

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 Monthly (Established 1885).....2.50 ..
 Scientific American Export Edition (Established 1893).....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, New York.

NEW YORK, SATURDAY, JUNE 6, 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.

THE TWO HUNDRED AND FIFTIETH ANNIVERSARY OF NEW YORK CITY.

Although it might have been possible to find a more sentimental event than the incorporation of the city on which to base the recent 250th anniversary of New York, such, for instance, as the landing of the first settlers, or the purchase of Manhattan Island by the Dutch for sixty guilders, it cannot be denied that the incorporation marks the actual birth of the city and is the logical landmark from which to measure its life and progress among the great cities of the world. There is, of course, an unavoidable sameness in all such celebrations, but in this particular case there were circumstances which gave to the celebration a special interest, and served to draw the attention of the civilized world. In all the world's history there is no parallel to the extraordinary rapidity of the growth of New York city in wealth, extent and population. In 1653 we find a little settlement of 1,500 souls, housed in a few modest homes in a clearing at the southerly end of forest-covered and rocky Manhattan Island. Two hundred and fifty years later, New Amsterdam is represented by splendid New York, with a population of close upon four millions of souls. The forests of Manhattan have been swept away, the swamps filled in, the rocky hills laid low, and the island covered from end to end and from river to river with majestic buildings devoted to commerce and industry, with the magnificent homes of its successful merchants and financiers, and the lofty apartment and tenement homes of its busy toilers, while its streets and avenues are seamed and undermined with a veritable network of railways for the quick transit of its inhabitants.

It would be a distinction for any city to have grown in two and a half centuries from a mere village to be the second greatest metropolis of the world. But New York city has been favored by holding a commanding geographical position which in itself has undoubtedly given it a prestige unique among the cities of the world. Most fitly has it been named the gateway of the western hemisphere, for into its harbor and outward through its radiating network of railways, has poured and been distributed that marvelous stream of cosmopolitan humanity which has contributed so largely to our growth in population, and to the development of that national versatility to which our commercial success is largely due. New York city has increased by a steady influx from every quarter of the compass; from the East by the immigration of foreign races, a large percentage of which has made New York its home, while from the West, North, and South it has grown by the steady inflow of the more energetic among its own native population, whose ambition has drawn them to a city that holds out promises of wealth and fame, promises, by the way, that it frequently re-creates with a most lavish hand.

Although the municipal history of New York city has been extremely turbulent and much of it discreditable, allowance must be made for the fact that the city is so largely cosmopolitan, and that it has ever been the favorite hunting ground of the political adventurer. When we remember how many thousands of immigrants settle each year within its boundaries, and that these people, many of whom cannot even speak the language of the country, are early invested with the privileges of the franchise, the marvel is not that the city should have had so much, but rather that it should have had so little, that is disastrous and humiliating written in its records. Moreover, there is much promise for the future in the fact that whenever the best elements among the citizens of New York city have set themselves to reform municipal abuses, they have been easily able to obtain full control and have proved, as

at present they are proving, that the city can conduct its affairs righteously and justly and in the best interests of the individual citizen.

It is pardonable at a time like the present to make a forecast of the future; and it may safely be said that if the city continues to grow at the present astonishing rate, it will hold, sooner than many of us expect, the proud position of being the leading metropolis of the world, pre-eminent not merely for its numbers, extent, and wealth, but also, let us hope, for the purity of its government and the high ideals and political integrity of its citizens.

REMARKABLE EFFICIENCY OF ELEVATED RAILWAY ELECTRIC SERVICE.

That electric traction is more economical and in every way more efficient than steam traction for rapid transit on a road of the great traffic and very frequent stops of the Manhattan Elevated Railroad in this city, needs no demonstration at this stage of electrical development. Yet, the economical results shown in the operation of this system since the installation of electric traction have more than borne out the predictions made at the time that the change was determined upon. The average speed of the trains has been accelerated about twenty-five per cent, which, of course, means that the capacity of the road has been increased to that extent. The total time for any given trip over the line being twenty-five per cent less, it is possible to run, under the same headway, just twenty-five per cent more trains than formerly. The gain in speed is chiefly in the rapid acceleration at starting, and quicker stopping due to the introduction of the Westinghouse air brake. The speed of the train when under way is also higher than it was when steam locomotives were in use. There is a further gain due to the fact that in the busy hours the trains are six cars instead of five cars in length, there being a further increase in capacity of twenty per cent from this cause alone. The total number of persons carried daily by the elevated system has now reached the great average of 800,000. To work this service requires the exercise of 45,000 electrical horse power. No such results as these could be accomplished by the old steam engines, whose greatest tractive effort was equal to about 7,000 pounds pull on the drawbar. The maximum tractive effort exerted under the present system, in which the motors are distributed throughout the train and a much greater load is therefore available for adhesion, is about 20,000 pounds. The remarkable increase in the starting power and in the brake power is not secured, however, without some expense of personal convenience, many of the motormen seeming to be rather slow in learning to handle the greater power which they have at command with proper discretion. The starting and stopping is more jerky and irregular than it need be; although with every added month of operation there is a marked improvement as the incapable motormen are being weeded out.

COST OF HIGH-SPEED STEAMSHIP TRAVEL.

In connection with negotiations between the British Admiralty and the Cunard Company for two new vessels of 25 knots average sea speed, an investigation was made of the comparative size, horse power and cost of first-class Atlantic passenger steamers designed to steam at speeds that increased in each vessel by one knot per hour. Estimates were made of the size, cost of construction and cost of operation of steamers of from 20 to 26 knots per hour, and the investigation was based upon a 20-knot steamer 600 feet in length, with engines of 19,000 horse power and consuming in a single trip across the Atlantic 2,228 tons of coal. Such a vessel would cost \$1,750,000 and it would receive from the government an annual subsidy of \$45,000. A 23-knot steamer, built under the same government conditions as to subsidy, would be 690 feet long, would require 30,000 horse power; would cost \$2,875,000 and would require an annual subsidy of \$337,500. A 25-knot steamer would be 750 feet long, would require 52,000 horse power; would cost \$5,000,000, and would require an annual subsidy of \$750,000, while a 26-knot steamer would have to be 780 feet long, would require 68,000 horse power, would cost \$6,250,000, and an annual subsidy would have to be paid by the government of \$1,020,000.

In the machinery department of a 20-knot vessel 104 men would be required; in a 23-knot vessel, 150 men; in a 25-knot vessel 260 men, while for a 26-knot ship there would have to be 340 engineers, oilers, etc. It will thus be seen at what an increasing rate the first cost and the operating expenses of these high-speed steamers run up. For the increase in speed of a single knot an hour, or 24 knots per day, it is necessary to add 30 feet to the length of a 25-knot ship, 16,000 horse power to the motive power and 1,255 extra tons of coal must be put into the bunkers. The displacement must be increased by 3,100 tons; 80 more men must be added to the engine and boiler room staff, and the total cost will be increased by \$1,250,000.

THE ABUSE OF A NOBLE SPORT.

It required only a series of shocking fatalities such as happened in the recent Paris-Madrid automobile race to bring the governments concerned and the general public to their senses, and demonstrate to what criminally absurd lengths the sport of automobile racing has been carried. On the other hand it is well to remember that in the presence of a great disaster there is always a risk of panic legislation, and it is to be hoped that, while the Paris-Madrid horror will result in the abolition of road racing under the extremely dangerous conditions that have hitherto been allowed, it will not lead to the prohibition of such racing when it is governed by reasonable restrictions as to the contestants, and surrounded by absolute safeguards for the general public.

The French government has sanctioned and, indeed, officially promoted these contests on the ground that it was automobile racing that was largely responsible for the rapid development of the automobile industry in France. This is probably true; for it necessarily follows that in endeavoring to produce cars that will stand the enormous strain and the tax upon the endurance, of these long-distance road races, there is a stimulus both upon the inventor and builder such as could be afforded by no other means. The miserable mistake and folly of the whole business is in permitting the races to extend over such great distances that it has become impossible to adequately police the course and surround the contestants with adequate safeguards. In the present system there was absolutely no tax upon the weight or power of the cars. Any amateur who possessed sufficient money and foolhardiness was at liberty to have built for him and to run a veritable locomotive over the course. This, in itself, was an invitation to disaster; but when he was allowed to send this machine crashing along the public highways between lines of densely packed peasantry at speeds of from 50 to 80 miles an hour, the conditions were ripe for slaughter.

If automobile races are to be conducted in the future—and seeing that these races are a direct stimulus and benefit to the industry, it is certainly desirable that they should continue to be held—they must take place either on specially constructed and carefully guarded courses, or on stretches of public highway from which the public is absolutely excluded. Moreover, the contestants should be limited to successful candidates who have been selected after a series of trial races. This is the plan that is to be followed in the forthcoming races in Ireland, where instead of several hundreds there will be but a dozen competitors and where the course, which is of limited length, will be kept guarded by some 7,000 or 8,000 of the constabulary.

But even in the case of the Irish race it will be impossible to eliminate one inevitable cause of disaster, namely, the unevenness and curvature of a public highway. When a machine is traveling at a speed of 60 to 80 miles an hour, slight inequalities in the surface, which would not be noticeable at 30 or 40 miles an hour, become, by virtue of the terrific jar imparted to the machine, a positive source of danger; while in rounding curves which have no banking on the outer side a heavy cross strain is thrown on the tires, and should the speed exceed a certain rate, either the tires will skid or the machine will be overturned by the great centrifugal force set up.

Perhaps it may prove that these difficulties (which are inherent, if the public highways are to be used by high speed vehicles) are not unmixed disadvantages; for they may lead to the recognition of the fact that if we are to utilize the high speed possibilities of the automobile, we must solve the problem along the lines upon which we have so successfully solved it in railway travel, and build special roadbeds for high speed automobiles. The indications are that the time is not far distant when the increase in automobilism will be such as to guarantee the construction of special roads with perfectly true surface, with small curvatures properly banked on the outside, and with ample protection, by the exclusion of all grade level crossings, against collisions with passenger and vehicular traffic.

We close with a brief summary of the race and the times made by the leading cars.

The first stage of the ill-fated race, from Paris to Bordeaux, a distance of 300 miles, was covered by the racers early on Sunday morning, May 24, with so many fatalities and serious accidents to the participants and onlookers that the running of the two remaining stages was forbidden by the French and Spanish governments. Seven were killed and three others critically injured as a result of the terrific speed and the failure of the authorities to keep the road clear. Marcel Renault, the winner of the Paris-Vienna race last year, and two chauffeurs on two other racers, were killed by their cars upsetting when their drivers tried to avoid obstacles in the road, while two