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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.

DESTRUCTION OF CITY REFUSE.

The question of the destruction of city refuse by burning and the utilization of the heat for power—a question that has attracted considerable attention and has been put to careful test in the older countries—is destined to receive widespread attention from the municipal authorities in America. Many years ago attention was drawn to the possibility of a city getting rid of its refuse by a method that would yield a valuable return, by the Borough Engineer of Southampton, England, who utilized the waste heat from a refuse destructor in driving the electrical plant for lighting the city. Since that time the world has been made familiar with the results obtained in one of the London districts, and a large amount of valuable matter has been written and data gathered upon this most important subject. It is now pretty well established that the value of city refuse as fuel for city lighting will vary with the locality and the general conditions. As a rule, it has been found that in England the destruction of refuse does not alone furnish sufficient heat to run the city lighting plant, and recourse has had to be made to the coal pile. When the duty to be performed is entirely that of electric lighting, the refuse destructor has not given such good results as when the plant was used for operating a street railway system. It has been found that the refuse destructor gives its best results when it is working at an even rate of combustion, and this condition is obtained where the load on the electric plant is not subject to extreme fluctuations.

Valuable information in connection with the working of the refuse destructor, when employed in raising steam for an electric plant, is furnished in a recent report by the Electrical Engineer of the Borough of Fulham, London, presented to the Council, in which it appears that the cost of burning 30,201 tons of city refuse was $27,100. As the electrical department was paid $19,230 for the work, the actual cost to the station was $7,870. As an offset to this there was a considerable reduction in the expenses for coal. The author of the report bases his estimate of the actual cost to the electrical lighting department of the refuse destruction, upon the workings of several electrical plants owned by corporations in the city of London, in which he finds that the average cost of the coal per unit works out at 2.10 cents, whereas, the cost of coal to the electrical plant of the Borough of Fulham for last year worked out at only 0.76 cent per unit. Basing his estimate upon these figures, he finds that there is a net profit from the destructor department of $3,442. Although these results are not so flattering as were predicted a few years ago, when this system was first put to the test, they do demonstrate that the sanitary disposal of city refuse by cremating can be carried out with a net profit to the user, where the plant is properly installed and the general conditions are favorable. The results, as we have said, will be largely modified by local conditions; and it is a question of vital interest to the great cities on this side of the Atlantic, as to how far this method of refuse disposal, which has every sanitary consideration to recommend it, can be carried out with similar economic results to those obtained in the plant under consideration.

THE STEAM TURBINE FOR OCEAN SERVICE.

The unbroken success which has attended the application of the steam turbine to steamship propulsion, beginning with the experimental "Turbinia," and ending for the present with the handsome 22-knot Channel steamer which we illustrate on another page of this issue, is a sure guaranty that before long we shall see this remarkable engine installed in a first-class, high-speed transatlantic liner. Had there been any failure recorded in the last four or five years of experimental work; had the steam turbine shown any inherent and unsurmountable defect rendering it unsuitable for marine purposes, the great steamship companies would be justified in their hesitation to substitute the compact and self-balanced motor for the ponderous and at best but poorly balanced reciprocating engine. But no such obstacle has shown itself. It is true, the impossibility of reversing the turbine seemed for a while to be fatal to its introduction on steamships; but the present arrangement of installing a set of reversing turbines on the same shaft with the main engine has removed the difficulty, and the distribution of the motive power upon three shafts has provided all maneuvering power that can reasonably be asked for. A recapitulation of the experimental period referred to will show how unbroken the success of the marine turbine has been. The very first vessel to carry it, the "Turbinia," broke all existing records for speed, steaming at over 34 knots an hour. Then came the "Viper" and the "Cobra," whose turbine engines placed them so far ahead of all existing torpedo boats in point of speed as to put them in a class by themselves, the 37 knots achieved by the former boat never having been surpassed in an official and properly certified trial of any kind of vessel before or since. Then came the Clyde passenger steamers "King Edward" and "Alexandra," in which the conditions for comparative tests were most excellent, the boats being of about the same size and engaged in the same service as existing high-class vessels, the data of whose performance was well known to the companies who owned them. In these vessels it was proved that on a given displacement and coal consumption, it was possible to get about a knot extra speed by the use of the turbine motor, while the absence of vibration and the increased passenger accommodation were further distinct and very valuable gains in favor of the new boats. Quietness in running, economy in space and fuel are features which naturally attracted the attention of the yachting world, and to-day three Americans are owners of vessels which are among the fastest and most comfortable yachts afloat. "Tarantula," with a speed of 26 knots, and "Emerald" and "Lorena," with speeds respectively of 16 and 18 knots an hour, will probably be seen in these waters during the coming international cup races, where they will meet another successful turbine yacht in the "Resolution," which is driven by a turbine engine of a purely American design. The latest success is that achieved in the turbine steamer "Queen," recently put in service between Calais and Dover, which made her first cross-Channel trip at an average speed of 22 knots an hour. She is to be followed by other vessels of this type, which are now building for three different companies that ply across the stormy waters around Great Britain.

As a matter of fact, in view of the unbroken success that has attended the use of the turbine in the smaller classes of steamship, the hesitation of the large transportation companies to adopt this system for the big liners is to be attributed to a conservatism which, although it is not justified by the facts, is not unnatural in view of the great cost of these huge vessels, which each represent an investment of from three to five million dollars according to their size and speed. Nevertheless, so far from the installation of turbine engines on an ocean liner being in the nature of an experiment, the only condition that would be novel would be the increased size of the turbine as compared with those which have done such successful work in smaller vessels; and it has been asserted time and again both by Mr. Parsons, the designer, and by the builders, that the economy in space and weight and the absence of vibration which have been realized in the smaller boats, would be realized in greater ratio as the size and power of the vessel on which the turbines are installed increased. In other words, so far from there being any new conditions prejudicial to the turbine introduced by building them in the much larger units necessary to drive a transatlantic liner, the very increase in size would bring about a larger proportionate reduction in the weight and space per unit of power than has been realized in the vessels of 2,000 tons and under, that are now running successfully with turbine engines. Basing their calculations upon data already secured, it is estimated by the builders that in a vessel of the same displacement as the largest and fastest of the present transatlantic steamers, it would be possible, by the installation of turbine engines, to secure fully one knot more speed; and when we remember that the resistance of these fast vessels increases as something more than the cube of the speed, it will be seen how great would be the actual economy of a large capacity marine engine. Furthermore, from the passengers' point of view, there will be a great gain in comfort due to the absence of vibration; for it cannot be denied that the extreme vibration of the high-speed ocean liners of to-day, due to the reciprocating engine, is one of the most serious drawbacks of transatlantic travel.

GROWTH OF OUR RAILROAD SYSTEM.

It was to be expected that the present commercial prosperity would have a marked effect upon the railroad system of the United States, and the statistics for the last fiscal year of the Interstate Commerce Commission show that in every respect there has been a decided and very satisfactory growth. The total single-track railway mileage is 202,472 miles, an increase for the year of 5,234 miles, which is greater than that for any other year since 1890. For the service of the 2,037 railway corporations included in this estimate, 41,228 locomotives were required. The total number of cars of all classes in use at the close of the year was 1,640,-220, an increase of over 89,000 over the previous year. Of this total number, 36,991 were passenger cars, 1,546,132 freight cars, and 57,097 were devoted to the direct service of the railways.

It is gratifying to learn that of the total number of freight cars as given above, 1,204,929 were fitted with train brakes and 1,521,000 with automatic couplers. The total number of employes at the close of last year was 1,189,315, an increase of 118,146. There was paid out during the year in salaries and wages $676,028,592. The amount of railway capital outstanding was $12,134,182,964, and the amount of dividends declared during the year was $185,391,655. This is equivalent to a dividend of 5.55 per cent on the amount of stock on which some dividend was declared. The number of pasengers carried during the year was 649,-878,505, an increase of 42,600,384, and the number of tons of freight carried was 1,200,315,787. The gross earnings of the railways for the year were $1,726,380,-267, and the income from operation, or net earnings, was $610,131,520, an increase over the previous year of over $52,000,000. The unpleasant feature of the statistics is reached when we consider the record of railway accidents for the year. The total number of casualties for the twelve months was 73,250; the number of persons killed having been 8,588, and the number injured 64,662. Of these totals, nearly 3,000 railroad employes were killed and over 50,000 were injured—truly a ghastly result; one that should bring a blush to the cheek of every patriotic American. It certainly looks as though the charge often laid against us, that we are brutally indifferent to the sanctity of human life, is only too true. The number of passengers killed during the year was 345, while 6,683 were injured. This is a great increase over the year preceding, when 283 were killed and 4,988 pasengers injured. Referring to the total figures of killed and injured, the number of killed amounts to one-seventh of the total number of men in the United States army, and the number of injured is greater than the number of men in the army by nearly 5,000. As for the risks incurred by the trainmen on American railroads, their work is certainly the most perilous of any in the world, not even excluding that of the soldier in time of warfare; for our railroads kill in a single twelvemonth one employe out of every 135, and they injure one out of every ten.

PROGRESS OF THE UGANDA RAILROAD.

The Uganda Railroad, which was commenced in December, 1895, by the British government, following the taking over of the East Africa Protectorate and Uganda from the British East Africa Company in 1894, is now completed so far as the actual track is concerned. This railroad extends from Mombasa on the East Africa Coast to Port Florence on Lake Victoria Nyanza, a total distance of 584 miles. In many ways the building of this railroad constitutes a remarkable engineering achievement, the route for the most part lying through very difficult country and jungle. When the railroad was projected it was estimated that its total cost would amount to $15,000,000, but the expense of the undertaking has considerably exceeded the anticipated cost, as the money already devoted to the work is over $25,000,000. This works out about $43,000 per mile—a by no means expensive outlay considering the engineering magnitude of the undertaking.

One of the most notable incidents in connection with the construction of this railroad was the large order of twenty-seven steel bridges placed in this country. These have all been erected and finished and the only uncompleted section of the railroad is the substitution of steel bridges for a number of insignificant temporary wooden structures.

Already the railroad is exercising a beneficial influence upon the country through which it passes, while the maritime traffic upon the Victoria Nyanza is being rapidly developed. Both Indians, Italians, and Germans have large vessels trading upon the lake. A twin-screw steamer is already in service and a sister vessel is in course of erection at Port Florence for a similar purpose. The vessels each measure 176 feet in length, have a draft of 6 feet, and a displacement of 600 tons, and passenger accommodation for 100 passengers. These vessels were designed and built at Paisley on the Clyde, then dismembered and transported in sections to Port Florence, where they were reassembled. The first of these two twin-screw steamers on its trial trip from Port Florence to Entebbe—the Uganda administration headquarters on the opposite side of the lake—and back again occupied two days, including time for discharging cargo at Entebbe.

At present a through train runs twice a week each way between Mombasa and Port Florence, and the new