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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.

THE DOUBLE-DECK CAR FOR RAPID TRANSIT.

Of the many schemes suggested for the improvement of rapid transit facilities in the congested centers of our larger cities, the one which above all others would give the greatest relief is the least known and the least talked about. We refer to the double-deck car. Many times during the past few years the SCIENTIFIC AMERICAN has drawn attention to this simple and ready method of doubling the capacity of any given line of railroad, and we have earnestly recommended its adoption on the crowded surface lines of New York city. We remember that when, in 1897, during the course of conversation with Mr. Vreeland, at that time president of the Metropolitan Street Traction Company, we suggested that the quickest way to increase the capacity of his roads, and more particularly of the Broadway line, would be to double-deck the cars, he replied that double-decking would afford no relief, and might prove to be a positive hindrance. The theory advanced was that when cars are running under ten seconds headway, the frequency of the service is dependent primarily upon the speed with which they can be loaded and unloaded, or upon the shortness of stops; and that doubling the capacity of each car would simply produce a congestion at the platforms that would lengthen the stops and so reduce the capacity of the line.

In spite of this opinion from one of the leading authorities on street railway traveling, the double-deck car has continued to multiply and prove its usefulness, where it has been given a trial, to such an extent that to-day, of the 6,660 electrical cars of Great Britain and Ireland, 90 per cent are double-deck and 10 per cent single-deck; while of the 3,517 new cars in cities having a hundred or more cars in use, 94 per cent are double-deck. That the double-deck car is well adapted to congested traffic in large cities is proved by the fact that of the 450 electrical cars in Manchester, 425 are double-deck, of the 480 cars in Liverpool, 468 are double-deck, and of the 400 electrical cars in and about London, all are double-deck.

An exhaustive study of this question has recently been made for the Merchants' Association of New York by Mr. John P. Fox, and his results are embodied in a report to the Committee on Engineering and Sanitation. This gentleman carried out his investigation during a visit to Great Britain and the European cities where it is most extensively used; and the report contains expressions of opinion from the managers and superintendents of the various traction companies in Europe as to the relative advantages of single and double-deck cars. According to the statement of the general manager of the Liverpool Corporation Tramways, when electric traction was introduced in Liverpool in 1898, it was thought desirable to follow the American practice of using single-deck cars. The main argument against the double-deck car was that too much time would be occupied in ascending and descending the staircase; but this objection was entirely met by adopting a staircase which was perfectly safe to descend while the car was traveling at any speed, and which, therefore, enabled the conductor to refuse to stop the car except at the order of a person actually on the lower deck. The staircase referred to is of the reversed type, and no accidents have ever occurred in Liverpool from people being thrown off the staircase when the car was in motion. As to the length of car stops, it was found by actual timing of these cars in Liverpool, that the average time consumed per passenger in getting on and off worked out at 1.9 seconds; whereas in a large American city where the operation of the cars is similar to that in Liverpool, the length of stop per passenger averaged 2.8 seconds on an open twelve-seat car.

As showing the great increase in capacity secured by double-decking, it may be mentioned that some of the Liverpool single-deck American cars had stairs and deck added, and were used for trial, before the double-deck car was adopted as the exclusive type for service. These cars were used on Saturdays, Sundays, and holidays, and at other times when cars of large accommodation would be required. The seating capacity was increased from forty to a hundred by the addition of sixty seats on the upper deck. The total weight of the car was only 31,360 pounds, and the two 35-horsepower motors already installed on the cars were found to be sufficient for the work. The largest closed cars in New York, the convertible Third Avenue cars, with cross seats, are about the same length as the Liverpool converted car; they weigh 3,600 pounds more, and seat only 48 per cent as many passengers. The objection will be urged against the double-decking of cars in New York city, that on certain lines the height of the elevated structures is not sufficient to allow such cars to pass under. The reply to such objection is that it would be a simple matter to raise the grade of the elevated tracks in such localities as the intersection of Broadway and Thirty-fourth Street, without working any injury to the elevated traffic. In fact, the location of the Thirty-third Street station at the top of a grade would be conducive to quick starting and stopping, and would be quite in keeping with the latest practice, which is to place all stations at the summit of a rather steep grade. Of course, the introduction of a double-deck car in this country would be met by strong opposition from the management, and this for the reason that our roads get their best profits from standing passengers. On the other hand, it seems as though standing has been overdone in this country, even if the subject be considered from the financial standpoint; for the extreme overcrowding which is witnessed during the winter months, causes loss of fares, and results in very serious loss of time in stops, it being no unusual thing for a minute or more of time to be lost while passengers are endeavoring to squeeze their way through the tightly-wedged mass of humanity on the platforms in the endeavor to board or leave the cars.

KEEPING THE HEALTH OF A CITY.

The sanitary conditions of a great city concern all who dwell within its borders, and the comparative mortuary tables prepared by its health board are being recognized more generally as important commercial assets. Nature has generously environed some cities with conditions favorable to the good health of their citizens; but continued neglect to keep pace in a sanitary way with rapidly-growing population has converted many such a town into a hot-bed of fever and contagious diseases. Of the many municipal problems pressing for solution, few demand more accurate study and investigation than that pertaining to the health of our large cities, with their vast ignorant and foreign population, congested tenement districts, crowded business places, and numerous public halls for amusement, education, and recreation. London, Paris, Bombay, Berlin, and Rome have had their scourges in the past to testify to the fearful penalty of ignorance and neglect; but American cities are young and vigorous yet, and they have escaped many of the plagues and disease epidemics that have marked the pages of ancient history.

Modern sanitary conditions have improved in the past quarter of a century in all the principal cities of the world, and we stand less in danger of widespread epidemics than ever before; but the ambition of every well-ordered city is to decrease its mortality to the lowest possible minimum. Contagious and infectious diseases may always be with us; but the prompt work of isolating and stamping them out is rapidly robbing them of much of their terror. There is a new era dawning in respect to the spread of all such diseases. Medical science has already robbed the bubonic plague of most of its dread. The appearance of a steamer in the port of New York with several cases of plague aboard barely causes a ripple of fear among its three million odd inhabitants, and yet a little more than half a century ago the terrible disease took such a strong hold of the city that grass could be found growing on lower Broadway in the busiest part of the town.

Yellow fever has succumbed to the inevitable. Havana has been relieved of its pall of death, and our own southern ports no longer fear the annual summer visitant. Smallpox has practically been controlled and brought under supervision, so that an epidemic of it in any well-regulated city is a disgrace to its governing powers and health board. We have become so well accustomed to the regulation and isolation of these violent diseases that few give much thought to them. But immunity from them is purchased by eternal vigilance and constant work on the part of those in charge of our public health. The workings of a modern, up-to-date city health board are peculiarly interesting. To the uninitiated, dealing with diseases is far more complicated than dealing with crime. Our individual danger is ten times greater from epidemics than from murders, robberies, accidents, and fires. Yet as a rule our police and fire departments excite our admiration, while the squad of health inspectors more often arouse our anger and opposition.

The Health Department of New York city deals with a total population of something like 3,500,000, extending over a vast area, and housed in almost every imaginable form of habitation. The population is the most heterogeneous in the world, representing every nationality, religion, and belief. The problem of dealing with so varied a population to enforce sanitary and ordinary health precautions is intricate and difficult. Instead of co-operation there has been more often bitter opposition. The crusade against smallpox conducted by the present Health Board in the past two years was opposed by the ignorant and superstitious, and by a considerable body of the more intelligent who were opposed to vaccination on principle. The inspectors were openly abused and resisted, and it was only through the co-operation of the police that an effective campaign was conducted. When the scare reached its height, the opposition from the tenements decreased, and the educational value of the campaign was worth all the efforts and expenditures made. It was rarely then that a case of smallpox was discovered in the tenements without being promptly reported, and, in most cases, followed by a wholesale exodus of the people to the Health Board's headquarters to be vacccinated. The dread of smallpox epidemics in New York city is thus lessened for the next twenty years. Instead of opposing and fearing the inspectors, the people of the tenements in most cases to-day show a wholesome welcome to them when they come armed with the quill and virus to save them from smallpox infection.

Contagious eye disease among the children of the public schools reached alarming proportions in the city until the Board of Health attempted to stamp it out. There were some fifty thousand children suffering from the disease at one time, but effective measures were taken to check its spread. Children suffering from it were kept at home or sent to the hospitals, and a strict quarantine placed on all the schools. The disease now has been almost stamped out. But eternal vigilance is the price of immunity. Every public school is under the immediate supervision of the Health Board. Scarcely a day passes that the children of nearly every grade are not examined. Should one of them show feverish cheeks, high temperature, or furred tongue, he is quietly examined, and sent home as a precaution. When measles, chicken pox, scarlet fever, or diphtheria break out in the home of some little scholar, his home is quarantined to some extent from the school. Each day a child coming from an apartment or house where any of these contagious diseases are known to exist must be examined by the Health Board physician before he is allowed to enter his class.

So strict is the quarantine now enforced against the schools that a scholar who has become a victim to any of the contagious diseases cannot return to his studies until a permit has been issued to him by the Health Board. This requires a personal visit from the Health Board doctor. In the private schools similar enforcements of the rules of the Health Department are now being made. Likewise churches, concert halls, and all places of amusement of a public nature are being visited and their sanitary conditions examined. Wherever people congregate together, there the seeds of disease are apt to spread and flourish, and the Health Board puts competent men on the scene to investigate. Scarlet fever, chicken pox, diphtheria, and measles are ever present somewhere in a city like New York. Several hundred new cases will develop every week in the city if left unquarantined.

In the matter of milk inspection the Health Department alone saves the city all the expense which it incurs. Hundreds of innocent babies are saved every summer by the recent rigid system of milk inspection. The doctors of the department go further. They give free instruction and directions to the poor and ignorant parents of the children. Inspectors not only test the milk as it reaches the city, but they go from store to store and make tests of milk purchased over the counter. The practice of sending inspectors to the farms in milk districts to study conditions there has been inaugurated. Instructions are given to the farmers about sanitary conditions of their cow stables and creameries, and if these orders are not obeyed, a ban is placed upon the milk coming from the spotted farms, and it is not admitted.

Milk inspection has always been one of the most difficult questions for the department to handle, for dealers, shippers, and farmers appear to combine to elude the Health Officers. Light fines were usually the only punishments for adulterating the milk, or for putting chemicals in it to increase its thickness. Under the present administration so much terror has been inspired by heavy fines and imprisonments that few dare openly break the law. Moreover, the inspection is kept up continually, and no dealer knows just when an inspector may test his samples and hale him before a magistrate.

Clean food, free from all disease germs; pure water,