an-hour trains, it would be possible to journey from New York to Philadelphia in little more than forty-three minutes, and to cover in seven minutes the short distance of fifteen miles between the Battery and Spuyten Duyvil, or in other words, the entire length of the island of Manhattan.

## DANGERS IN IRRIGATION.

A "well-known government scientist," was recently quoted in the columns of the New York Sun as stating that irrigation is only a temporary expedient for making arid lands productive, and that genuinely arid countries are always sooner or later ruined by the alkali on the soil, which is brought to the surface by the waters of irrigation and there deposited. Such a statement, ascribed to one presumably connected with the Department of Agriculture, deserves somewhat more than passing attention, particularly in view of the extensive irrigation carried on in these very lands in the improvement of which this very Department has spent so much money. That the evil was exaggerated there seemed no doubt. An inquiry directed to the Agricultural Department brought a reply from Prof. Elwood Mead, Chief of the Irrigation Investigations, who shares our view of the matter.

The Department is well aware of the fact that water dissolves the salts contained in the lower soils of arid regions, and that the water rises by capillary action, and carries these salts in solution up to or near the surface, where they are deposited when the water is evaporated. This state of affairs would be extremely serious, so serious, indeed, that further irrigation would be of doubtful value, if not an absolute waste of time and money, were not the remedy for it, which the unnamed "government scientist" demands, already discovered and put into practice. The investigations of the Department show that the conditions in question are due mainly to over-irrigation, that is, flooding of the arid lands; but can be remedied by proper drainage. The soils of arid regions are usually of a sandy and silty nature, in which water and air penetrate to great depths. In consequence of this, the roots of plants in these regions reach down to considerable depths to obtain moisture and nutriment, instead of spreading along the surface as in humid climates. If, by over-irrigation, the water level is allowed to rise close to the surface, the layer of soil which supplies the plant with food is shallower, and its nutriment soon exhausted. Furthermore, if the water is within reach of surface evaporation, the alkali it contains in solution will accumulate to such an extent as to render the soil unfit for cultivation. The employment of judiciously disposed drains serves the double purpose of preventing undue rise of the irrigation water and of carrying off the objectionable alkali. The depth to which these drains are laid is a matter of great importance. The limit has been placed at four feet from the surface, though greater depths have been recommended. Careful consideration of the source and flow of water sometimes permits the location of a single drain in such a manner as to carry off water which might otherwise injure hundreds of acres of land. The drainage water may be collected in reservoirs, and then redistributed in the irrigation ditches. In localities where water is scarce, the economy of such a system is apparent. Such operations have been successfully and very extensively carried out in Colorado, where it has also been demonstrated that lands already injured by alkali can be restored to productiveness by means of proper subsoil drainage.

## INDIA RUBBER AND ITS SUBSTITUTES.

More than 50 million pounds of India rubber, valued at more than 30 million dollars, were imported into the United States last year. In 1890 the quantity was only 33 million pounds, in 1880 16 millions, in 1870, 9 millions, and in 1862, the earliest date at which it was separately shown in the import statements, merely 2,125,561 pounds. This very rapid growth in the importation of crude India rubber is of course due to the great increase in its use in manufacturing, both as to rubber garments, shoes, etc., and its use in machinery and as tires for vehicles. Over 100 million dollars' worth of manufactures from India rubber are now turned out from the factories of the country every year, and about half of this total is in the form of boots and shoes. So great is the demand for India rubber for use in manufacturing that, not only has the importation grown from 2 million pounds in 1862 to over 50 millions annually at the present period, but in addition to this the forests of the East Indies are called upon for several million pounds annually of a new substitute for gutta-percha, known as "gutta-joolatong," while at the same time the highways and byways of Europe and other continents are ransacked for cast-off rubber manufactures from which the rubber is "reclaimed" and re-used in conjunction with the new rubber from the forests of Brazil, Africa, and the East Indies.

Figures just compiled by the Department of Commerce and Labor, through its Bureau of Statistics, show the importations of three classes of material utilized as India rubber in recent years. They show that during the past few years the importations of crude rubber have ranged from 50 to 55 million pounds; of gutta-joolatong from 5 to 15 million pounds, and of "old and scrap rubber, fit only for remanufacture," from 10 to 20 odd million pounds per annum, and of gutta-percha a half million pounds.

The industry of importing and "reclaiming" India rubber for re-use in manufacturing is a comparatively new one, and while it utilizes large quantities of worn-out rubber boots and shoes and other articles of this character from the scrap heaps of the United States, it has extended to other parts of the world only in recent years. In 1893, for example, the total importation of "old and scrap India rubber fit only for remanufacture" was less than a million pounds. In 1896 it was over 3 millions, in 1898 more than 9 millions, in 1900, 19 millions, in 1902, 22 millions, and in 1903 24,659,394 pounds, valued at $1,516,137.

Gutta-joolatong is another comparatively new material which may be utilized as a substitute for or in conjunction with India rubber. It is a product of the East Indies, chiefly the island of Borneo, located not far from our Philippines, and in the form in which it is imported is described as "whitish in color, looking something like marshmallow candy, smelling strongly of petroleum, and oxidizing on exposure to the air, becoming hard." The same description says: "It is not a substitute for gutta-percha or India rubber, but is used chiefly as a filler in manufactures of India-rubber gum, and gutta-percha." The importation of this newly developed aid in the manufacture of India rubber has increased from 6½ million pounds in 1899 to 14 million pounds in 1903.

A very large proportion of the India rubber imported into the United States is produced in Brazil. Over one-half of the total is imported direct from Brazil, while considerable quantities come from the United Kingdom, presumably the products of her colonies, and from Belgium, chiefly the product of the Congo Free State, which is under control of the Belgian government, and its industries of this character controlled by the people of that country. Recent reports received by the Division of Consular Reports of the Bureau of Statistics prove that experiments in the East Indies have shown the entire practicability of producing the best Para rubber in territory immediately adjacent to the Philippines from trees transplanted from South America, and suggesting the possibility that the Philippine Islands may in time supply at least a part of the growing rubber consumption of the United States.

## NEWS FROM THE ZIEGLER EXPEDITION.

The "America," bearing the second Ziegler polar expedition, has been heard from. Mr. Ziegler has received a letter from Anthony Fiala, who is in command, written in the Barentz Sea July 20. The letter reads as follows:

"We are rapidly nearing a sail, and in hopes of this reaching you I write hastily. We left Archangel on the Fourth of July, but were delayed by a storm in the White Sea, reaching Vardo, Norway, July 9. At Vardo we took on additional coal and water, leaving there the evening of the 10th. Since then we have been skirting the edge of the ice pack, vainly looking for a lead. We made a direct course from Vardo, striking the ice at 38:30 east longitude, 75 north latitude, and then went into the ice to 75:38, but it was so solid that we returned and went eastward and southward along the edge of the pack looking for a lead until we were near the shore, in plain sight of Nova Zembla, last night, in latitude 72:45 north. Not finding a lead of any character worth going into the ice, we are returning northward and westward, where we intend to push into the ice between the 46th and 47th parallels of east longitude, as Capt. Coffin thinks it will be the best place to try to force our way. Instead of being a particularly good year as to ice conditions, the indications thus far seem to prove otherwise, and the strange silence from the lack of life that broods over this waste of ice is peculiar. We have indeed struck a peculiar season. Numbers of dead birds strew the cakes of ice, and not one polar bear has been sighted, and only a stray seal once in a great while. It either indicates immense fields of ice north or lots of open water; let us hope for the latter. Everything aboard has been pleasant and harmonious. Men are in splendid condition and happy, although impatient to get north. The horses and dogs are in particularly good form, and we are thankful for the coal we took on at Vardo, for we shall need every ounce of it as we look at the long, unbroken mass of ice."

This letter having been written over two months ago, it is believed that a favorable lead was found and the party's base, Franz Josef Land, successfully reached.