"Wake-up, Britain" type of speech and literature clanged incessantly, is echoed and possibly revived. The author is competent by experience to wield the whip, and supports his lament and exhortation with historical facts backed up by statistics and a clearly expressed insight into the depths of national and individual character.

After indicating at length what our failings are and the causes producing them, Dr. Drysdale winds up a noteworthy address with the following advice :—

"In bringing this lengthy address to a close perhaps you will permit me to indicate what I believe to be the best courses before you. Some of you may become manufacturers, others will hold more or less high positions in various firms, others again may develop on the scientific side.

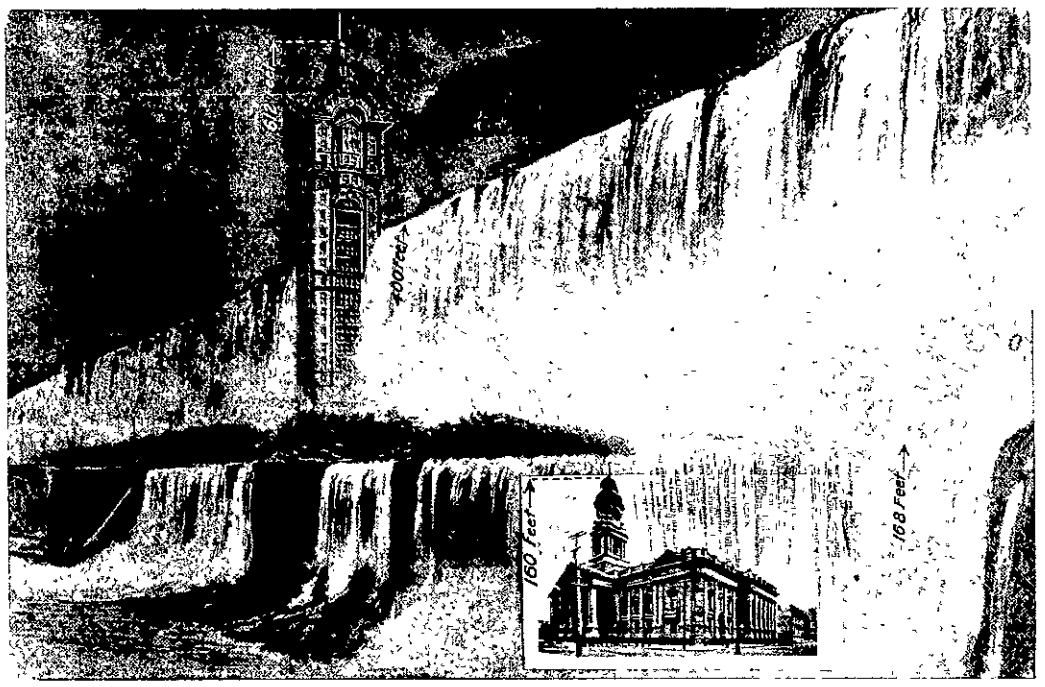
"In the first place, a really good all-round scientific knowledge is indispensable to the engineer, and a certain amount of it for any capitalist who has to do with engineering. Don't despise pure science, however unpractical it may appear. Science has two functions —destruction of error, and the finding of truth—and one is just as important as the other. The debt we owe to Copernicus, Galileo, Darwin, and Haeckel is as great as to Volta, Ohm, and Faraday. What is the pure science of one decade is the applied science of the next. The dynamo is really due to Faraday, wireless telegraphy to Maxwell and Hertz, and the modern electric lamps are the direct outcome of the scientific investigations of Tyndall on the efficiency and laws of radium. Much more remains to be done in this direction, the efficiency of a perfect lamp being probably between 5 and 10 c.p. per watt. The man who wants to find it had better study all he can about the electro-magnetic theory of light and electrons, keeping his object in view all the time.

"Don't carry your studies too much into detail. A dozen first principles thoroughly mastered are worth hundreds of facts as to the shapes of outsides of machines or any amount of 'good modern practice' unless you have definitely settled to specialise in one particular direction.

"We may be honestly proud of the fact that British physicists from Newton to Faraday, Cavendish, Maxwell, Kelvin, and J. J. Thomson have been in the forefront of progress. What we want are the practical men sufficiently educated to take each discovery from these pioneers and turn it to practical account, as the Germans have been doing for the past twenty years or more.

"Whatever else you do study French and German thoroughly, and spend your holidays abroad if possible. Read the German technical papers, and try to get some Continental or American electrical experience. I am doubtful about the advisability of a complete college education abroad, unless a student is already master of the language. The most luminous teaching in the world is lost if one is struggling with the intricacies of the language at the same time.

"Study ethics, economics, and hygiene. Remember you are a human being first, and an engineer afterwards. The works of Adam Smith, Ricardo, Bentham, Bain, Malthus, J. S. Mill, and William Ellis, are mines of almost unexplored wealth, and should enable you to avoid very many pitfalls. After you have read these you may try Henry George and Karl Marx, in order to know what labour is being fed on. Had I my way, a course on these subjects, as well as in commercial matters, should be an essential feature of every engineering college training, even at the cost of leaving some technical work out. If you make your way and become an employer, remember your economic studies and try to act on them, and disseminate this knowledge among your workpeople. It will pay you, if you don't try to do too much at once. The keynote for general success is *enlightened* self-interest, but that is not the sort of self-interest which prevails today.



THE GREAT WATERFALLS OF THE WORLD—A COMPARISON.

Victoria Falls, Zambesi - -	400 feet	The Singer Building, New York -	612 feet
The Niagara Falls - - -	168 feet	Town Hall, Wellington - - -	160 feet

"Try to turn your studies into new directions. At the present time nearly all electrical engineering students seem to want to see the wheels go round, and nearly all our colleges are sending out seventy to eighty per cent. of potential dynamo designers. There is much more prospect at present in the fields of telegraphy, telephony, insulation, and cables, and especially in lighting. Traction work will still be good for some time, but is very much competed for.

"Lastly, don't despise money but don't sacrifice too much to getting rich in a hurry. If you keep your mind clear and tackle some of the many fine practical problems still before you in a sound manner, you will find your progress, though slower at first, will bring you out further in the long run. Besides money is not the only thing. After making enough to support existence, the chief thing everyone works for is the esteem of his fellows. Some can only get it (?) by riches and ostentation, but if you can get a comfortable living and feel that you have been of use to others as well as yourself, your frame of mind will be happier. There are two ways of attempting to raise oneself above one's fellow creatures. One is by pulling yourself up, the other by pushing them down. The second method is much in favour here at present. Capital, labour, and science try to depreciate each other. Manufacturers stand in their own little corners, each jealously guarding some really or hypothetically valuable trade secrets, while our more prudent foreign neighbours are helping each other along and taking advantage of us."

The Modern Destructor.

[By T. C. Ormiston Chant, A.M.I.C.E.]

In the earlier days of the refuse destructor it was of first importance to place it as far as possible away from habitations, but in a position as central as was consistent with the reduced cost of carting refuse to the site. With the advent of the modern destructor, and its absolute freedom from nuisance caused by dust and smell, the former consideration no longer weighs in choice of site, but many other points have to be taken into account.

In order to be able to select a type of plant suitable for the existing conditions, the following points must be considered in the order given below :—

1. Whether to erect at different parts of the community two or more destructors of small size, or to place one large one in a central position to deal with the whole of the town's refuse.
2. Whether the site (or sites) chosen admits of the economical disposal of superfluous clinker.
3. What type of plant is the most economical.

Taking the first and second points, it is safe to say that, except in very densely populated towns where the area of collection is small and the sites available are few, no destructor of a greater capacity than 160 tons per day of 24 hours should be installed, unless there are exceptional facilities for disposal of any superfluous clinker. With proper manipulation a good destructor reduces refuse to about a quarter of the quantity of hard vitreous clinker, a most valuable by-product wherever new roads and buildings are being made. In some cities, however, no use can be found for the clinker, and then the cost of carting it away becomes an item of importance.

It is easy to imagine that sometimes there may be no available central site large enough for one big destructor in a town. The question then arises as to the advisability of placing one large destructor without, or two smaller ones within, the area of collection of refuse, and in suitable positions. The greater cost of working and maintaining two small plants would be quite likely to exceed the extra cost of carting to the one large plant outside the town.

Taking the third point, the most economical destructor is that which costs least to operate and maintain, in proportion to the amount of useful heat and by-products available. The plant best able to satisfy all these conditions is the one which, firstly, maintains a temperature averaging about 2000°F., never falling below 1250°F. and never exceeding 2900°F. Secondly, suitable boilers should be installed capable of raising all the steam that the heat from the furnace can generate. Thirdly, heated forced draught should be used in the furnaces, and the steam used to obtain the blast should be a small proportion of the total steam generated in the boiler. Fourthly, the operations of feeding the refuse into the furnace and withdrawing the clinker should be conducted from different sides of the furnace. Fifthly, the blast should be heated by the waste gases. Sixthly, the boiler feed water should be heated by any exhaust steam available, or where suitable, an economiser. Lastly, the atmosphere in which the men operating the plant have to work should be as pure as possible.

In designing the "Heenan" destructor all these points have been given proper thought, and it is here my intention to describe the plant now being