

## SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN &amp; 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. 40 lbs. 5d. 4.00

## THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845)..... \$3.00 a year  
 Scientific American Supplement (Established 1876)..... 3.00 "  
 Scientific American Building Monthly (Established 1885)..... 2.50 "  
 Scientific American Export Edition (Established 1873)..... 5.00 "

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, APRIL 1, 1905.

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.

## CASUALTIES—MILITARY AND CIVIL.

And now it would seem that the steam railroad has a close rival in the art of killing and wounding; for the latest statistics of the Census Bureau show that during a single year 1,218 persons were killed and 47,429 injured by street railway lines in this country. To those of us who happen to live in New York, where just now the daily collision on our elevated and subway lines, with its list of casualties, is an item that we should miss from our morning paper, these figures may not prove so startling as to the citizen who travels under more normal conditions; but in all conscience they are big enough to be positively shocking, particularly when we remember that a great number of street car accidents are never reported. Added to the statistics of steam railroad accidents, they show that people are being killed at the rate of 5,300 and wounded at the rate of 100,000 a year! And it all happens to persons who are engaged in the "peaceful pursuits" of "the most highly-developed civilization" of modern times.

Add together two or three years of such statistics, and you get a total casualty list equaling that of the Russo-Japanese war.

Odd, is it not, that we should blench with horror, as we read in one column of the wholesale killing and wounding on Manchurian battlefields of men whose profession it is to kill and be killed, and yet read in the next column with easy composure of the day-by-day killing and wounding of our neighbors or associates, under circumstances for which in nine cases out of ten there is no excuse whatever to be offered.

## "CONSIGNED TO THE SCRAP HEAP."

The New York Evening Post has delivered itself of the following: "What the big-navy men cannot deny is that a single new invention or development in marine engineering may consign our enormously costly fleet to the scrap heap without a moment's warning." Strange, is it not, that our staid contemporary should commit itself in its most approved *ex cathedra* manner to what is surely one of the most foolish fallacies of the day. And still more strange that it should do so at a time when the naval experts are telling us all that, if the naval operations of the present war teach one truth more than any other, it is that the battleship is the supreme engine of naval warfare—more secure to-day than ever against the many cheap and short-cut devices that were designed to bring about its "annihilation." It was but a few days ago that the captain of one of the sunken ships at Port Arthur assured the writer that the battleship had more than vindicated its construction, and the principles and theories upon which it had been designed. His own ship, struck time and again by mines, battered by direct shell fire from Togo's battleships, and by the plunging shells from Nogi's batteries, the target for at least a score of torpedoes, some of which found the mark, was sent to the bottom only when he himself opened the sea valves to prevent her from becoming the prize of the enemy. In all the rough handling, above water and below, that the Russian fleet has received in the past twelve months, it was the battleship alone that time and again proved able to survive the blow of the torpedo or the floating mine. For a cruiser to be struck by one of these deadly weapons has meant, with a single exception, immediate and total destruction. Not a battleship was sunk by gun fire; whereas cruisers, and all smaller craft, were by this means sunk or so badly damaged as to be put out of action. It is the battleship that has decided the issue of the naval campaign. In the coming fight, down in the Indian Ocean, between Rojestvensky and Togo, the fate of the victorious Manchurian armies of Japan will depend upon what number of battleships survive on either side. If the unexpected should happen, and Togo should lose three or four of his battleships, not all the armored cruisers,

protected cruisers, gunboats, and torpedo boats of Japan could wrest from Russia the command of the sea, or stave off the ultimate capitulation of Oyama's armies.

The history of modern naval development shows that it has moved steadily in the direction of big units, each representing a vast concentration of fighting power, whether for attack or defense. Our 16,000-ton "Connecticuts" and "Louisianas" are the result of a law of evolution, which is as inexorable in a warship as it is in the processes of natural life. At the same time, naval history shows that inventors have been quick to appreciate what they conceived to be the weak feature in this policy of concentrating the fighting strength in a few large units, rather than in many smaller ones. Periodically, the small, cheap "kill-all" device bursts upon an awestruck world, and forthwith the wiseacres shake their heads and predict a complete "revolution" in naval construction. Our contemporary is not by any means the first that has consigned "our enormously costly fleet to the scrap heap without a moment's warning."

The naval revolutionist is ever in our midst; and not even the contemplation of the large and ever-growing list of naval engines of destruction that fail to destroy, deters each new annihilator from being duly heralded as sounding the death knell of every battleship afloat.

There was the torpedo boat, "a single new invention" which caused all the naval powers to set afloat whole squadrons of these now discredited craft. For the torpedo boat was met first by the rapid-fire gun and the torpedo net, and then by the destroyer, a larger edition of itself, swift enough to catch, powerful enough to sink the torpedo boat. The predicted revolution never took place; and the battleship continued to grow steadily in size, power, and price. Then came the submarine ram, which was to usher in another revolution. Great Britain built her "Polyphemus," and the United States her "Katahdin;" but the former was stricken long ago from the lists, and the latter has already found a post of interest, if not of honor, in our museum of naval curiosities. It was a fascinating idea, that of a turtle-backed, submergible ram, hard to see, impossible to hit, running amuck through a fleet of these "big-navy men" battleships, and sinking them with pitiless deliberation. Nevertheless, the Spanish war came and went, while the "Katahdin" lay rusting at her moorings.

The next annihilator was the awe-inspiring "dynamite gun." Here, surely, was that "single, new invention or development," that was to prove a veritable demon of destruction—worth just as many battleships as happened to come within range of its shells. Why spend so many years in building a 16,000-ton "Connecticut," when in one-fifth of the time one could set afloat a dozen "dynamite cruisers," bearing the awesome name "Vesuvius," and each capable of sinking a battleship a minute by the very simple expedient of tossing a quarter of a ton or so of dynamite aboard from her pneumatic guns? We shall not soon forget that queer little midnight comedy, when the "Vesuvius" drew stealthily within range of Santiago harbor, and proceeded to scatter "earthquakes" among the rocky bluffs of the Cuban coast.

Just now the "single new invention or development" which is to "consign our enormously costly fleet to the scrap heap," appears to be the submarine torpedo boat. We are willing to admit that the submarine has proved terribly destructive, and in every case "without a moment's warning;" but unfortunately, in place of consigning our own or any other "enormously costly fleet to the scrap heap," its chief exploit seems to have been that of consigning its unfortunate crew to untimely and most hideous death. It is probable that there is no "single new invention or development" which, in this respect, has so unique a record. It is a gun which kills at the wrong end of the barrel, and until this latest "annihilator" shall have given over slaying its friends, we shall be forced to the conclusion that not to the submarine is to fall the honor of consigning our fleets to the scrap heap.

As it has been, so it will be. There has been much evolution, but no revolution, in the growth of the fighting ship to its present bulk and power. To the country that can concentrate in greatest numbers the big battleship, with its combination of a steady platform, long-range heavy guns, a large reserve of buoyancy, and good speed (to say nothing of its trained personnel) will the victory of the future and the ultimate blessings of permanent peace belong.

## ELECTRIC RAILWAYS AND POPULATION.

Some interesting illustrations of the extent to which the outer areas of cities have increased through the development of the street railway are to be found in the recent report of the Census Office on American Street and Electric Railways. For instance, the population of Manhattan borough of New York city increased from 1,441,216 in 1890 to 1,850,093 in 1900, or 408,877. Of this increase, 231,556, or considerably more than one-half, took place in that part of the island lying north of Eighty-sixth Street, the population in this section having practically doubled during the

decade. This district is situated about seven miles from the southern extremity of the city, and the great majority of its breadwinners do business downtown and make daily use of the street railways. In the Bronx borough the population increased from 88,908 to 200,507, the increase being mainly along the street and elevated railway lines. In Brooklyn and Queens boroughs the increase in population was 39 and 76 per cent, respectively, and in each case the advance was mainly in the outlying wards.

Another conspicuous illustration of this influence is furnished by the city of Boston. Of the seven wards lying nearest to the business center of Boston, five showed a decrease in population, while in the outlying wards there was an increase of 93,395 inhabitants, or nearly five-sixths of the total increase of Boston. Moreover, the population of the immediately adjacent cities of Cambridge, Somerville, Chelsea, and Brookline increased much more rapidly than that of the older parts of Boston. A very considerable proportion of the breadwinners, both of the outlying wards and of the adjacent cities, are employed in the business district of Boston and depend upon the electric railways for their transportation.

The change in the distribution of the population of Philadelphia since 1890 has been remarkable. Almost all of the wards in the heart of the city show a decrease in population, while several of the large outlying wards to the west and north of the business center have added greatly to the number of their inhabitants. Moreover, the electric railway has given a powerful impetus to suburban life, not only for residence but also for manufacturing purposes. The effect of this influence is shown in the increased population of the suburbs of Boston and Philadelphia, two cities whose suburban residents are served largely by electric railways. Other cities showing this influence in a marked degree are St. Louis, Milwaukee, and Cleveland.

The presence of a rapid and cheap means of passenger transportation permits manufacturing and commercial establishments to be located conveniently and economically and allows the concentration of retail and wholesale trade and office business in specialized centers. The change thus noted has had a marked influence upon the value of land, and upon rentals and building operations, for every extension of an electric railway line into new territory increases the selling and rental values of the real estate in the vicinity. Thus the clearly marked effect upon the community of the increase of electric railway facilities is to prevent overcrowding and to promote equalization of values.

The effect of street railways in concentrating business is evident, although there are no satisfactory statistics regarding the degree to which the business of cities has become concentrated in narrow areas. It has been estimated, however, that the daily movement of people into the central section of Chicago by means of the surface street railway alone is about 225,000, while a still larger proportion of the traffic of the elevated railways is to and from the same business center, which has an area of scarcely more than a square mile. It has also been estimated that the day population of Manhattan Island below Canal Street is about half a million greater than the night population. Practically all of this enormous number of persons is carried to and from this section by the electric railway.

## THE GEORGE WASHINGTON UNIVERSITY.

BY N. MONROE HOPKINS, PH. D.

Active steps are now being taken to expand the George Washington University, formerly Columbian University, and to make of it an institution of national character. These plans provide for a great post-graduate university, with every advantage for advanced study and higher research. It is also proposed to have numerous affiliated colleges, like the system which prevails at Cambridge and Oxford in England. George Washington, in his last will and testament, expressed a desire to have in the capital city of the country just such an institution as this university is about to become, and his ideal will doubtless be realized.

The George Washington University was organized by an act of Congress on February 9, 1821, under the name of the Columbian University, and its name has recently been changed. It may be of interest to sketch briefly the causes which led to this change of name. The change was made on June 8, 1904, by unanimous vote of the Board of Trustees, and on June 22, 1904, the Secretary of the Interior and the United States Commissioner of Education approved the change, the action having been taken under Congressional sanction given on January 23 of the same year.

For a long time Columbian University had been confounded with Columbia University of New York, and there had long been a wish on the part of those interested to secure a name more national in character. It happened that in May, 1897, a large body of patriotic women from all sections of the United States held a meeting in Washington and organized the George Washington Memorial Association. Its objects, as stated in its articles of incorporation, were "To advance and secure in the city of Washington a uni-