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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.

STUPENDOUS TRAFFIC OF GREATER NEW YORK.

The growth of New York city is full of surprises, and in no respect are the evidences of growth so striking as in the statistics of electric railway traffic. Herein is added proof of the fact that the electric trolley is one of the most potent factors in promoting the increase in a city's population. Close upon the heels of the motor car there ever follows a crowd of eager homeseekers, to provide for whom the resources of the real estate agent and the house-builder are taxed to the utmost. So urgent is the demand for increased transportation facilities, that it would seem to be scarcely possible to build an electric line, whether elevated, surface, or subway, into any district of Greater New York, which will not be almost immediately carrying a fairly voluminous traffic, if it is not indeed crowded at once to its full capacity.

That it is scarcely possible to build electric lines faster than they are required, is shown by the total figures of travel for the quarter ending with June of this year, during which over 332,000,000 cash fares were collected in New York city; and the significance of this total is emphasized when we learn that it represents an increase of about 30,000,000 fares, or between nine and ten per cent over the corresponding quarter of the previous year. The largest increase took place in the Borough of Manhattan, where it amounted to 17,700,000; while the increase in the Borough of Brooklyn amounted to over 8,000,000. The largest percentage of increase is that in the Borough of the Bronx, where it reached 48 per cent, the relative percentage in Manhattan being 9, and in the Borough of Brooklyn 8½ per cent. The enormous traffic existing in New York city is perhaps best realized by a statement of the figures showing the heaviest traffic on any single day. Thus, during one day of last April, the Interborough Rapid Transit Company carried on its elevated lines 938,959 passengers, while the New York City Railway Company carried on one day in May 1,846,538 passengers on its various surface lines. The largest total, however, is that for Brooklyn, the Brooklyn Heights Railway Company having carried on one day during last June 2,129,264 passengers.

With a rate of growth as rapid as is indicated by these figures, it is incumbent upon the city authorities to push forward, with all possible speed, the construction of the new system of subways which has been approved by the Rapid Transit Commission. It took four years to build the present Subway, and it will scarcely take less to construct the proposed additions. At the present rate of growth, the increase in the number of passengers within Greater New York will be something enormous, and must surely put an exceedingly heavy strain on existing facilities.

THE WORST ENEMY OF THE GOOD ROADS MOVEMENT.

The worst enemy of the good roads movement is the stupid neglect to which the newly-made roads are so often subjected—a neglect which dates from the very day on which they are completed. The indifference of the public and the parsimony of legislatures are not more hurtful to this good cause than the fact that in so many cases the new highways are suffered to fall into disrepair, just as fast as the traffic and the weather can wear them down. It is likely that everyone who reads this statement can call to mind one or more stretches of macadamized road in his immediate neighborhood, which to-day present a surface which is merely a mockery of that over which they rode when the roads were first opened to the public. This rapid deterioration was evident even in the days when the bicycle was popular, and before the automobile had commenced to tear loose the top dressing of the roads and scatter it to the winds under the united traction and suction of its rubber tires. The deterioration of newly-made roads was far too rapid, even in those days; but in this age of the automobile, the rate at which our highways have been torn to pieces, mainly because of lack of maintenance, or of maintenance that is properly applied, is simply appalling.

Of all the works of man that come within the province of the civil engineer, there are few, if any, which call for more careful attention, and more immediate repair on the first signs of disintegration, than the common turnpike macadamized road. Perhaps the nearest to it in this respect are the track and roadbed of a steam railroad; though we doubt if even that heavily-worked system shows the lack of upkeep so quickly as does a frequently-traveled highway. The amount of ignorance, or indifference, displayed in the neglect of new macadamized roads would scarcely be credible to a European, who has been accustomed to witness the watchful care with which the famous roads of Europe are maintained and the very first signs of wear corrected. Instead of keeping a gang of men employed in the constant, day-by-day, repair of weak spots, hollows, and ruts, our authorities in many cases seem to think that it is sufficient to spread a few loads of top dressing over the whole surface of the road annually or biennially, as the case may be, and let it go at that. Under this method the solid portions of the road receive just as much care as those which have developed soft spots and shown the need of more extended repair. The top dressing serves no better purpose than to temporarily cover up the damage of the last season's travel, and in a few weeks' time the surface is about as badly, if not more, broken up than before. Matters go from worse to worse until there is a call for drastic remedies. In nine cases out of ten the drastic remedy consists in breaking up the entire surface, and practically rebuilding the road.

Now, it has been proved to a demonstration, not merely in Europe, but in certain sections of this country where the maintenance of roads is intelligently and conscientiously carried on, that if a macadamized road be properly built in the first instance, with firm foundation, adequate drainage, and an ample crown to shed the water from its surface; and if a small force of men, answering to the section gang on a steam railroad, be kept constantly employed in repairing any incipient wear of the road, such a highway need never be rebuilt, but will be good for all time. That is the great lesson which needs to be enforced by the advocates of good roads. When it has been brought home, and commissioners have learned to maintain their new roads in absolutely first-class condition, so that the value of a macadamized road will be apparent, not merely in the first few months of its life, but continuously through the succeeding years—then, and not till then, we may look for the rapid extension of a system of macadamized highways throughout the whole of the United States.

EROSION—THE LAST PROBLEM FOR THE GUNMAKER.

The splendid results which have been obtained by the designers and manufacturers of heavy ordnance are highly creditable to the art. At the proving ground, in the field, and on the high seas, the modern high-powered rifle has achieved truly wonderful success. Guns have been constructed which will stand enormous pressures without failure, and deliver projectiles of extraordinary toughness and hardness, at velocities which were undreamed of a few years ago, and with an accuracy of fire in the first few rounds which leaves nothing to be desired. At present, the powder is not equal to the gun, not at least in respect of its accuracy and reliability; but as soon as a powder has been made which is perfectly stable, and can be relied upon to give unvarying results for a given charge in a given gun, the art of heavy-gun manufacture will have been brought, with one very serious exception, to a point of practical perfection. The exception is to be found in that nightmare of the ordnance expert, gun erosion, or the more or less rapid wearing away of the bore of the gun by the action of the powder gases. It is to this point that the artillerist of to-day, whether he is working in the laboratory, in the gun shop, or at the proving ground, should devote his best energies; for gun erosion is a trouble which, in some guns, will, after a few rounds have been fired, entirely upset the calculations as to its range and accuracy. The disintegration of the face of the bore by erosion is most severe in the grooves of the rifling; and as these become worn away, they cease to get a good grip on the rifling band, with the result that the projectile is not given a sufficient speed of rotation about its axis to maintain the axis parallel with the line of flight, and the shell begins to tumble end over end.

So much fruitless effort has been directed to the cure of gun erosion, but there is discernible a distinct note of discouragement on the part of our ordnance experts; as witness the recent recommendation of the Army Board of Ordnance, that high velocities and heavy powder pressures be abandoned, and that we return to the old system of firing heavier projectiles with smaller velocities and corresponding lower powder pressures. The SCIENTIFIC AMERICAN, at the time of the publication of this recommendation of the Army Board, protested against such a complete acknowledgment of defeat, and we urged that it was too early yet to assert that the problem of gun erosion had been subjected to its last analysis, or that every possible method of prevention had been tried. We are still decidedly of that opinion, and for the following reasons:

It is found that the most severe erosion of the bore takes place near the breech, and that it diminishes rapidly toward the muzzle. This fact would agree with the theory that the wearing away of the metal of the bore is due to the rush of the white-hot gases between the projectile and the bore, the gases finding vent through the small openings, and there are many of them, which are left when the shell is rammed home into place. The velocity with which the shell is rammed home is never sufficient to force the copper rifling band far enough into the grooves to completely seal them up; for if one looks into the gun, after a shell has been driven home, it is frequently possible to see daylight between the shell and the bore. When the gun is fired, the gases, under the enormous initial pressure of twenty or more tons to the inch, pour through these interstices with a frictional effect which, added to their heat of many thousand degrees, is sufficient to wear away the metal of the bore as though it were made of wax in place of hardened steel. This abrading action takes place until the powder has driven the shell far enough forward for the copper rifling band to entirely, or at least more completely, seal up the grooves of the rifling, when the escape of gases is largely or entirely prevented, and the scoring ceases. This will explain the fact that, even in some of the latest guns, where the powder pressure is maintained at a high figure right to the muzzle, the scoring is nevertheless confined to the neighborhood of the powder chamber.

Evidently, if this explanation be correct, the remedy is to be found in some more perfect method of obturation, or sealing up of the base of the projectile; and this might be done, either by a liberal increase in the width of the rifling band, or by the provision of some additional obturating device at the rear of the band. Some years ago we published in this journal a sketch of a device of this character designed by Vickers, Maxim & Co., which consisted of a copper plate covering the entire base of the projectile, and provided with an annular lip, which was driven firmly against the bore of the gun by the gases, and held there with an action similar to that of the leather pad in the Brahma press. For reasons which have not been made public, the device did not prove to be altogether successful, although the principle was correct. Apparently, all that is necessary to prevent this initial erosion is, as we have tried to show, to provide some form of sealing device, back of the rifling band, which will bar the passage of the gases until the band has been driven home sufficiently to fill the rifling grooves, and entirely seal the gun. Here is a field that will well repay investigation, one which has not received the careful study which the magnitude of the interests depending upon its solution demands. We believe that there are no inherent mechanical difficulties to prevent the design and manufacture of a thoroughly operative device of this kind; and when it has been produced, and not till then, the modern, high-powered rifle will be a practically perfect piece of mechanism, with powers of endurance that are comparable to that of any other. Furthermore, it will open great possibilities, either of vastly increasing the pressure, velocity, and energy of the gun for the same weight, or of greatly decreasing the weight for the same energy. What that means will be appreciated by the naval constructor, who will find himself able to increase the fighting power of his ships without increasing their size, or by the artillerist in the field, who can, at a stroke, greatly lighten the load to be transported, without decreasing the power of the gun when it is unlimbered for fighting.

Mons. Vercier tested the preservation of flowers by means of refrigerating apparatus, and he obtained extremely interesting results. In August, 1904, he exhibited before the Société l'Horticulture some China peonies gathered ninety-seven days previously. He put them back into an ice-house, and forty-one days later several of them were still found to be in a fair state of preservation. The experiments have been taken up again upon a larger scale, the peonies being cut with stems about 15¾ inches long and placed in glass bowls filled with water. The ends of the stems were trimmed every three weeks, and the water was renewed every month. Under these conditions buds of China peonies gathered ready to open on May 31 were still in pretty fresh condition on September 22. Tree-peonies gathered half open May 11 were withdrawn from the refrigerating cellar June 16; they remained open in the room for thirty-six hours. The leaves hinder the preservation. It is better to preserve but one of them, that nearest the flower; it stays very green. Of all the flowers subjected to the treatment, the peony in general and the red and white China peonies in particular showed the most endurance.