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 "
American Homes and Gardens...................................... 3.00 "
Scientific American Export Edition (Established 1878). .... 3.00 "

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MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, JULY 22, 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.

FACING AND TRAILING SWITCHES.

The facing switch is one of the most fruitful causes of railroad accidents in this country. The switch is an absolutely necessary feature in railroad operation; for without it it would be impossible for trains to be moved from the main line onto sidings and into freight yards. The unquestionable peril which attaches to switching arrangements, especially on lines of fast passenger traffic, is not inherently necessary. It may be removed entirely by a reconstruction, the cost of which would be cheap in comparison with the great security that would be gained by the lines that made the change. There are two methods by which a train running on the main line of traffic can be moved on to a siding. One is by what is known as a facing-point switch which, when it is set for the siding, enables the train to turn out without stopping, as it merely has to slow down sufficiently to take the rather sharp curve without risk of derailment. If, by mistake or malice, the switch has been "left open," a fast train, traveling at a higher speed than that at which it is possible for it to take the siding safely, will jump the switch, and a derailment and probable wreck will ensue. The "trailing switch," on the other hand, opens backward in the opposite direction to the traffic, that is to say, a train taking the siding at a trailing switch, must run entirely past it and then back up into the siding. If a switch of this kind be left open by mistake or malice, a train will run through it without any risk of derailment, the flange of the wheels automatically thrusting the switch open as the train passes.

The facing switch becomes dangerous only in the presence of carelessness or malicious interference. It can be used with safety as a part of a system controlled from a signal tower, or in positions where it is under full observation and surveillance at all times. For use at remote country stations on the main line of a railroad that runs fast expresses at all hours of the day and night, the facing-point switch is a distinct menace to the safety of passengers. In such cases it should be abolished and the trailing switch substituted. It is, of course, too much to ask our railroads to make this change at every station; but there are a large number of insignificant sidings where it should be made, and made at once. There would be some delay at times, due to long freight trains having to run entirely past the switch before backing into the siding; but on a well organized road, this matter, like the other difficult problems of transportation, could be properly adjusted.

BELOW THE BELT.

It is semi-officially stated by the Russian Admiralty that the battleships "Navarin," "Borodino," "Alexander III.," and "Kniaz Souvaroff" "turned turtle" during the battle of the Sea of Japan and went down with all hands. Of all forms of destruction that can befall a warship, this is the most terrible, for it involves the all but total loss of the ship's company. In a recent letter to the London Times Sir Nathaniel Barnaby, the well-known naval constructor, draws attention to the fact that the capsizing of these large ships has been attributed to some fault in their design, and he refers to statements which he has made in a book written a few years previously, to the effect that the modern ship of war, whether of the protected or armored type, was in danger of capsizing when wounded under water, to an extent unknown fifty years ago. He had also claimed that the increased risk of capsizing before sinking of the wounded ship of war of to-day was not peculiar to any particular class of ships or to any particular navy.

We are of the opinion that the capsizing of the Russian ships was probably caused by hits below the water-line belt of armor. The possibility of such hits being made was greatly increased by the fact that there was a heavy sea running, and that in rolling the ships must at times have rolled the bottom edge of the armor entirely out of the water. Furthermore, it has happened in naval engagements of this war fought in smooth water, that vessels have suffered from shot holes below the water. In reply to our inquiry as to how this happened, one of the captains of the Port Arthur fleet informed us that shells fired from long range and striking the water a short distance from the side of the ship, would pass through the water and strike below or near the bottom edge of the belt. A case of this kind occurred on the battleship "Czarevitch," and several other vessels were similarly damaged. It cannot be urged that in the battle of the Sea of Japan the shot-holes which admitted water to these ships were made through the unprotected ends; for with the exception of the "Navarin," the belt armor was carried entirely from stem to stern.

The talented French designer of the "Borodino," "Alexander III.," and "Kniaz Souvaroff" paid particular attention to the under-water defensive qualities in these ships, and the fact that they were protected with a 9-inch belt of Krupp armor renders it probable that, at the range at which the earlier phases of the battle were fought, the belt armor itself was not penetrated. It begins to look as though the water-line armor will have to be carried down deeper, and it may be that it will also be carried to a higher level above the water line. This means bigger ships and larger displacement; but it will probably have to be done. Another change which may be necessary to prevent the capsizing of badly hulled warships is the elimination of longitudinal bulkheads, or rather, we should say, the provision of means for allowing an unrestricted flow of the water in any damaged compartment from side to side of the ship. The three ships of the "Borodino" class above mentioned carried a vertical wall of armor from end to end of the ship at a distance of about 12 to 15 feet inboard. It is possible that the water that entered on the sides exposed to the fire of the enemy collected between the outside hull and this inner wall of armor, and quickly brought the ship into the capsizing condition. It is true that in order to trim the ship provision is made for flooding compartments; but it may well be that in the confusion of a terrible sea fight like this, the necessary knowledge as to what compartments need to be flooded to preserve an even keel may be wanting to the very men whose duty it is to open the valves or control the pumps.

THE SECOND CITY IN THE WORLD.

The incomplete census figures indicate that the population of New York is now just under 4,000,000, or, to be exact, 3,987,154. The probabilities are that Manhattan and the Bronx alone will be found to have a population of 2,378,696. It is interesting to go back and compare the population of New York in the successive stages of its growth with that of to-day. The first federal census, taken in 1790, shows that the population was 33,131. In 1800 it had risen to 60,515, and in 1810 it was 96,373. In the next twenty years it more than doubled, having reached 202,589 in 1830. By the middle of the century it had passed the half million mark. Thirty years later, in 1880, it had again more than doubled, the population being 1,206,293. From 1900 to 1905 New York has grown from 3,437,000 to 3,987,154, or at the rate of over 100,000 a year. The standing of New York among the big cities of the world is shown by the following figures: London comes first with 4,536,641 people, and next to New York are Paris, with 2,714,008; Berlin, with 1,888,848, and Chicago with 1,698,575. Then follow Vienna, Canton, Tokio, and Philadelphia, all of which have over 1,000,000 inhabitants, the last named having 1,293,697 in the census of 1900.

As to the possibility of New York city becoming the largest city in the world, there is no indication that London will lose the first place for many decades to come, for within the metropolitan and city police limits that city contains 6,581,372 souls, this being the population of what might be called Greater London. To put it another way, London's "Manhattan" contains 4,613,812 souls as against New York's Manhattan population of 2,127,602; while her Greater London has 6,581,372 people as compared with Greater New York's population of just under 4,000,000. The rate of growth, however, is faster in New York than in London and if the present rates should continue, it will only be a question of time before the largest city in the world will be found in the Western Hemisphere.

FASTEST LONG-DISTANCE RAILROAD RUN.

The publication of the high speeds that were made by the eighteen-hour trains in their preparatory tuning-up runs, has re-awakened interest in the question of fast long-distance runs. One of the most interesting contributions to the subject is that of the English railway expert, Mr. W. M. Acworth, who, during his visit to the International Railway Congress in this country, was enabled to take notes of some very fast work by the famous American expresses that run during the summer months from Philadelphia to Atlantic City. These trains are scheduled to travel at average rates of 66.6 to 68.1 miles an hour, and on the occasion of Mr. Acworth's trip, a speed of 80 miles an hour was maintained continuously for a distance of 30 miles. In a recent article on the subject, in the London Engineer, Mr. Acworth raised the question whether anything like this performance had been accomplished on the Great Western Railroad's record run from Bristol to London. This was made last year by one of the Ocean Mail Specials from Plymouth to London, when the distance from Exeter to Bristol was made at the rate of 70.5 miles an hour and from Bristol to London at the rate of 71.5 miles an hour, the whole distance of 193¾ miles being thus covered at an average speed of 71 miles an hour. Mr. Rous-Martin, who was on the engine during this performance, states that a speed of 80 miles an hour was sustained, with virtual continuity, for 73 miles consecutively, the only time that the speed fell below 80 being while water was being taken from a water trough, the resistance of which reduced it to 75 miles an hour. During the fastest run recorded by Mr. Acworth on the Philadelphia-Atlantic City line, a distance of 55½ miles was covered in 42½ minutes. The same distance was covered during the Great Western's run in 42 minutes, which brings the average up to 79.3 miles an hour. The American and English runs for this distance were, therefore, almost identical in speed; but it is claimed that the remarkable feature of the Great Western engine's work was the long distance (193¾ miles) during which the high speed was maintained, and the fact that the engine which did the work was of a somewhat old-fashioned type. The American load was heavier; but on the other hand, the American engine was able to exercise double the tractive power of the English single-wheel type; and it is claimed, very properly, that the wonderful speed achieved on this road proves that for running fast trains, of which there are so many in England, the single driver type is admirably adapted.

The United States possesses in its 18-hour trains from New York to Chicago the fastest long-distance trains, the Pennsylvania maintaining an average speed of 50.3 miles for 905.4 miles, and the New York Central covering 959.4 miles at the rate of 53.3 miles an hour.

TESTING THE TOURING CARS.

The automobile tours which have just been carried out under the direction of one of the leading national associations have done much toward emphasizing the necessity of good roads for both touring and business transportation purposes; and one of these tours—that to the White Mountains for the Glidden trophy—has also demonstrated anew the cheapness of transportation by auto as opposed to that by rail, especially when a pleasure journey is being undertaken. With a touring car carrying five persons, from the results obtained on the tour, it appears that each person can be carried for about one-fourth the rate charged by the railroads, or in other words, for one-half cent a mile. This rate, however, is for transportation on good roads and exclusive of tire repairs. On poor roads the cost of fuel will be found to be augmented somewhat; but the greatest drawbacks are the low average speed possible to be maintained and the discomfort the passengers are obliged to undergo. In the western 500-mile tour from Chicago to St. Paul, so much rain was encountered that the roads were well-nigh impassable, and many of the tourists shipped their cars by rail after completing half of the journey. No less than eleven machines, however, made the journey under the most trying conditions. Instead of a pleasure tour, the automobilists made an endurance run of which they may well be proud. Among the cars that completed the journey were three White steam machines, three Knox air-cooled cars, a Pierce, a Packard, a Rambler, a Jackson, a Reo, and an Adams-Farwell air-cooled machine with a revolving-cylinder motor. These cars were three representative types of American machines, and they demonstrated once again the capability of the domestic car even under the worst weather conditions and roads that America is able to produce.

In the Glidden tour, thirty-four representative machines started from New York on July 11, and of these some twenty-eight reached Mt. Washington on July 14. A feature of this tour was the employment of a Packard and a Knox truck to transport the baggage of the tourists. These machines made very good daily runs, and generally delivered the baggage at its destination sooner than if it had been sent by express. Some interesting data on the cost of long-distance hauling based on their performances should be available at the conclusion of this 1,000-mile tour.

Within three years, at most, practically worthless land, so heavily charged with injurious salts as to be unfit for any form of agriculture, may be reclaimed to grow any ordinary field crop. The method of doing this is simple; and the expense involved is such that the work may in many instances be economically undertaken by individual, corporate, or State initiative. The total expense of reclamation, taking everything into consideration, is but a small fraction of the enhanced value.