

The work of the aeronautics division has made good progress; in particular the study of the best forms of aeroplane surfaces, and of the distribution of flow round such surfaces, has been greatly advanced. An opportunity of describing this work will arise later, on the issue of the annual report of the Advisory Committee for Aeronautics.

The metallurgy department was occupied for some considerable time during the autumn with the transference to the new Wernher building. The principal item of research work has been the investigation of the aluminium-zinc alloys, carried out for the Alloys Research Committee of the Institution of Mechanical Engineers.

Mr. Baker, the superintendent of the William Froude National Tank, has carried out a number of investigations, some of which have been already described in these pages. Careful comparisons have been made with Mr. Froude's results at Haslar by tests on models to lines supplied by him, and experiments have also been carried out with a model similar to others tested at Clydebank and Washington. These tests have shown satisfactory agreement, and the national tank is now ready to go forward with general experimental investigations of ship resistances.

In this short summary it is impossible to do more than touch on the many points of interest presented by the work of the laboratory. Enough, however, has been said to show that the laboratory continues fully to justify the appreciation which the great manufacturing firms of the country have displayed of its value to industry.

#### OZONE AND VENTILATION.

THE Journal of the Society of Arts of February 9 contains a paper by Messrs. Leonard Hill and Martin Flack on "The Influence of Ozone in Ventilation." The authors point out that whilst it is not legally permissible for the carbonic anhydride in the air of a factory to exceed a few parts per 1,000, no harm whatever is caused by breathing air containing up to 4 per cent. of this gas. A similar statement applies to deficiency of oxygen, which does not become important until the proportion falls to 14 or 15 per cent. These conclusions are quite in accord with the fact that, on account of the dead-space separating the lungs themselves from the open air about one-third of the air drawn into the lungs is re-breathed; it is thus quite impossible that a few parts per thousand of carbonic anhydride in the outside air should affect the lungs, in which the percentage is normally about 5 per cent.

Another theory of the ill-effects of bad ventilation is the supposed liberation of organic poisons. This also is probably fictitious, as animals will live and thrive when supplied exclusively with air already breathed by other animals, and containing  $3\frac{1}{2}$  per cent. of carbonic anhydride; they are liable to die of suffocation if the air supply is interrupted, or if the percentage of carbonic anhydride rises to 10 to 12 per cent. As an explanation of the discomfort arising from lack of ventilation the authors suggest: (1) the stagnation of the air, resulting in diminished evaporation from the skin, and a consequent sensation of lassitude; (2) the nausea caused by the odour emitted from an imperfectly washed crowd. The value of ozone in ventilation depends largely upon its power of removing this odour; sterilisation is perhaps less important as expired air is practically sterile; infection is conveyed by droplets of saliva, which cannot be removed by ventilation, but soon settle, and may be removed when the room is dusted.

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#### LA HOUILLE BLANCHE.<sup>1</sup>

THE work of the French "Direction de l'Hydraulique" has already been the subject of two articles in these columns (May 7, 1908, and November 25, 1909). On both occasions a tribute was paid to the very effective and thorough manner in which the department was carrying out its systematic investigation into the hydraulic reserves of the mountain ranges of France. The volume now under review is the fourth of the series, and it sustains the favourable impression created by its predecessors. It brings the record of observations down to the end of 1910, completing a period of very nearly eight years since the inception of the department. The service, in so far as it relates to the region of the Alps (which is the only range at present under observation, though the extension of the work to the Pyrenees is impending), is now concentrated under the direction of M. R. de la Brosse, whose former coadjutor, M. R. Tavernier, has become Inspecteur général de l'Hydraulique agricole.

The area of country comprised within the purview of the inquiry amounts to 22,000 square miles, and lies immediately to the south of the Lake of Geneva, extending to the shores of the Mediterranean, and being bounded on the east and west, respectively, by the Italian frontier and the river Rhone. The principal basins are those formed by the tributaries of the Rhone on its left bank between Geneva and the sea, the most noteworthy being the Isère, the Durance, the Var, the Arve, and the Dranse. Gauging stations to the number of 180 have been established in suitable localities, and the total number of gaugings carried out to December 31, 1910, was 3116, of which 726 represent the work of the last twelve months. The greatest number of records taken at any one station amounted to fifty-nine, and the mean for the whole was seventeen.

From the observations two factors, or coefficients, have been deduced. First the mean characteristic discharge, which represents the minimum guaranteed for half the year; and, secondly, the modulus, or arithmetical mean of the discharges corresponding to the daily level. The former of these factors is valuable in computing the industrial trustworthiness of a stream, and the second is an important element in connection with regularisation works. As an instance may be taken the case of the Durance at Rousset, where, during the five years 1905-9, the records show a variation in discharge between 18 and 440 cubic metres per second, giving as mean figures for the whole period a low-water discharge of 20 cubic metres per second, a modulus of 68, and a total annual volume of 2,138,000,000 cubic metres. The mean characteristic discharge, *i.e.*, the minimum on which it is possible to reckon during half the time, is about 46 cubic metres per second.

The motive power in the French alpine region actually harnessed at the present time amounts to 473,000 h.p., divided approximately as follows:—Metallurgy, 210,000; power and light distribution, 155,000; chemical products, 60,000; paper, cardboard, &c., factories, 30,000; electric traction, 10,000; miscellaneous, 8,000. Other schemes are now projected which will shortly raise the total to something in the neighbourhood of 2,000,000 h.p.

The volume contains one or two useful essays by individual contributors on technical matters connected with the taking of observations, and there are several interesting photographs. Then follows part ii., which

<sup>1</sup> Service des Grandes-Forces Hydrauliques (Région des Alpes). Compte Rendu et Résultats des Études et Travaux au 31 Décembre, 1910. Tome iv., pp. 556. Annexe I. Cartes. pp. 14+8 cartes; Annexe II. Nivellements, 33 planches. (Ministère de l'Agriculture, Direction de l'Hydraulique et des Améliorations Agricoles, 1911.)