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 1878) ..... 3.00 "

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MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, FEBRUARY 25, 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.

TURBINES FOR TRAMP STEAMERS.

The subject of the unsuitability of the turbine as a drive for ships of slow speed, that is, of speeds of about 9 or 10 knots an hour, at which the average tramp steamer travels, was recently discussed in the course of his presidential address before the Institute of Marine Engineers, by the Hon. C. A. Parsons, the man who, better than anyone else, is qualified to speak on this subject. The problem of turbine propulsion of ships at low speed presents the following dilemma: In a slow vessel the revolutions must be low, because a certain disk area and a certain blade area are necessary in the propeller if we are to avoid too great a slip ratio; but the pitch ratio cannot be reduced much below 0.8 without incurring excessive skin friction of the blades. This makes it necessary to use the highest revolutions possible under the circumstances, and these, in a 10-knot vessel, are necessarily very low. On the other hand, a certain surface speed of the turbine blades and a certain number of rows of blades are necessary to obtain a reasonable economy from a turbine; and if the revolutions are low, the diameter, and the number of rows must be increased. The result is that, for a speed of 10 knots, the diameter and the number of rows become inordinately great; the weight and the cost become excessive; and, of course, the efficiency of the turbine is somewhat impaired by the use of such extravagant dimensions in proportion to the power realized.

It will be news to the marine engineering world, and extremely interesting news at that, that Mr. Parsons says there is a way out of the difficulty, by which there can be obtained in a low-speed turbine the full measure of expansion essential to economy—an economy better than that of the best set of tramp engines of which he knows. He has found it possible to build a turbine that will operate economically under very low-pressure steam, even when it is running under slow revolutions. He states that the engines of a tramp steamer expand the steam down to about 7 pounds absolute pressure, when it is discharged to the condenser. The remaining energy, represented between the pressure of 7 pounds and that of say 1½ pounds, is practically lost. The new type of turbine is able to save about 70 per cent of this wasted energy; and the additional power due to the use of this low-pressure turbine is estimated at between 15 and 20 per cent of the whole power now realized—a gain which Mr. Parsons likens to that which was obtained in the advance from the compound to the simple reciprocating engine.

In referring to the possibility of the marine gas or oil engine becoming the extensive competitor of the steam engine, Mr. Parsons holds the same view which we have frequently expressed in this journal, that although such engines have realized a horse-power on a consumption from half to two-thirds of that of the best condensing steam engine, "it cannot yet be said that they can generally subsist on ordinary bunker coal. If, in the future, some form of gas producer using ordinary coal is successfully applied for use on board ship, and if the mechanical details of reversing can be satisfactorily arranged, then the steam engine or steam turbine will have to give place to the gas engine." That is exactly where we stand to-day, and as soon as our inventors and engineers can build a gas-producer that can take the ordinary "run of the mine," the application of the gas engine will become general in almost every branch of engineering. We do not know of a field of investigation or invention that holds out a richer prize than this.

THREE MONTHS OF RAILROAD SLAUGHTER.

The death roll of the railroads of this country continues to lengthen, and the number of casualties in any given period steadily increases. Accident Bulletin No. 13 of the Interstate Commerce Commission tells us that the number of persons killed in train accidents during the months of July, August, and September last year, as shown in reports made by the railroad companies to the commission, was 411, and that the number of injured was 3,747. Accidents of other kinds, including those sustained by employes while at work and by passengers in getting on and off cars, etc., brought the total number of casualties for that quarter of the year up to 14,239, of which 1,032 were killed, and 13,207 were injured. These figures mean that in the course of a single year, were this rate of maiming and killing sustained, our railroad system would be directly or indirectly accountable for the death of 4,128, and the more or less serious injury of 52,828 people. The Bulletin of the Commission says that the quarter under review may, as a whole, be termed the most disastrous on record. Of the 228 passengers and 183 employes killed in train accidents, 217 cases are accounted for by six accidents, and these 217 were nearly all passengers. In one case of derailment, 88 people were killed. In one collision 63 were killed; in another, 24; and two other collisions accounted respectively for 18 and 16 deaths.

The true measure of the blameworthiness of the railroad systems, in this matter of injury and death, is not so much the total number of victims as it is the total number of accidents. There is no strict relation between the number of people killed in a particular accident and the amount of carelessness, or poor management, or neglect, that brought about that particular accident. A very slight defect, not easily detected, might result in the killing of a hundred people, whereas some glaring instance of neglect might cause an accident in which the casualties were extremely small. Therefore, the true test of the ability of our railroads to take proper care of the passengers who commit themselves to their care, is the list showing the total number of accidents in a given period, and more particularly the total number of collisions and derailments, the one indicating faults of operation, and the other faults of construction and upkeep. Tested even on this basis, the records of these three months are very damaging to the reputation of our railroad systems. For the three months there were 1,439 collisions and 1,321 derailments, of which 232 collisions and 137 derailments affected passenger trains.

The technical journals which are devoted particularly to the affairs of the railroads, have complained of such reiterated and bald statements of the totals in the Accident Bulletins, as we have been in the habit of presenting in the columns of the SCIENTIFIC AMERICAN. It is claimed that careful analysis of these returns would show that the condition of affairs is not nearly so bad as the simple statement of these figures would seem to imply. It is further objected that the frequent reference we have made to the fact that in a recent year the railroads of Great Britain were operated without the loss of the life of a single passenger is also misleading, for the reason that while it may be literally true, there are unrecorded considerations which considerably mitigate the force of the comparison. We have carefully read these articles, with an honest endeavor to see the drift of the arguments set forth; but we have to confess that we have found nothing to lessen the significance of the fact that, while we have been killing people at a rate which has risen for one quarter to over 4,000 a year, a great railroad system in another country, on which the traffic is far more dense, and therefore more difficult to handle than ours, was actually able to prosecute that traffic, day in and day out, without the loss of a single passenger.

There are several conditions peculiar to American railroads which account for our large casualty list. The chief among these, undoubtedly, is the inherent restlessness of a not inconsiderable section of our railroad employes, which shows itself in the chronic disposition to move on and try some new field of work. This results in a continual change of the personnel, with the result that at any given time, on any given road, there will be found a large number of employes who are entirely new to, or but little familiar with, the special local conditions surrounding their work. Now, it is this familiarity with the local conditions, over and above the general knowledge which any engineer, conductor, brakeman, signalman, switchman, must have of his duties in the abstract—it is this familiarity we say, that is the very best safeguard against railroad accidents, or at least against those that have to do with the running of the trains.

Second only in importance as a contributory cause to railroad accidents is the continual change which is taking place in the management and official staff of our railroads, and in their ownership. As a result of the mad whirl of organization and reorganization, combinations, receiverships, and what not, there is a continual change of management from president to roadmaster. Well-established organizations and systems of management, that have gained that smoothness and accuracy of working and that mutual confidence and sense of interdependence, which can only come from long and successful association in the operation of a particular system, are suddenly broken up by the sale of the road or its combination with some other system; new men are introduced into high offices; and they, in turn, have their own particular friends or well-tried assistants whom they naturally wish to introduce; heart-burnings, jealousies, and disappointments ensue; and the whole operative system of the road is shaken from summit to foundation; for the general unrest invariably distributes itself throughout the whole working force of the road, with a consequent lowering of discipline and more or less careless performance of duties.

If the time shall ever come when the various railroads will be content to recognize each other's spheres of influence and control; if a day is ever reached when this perpetual reorganization, this turning upside down of railroad management, shall cease, we may look for a return of that sense of stability and permanence which formerly made the average period of employment by any particular company much longer than it is to-day. Then, only, will there be a return of that personal interest and pride in one's work, and that sense of security as regards the permanence of one's job, which will do more than anything else to promote careful work, whether in the construction, the maintenance, or the operation of our steam railroads. Then, and not till then, shall we see a diminution in the disgraceful record of deaths and injuries which appears with painful regularity in the reports of the Interstate Commerce Commission.

FUTURE WATER SUPPLY OF NEW YORK CITY.

If anyone doubt the possibility of New York city's having to face a water famine within the next two or three years, he should read the report recently made to the Mayor of this city by the Commission on Additional Water Supply, from which he will learn that the average rate of consumption of Croton water during the past year has exceeded the amount which all of the present reservoirs in the Croton watershed, together with the great reservoir now being formed above the new Croton dam, can supply in a year of small rainfall. This emergency has been obscured by the fact that the rainfall and stream flow for the past two or three years have been larger than the average, as shown by the records of the Croton reservoir flow, which have been carefully kept for many years. No one can predict the year of the next severe drought; but the facts that the rainfall has been above the average for the past few years, and that periods of large and small rainfall follow in cycles, make it very likely that we shall have to face some years of small rainfall in the near future. Emergency work is being done in the Croton watershed by the construction, which is immediately to be undertaken, of two dams above the new Croton dam, which together will impound an additional twenty billion gallons, to be held in reserve against a dry season; but it will take at least two years and probably longer to complete these. That we are running perilously close to the margin is shown by the following figures: During the quarter ending September 30, 1904, the average daily use of water from the Croton basin was 290 million gallons, whereas the records show that the average annual daily fall of the Croton River fell to 209 million gallons in 1880, and to 222 million gallons in 1883.

Admitting then, as we must, that it is necessary at once, and with all speed, to provide additional water supply, the question becomes one of where to get it, how to store it, and how best to conduct it to the city. These are questions of engineering pure and simple, and as such they should be judged and determined. But, alas! there has fallen upon this problem, as upon every other big engineering question affecting the interests of this city, the pernicious blight of politics. The problem is so vast, it involves such big expenditures of money, such possibilities of patronage, to say nothing of "graft," that the political harpy is watching it with a hungry eye. The Ramapo scandal is fresh in the public memory; but the snake though scotched is not yet killed. The air is full of propositions, from Engineer Birdsall's $90,000,000 tunnel aqueduct to the ex-governor's bill for State control of water rights. Meanwhile, the population of New York is growing by leaps and bounds, water consumption is increasing, and nothing is being done to adequately meet the crisis.

The agitation of this question is much older than the general public might suppose; for as far back as the year 1886, a study of the problem was made by Mr. R. D. A. Parrott, who pointed out the advantages presented by the Esopus and Schoharie creeks as a future source of water supply for this city. The results of his investigation were published in the SCIENTIFIC AMERICAN SUPPLEMENT of September 4, 1886; and it is an interesting fact that the scheme outlined at that time is practically identical, as far as the location of the reservoirs is concerned, with the Ashokan reservoir suggested by Mr. Birdsall, the present Acting Chief Engineer of the Department of Water Supply, Gas, and Electricity, and indorsed, after very considerable modifications, by the Burr-Freeman Commission in the report above referred to.

The report of the Chief Engineer calls for the construction of a dam across Esopus Creek, near Olive Bridge, and of a deep-tunnel aqueduct, 97 miles in length, from the dam to New York city. The magnitude of this part of the work will be realized more clearly when we bear in mind that the total length of