

CANADIAN LIME FOR THE AMERICAN MARKET.

The report comes from Boston that a syndicate of American capitalists, among whom is Mr. Frank Jones, who is interested in kilns at Sherbrooke, Que., is about to purchase the lime-kilns of Bras d'Or, on the island of Cape Breton, Nova Scotia, and at St. John, N. B. This action is to be taken in view of the probable reduction of the duty on lime under the amended American tariff.

The Boston despatch referring to this matter says that it is believed that under a low rate of duty a very large market for Canadian lime would be found in the New England States. Before the McKinley bill went into effect Canadian lime was admitted under a trifling tariff of about three cents a barrel. It overran the market in Boston, and practically had control of the trade. Despite the fact that Bras d'Or lime is not of as good a quality as Rockland lime, the difference in price incident upon the low tariff and the cheaper labor of Canada compelled the builders to use this lime. The McKinley bill put a duty of about 13 cents a barrel on Canadian lime and this had the effect of evening up the prices. The new tariff bill practically puts Canadian lime back to where it was. It is quite probable that again the builders will have to take notice of the big difference in price and fall back to the use of Canadian lime. Though wages are higher in Maine than in Canada, under a tariff the price of lime has actually fallen, so that it is selling cheaper now than at any other time in its history.

WIND PRESSURE.*

A paper on the above subject was read at the recent meeting of the Australian Association for the Advancement of Science, at Adelaide, by Professor Kermot, of the Melbourne University. The paper, which was of considerable length, commenced by referring to the great inconsistencies appearing in engineering and architectural practice, with regard to wind bracing of chimneys, roofs, bridges, etc., and to the great variation in the anemometric results given by the meteorological observatories; some observatories, such as Bidstone, near Liverpool (England) and Sydney recording pressures, or velocities corresponding to pressures of 90 lbs. or 100 lbs. per square foot, while others, such as Greenwich and Edinburgh, Melbourne and Adelaide, give results only one-third as great; and it was pointed out that these latter results correspond fairly well with usual experience with railway carriages and chimneys, great numbers of which would overturn with pressures of not more than 30 lbs. per square foot, and yet as a matter of fact do not overturn, and are regarded by the public as perfectly safe. Reference was next made to the experiments tried by Sir B. Baker at the Forth Bridge, which showed that the average pressure on surfaces as large as railway carriages, houses or bridges, never exceeded two-thirds of that upon small surfaces of one or two square feet such as have been used at observatories, and also that an inertia effect which is frequently overlooked may cause some forms of anemometer to give false results enormously exceeding the correct indication. The very elaborate experiments of Mr. O. T. Crosby, detailed in *Engineering* of 13th June, 1890, were next dealt with. These experiments showed that the pressure varied directly as the velocity, whereas all the early investigators, from the time of Smeaton onwards, made it vary as the square of the velocity. Experiments made by the author of the paper, at speeds varying from 2 to 15 miles per hour, were described, which agreed with the earlier authorities, and tended to negative Crosby's results. It was pointed out, however, that further tests on a greatly extended range of velocities were needed. The paper next described an apparatus devised by the author for determining the relative pressure of the wind on flat plates, cubes, cylinders, spheres and other geometrical forms. This apparatus consists of a screw propeller similar to that used on steamers, 28 inches diameter and 48 inches pitch on a 30-inch tube. This propeller is caused to revolve at speeds varying from 400 to 800 revolutions per minute by means of a gas engine. The helical currents of air proceeding from the propeller are gathered up and discharged in one approximately steady jet of 12 inches by 10 inches section, by means of a radial diaphragm and a conical mouthpiece, having its axis tangential to the helical direction of the air. In front of this jet was placed the object to be tested, supported upon a very delicately made carriage running on an accurately levelled surface plate, the force exerted being measured by a delicate spring balance, the accuracy of which has been verified by means of standard weights. A large number of experiments were made with this apparatus, and many interesting and valuable facts elucidated. The ratio existing between the normal pressure on a sloping surface, such as a roof, and that upon a vertical plane was found to agree with the table given in Stoney on Stresser, p. 524; but it was found that this result applied only to roofs supported on thin columns under which the wind could blow freely. When the

roof was placed upon a wall, as in an ordinary building, the wall deflected the current of air upwards, and greatly reduced the pressure on the roof. If the wall was provided with a parapet of ordinary proportions this effect was still more marked, the pressure being reduced to one third of what it would otherwise have been. In the case of a roof of 30 deg. pitch the pressure was actually reversed the roof having a slight tendency to lift. In these experiments the parapet was made only one-sixth the height of the roof measured from the level of the eaves to the ridge. Experiments were also tried as to the effect of a wind blowing in at the open end of a building having the sides and other end completely closed, and it was found that the internal pressure tending to lift the roof was equal to the pressure of the wind on a flat vertical surface. The pressure upon one side of a cube, or of a block proportioned like an ordinary carriage, was found to be '9 of that upon a thin plate of the same area. The same result was obtained for a square tower. If the cube or tower was placed so that the wind blew in the direction of a diagonal, the total pressure was just the same as when one side was presented. A square pyramid whose height was three times its base and which represented a common form of church spire experienced '8 of the pressure upon a thin plate equal to one of its sides, but if an angle was turned to the wind the pressure was increased by fully 20 per cent., a curious contrast to the action on a cube or square tower. A bridge consisting of two plate girders connected by a deck at the top was found to experience '9 of the pressure on a thin plate equal in size to one girder, when the distance between the girders was equal to their depth, and this was increased by one-fifth when the distance between the girders was double the depth. A lattice work in which the area of the openings was 55 per cent. of the whole area experienced a pressure of 80 per cent. of that upon a plate of the same area. The pressure upon cylinders and cones was proved to be equal to half that upon the diametrical planes, and that upon an octagonal prism to be 20 per cent. greater than upon the circumscribing cylinder. A sphere was subject to a pressure of '36 of that upon a thin circular plate of equal diameter. A hemispherical cup gave the same result as the sphere; when its convexity was turned to the wind the pressure was '15 of that on a flat plate of equal diameter. When a plain surface parallel to the direction of the wind was brought nearly into contact with a cylinder or sphere, the pressure on the latter bodies was augmented by about 20 per cent., owing to the lateral escape of the air being checked. Thus it is possible for the security of a tower or chimney to be impaired by the erection of a building nearly touching it on one side. A number of interesting experiments were made upon the shelter which one surface affords to another. This shelter was found to extend in front to a distance about equal to the breadth of the sheltering surface, and behind to several times that distance. For example, a 9-inch disc being used as the sheltering surface, and a 6-inch disc being placed two inches in front of it, the latter received only two thirds of the pressure it endured if the larger disc was removed, and this reduction in pressure was perceptible, though to a less extent, at all distances up to 9-inches. Behind flat surfaces eddies were found to exist, which caused other surfaces placed behind to be urged forward with considerable force. For example, a 7-inch disc placed behind a 6-inch disc, and 4 inches from it was urged forward with one fifth of the pressure with which it was urged backward when the 9-inch disc was removed. In conclusion it was recommended that 30 lb. per square foot be taken as the maximum wind pressure upon areas of not less than 300 square feet, and 30 lb. for smaller areas in positions of full exposure in the southern and south-eastern parts of Australia; that in more or less sheltered positions these values might be reduced according to judgment, the minimum for extremely sheltered positions being taken as one half the above figures; that the pressure on chimneys, towers, spires, roofs, and other objects be deduced from those on thin plates of equal area by means of the results previously given; and that a factor of safety of two for cases of simple stability, and three where the question is one of strength should be employed.

PUBLICATIONS.

The R. I. B. A. Kalendar for 1893-94, containing as usual some 300 pages of information concerning the Royal Institute of British Architects, is received.

A SPLENDID CEMENT FOR CELLAR FLOORS.—Numerous methods for making cement floors have been presented; among them the following is said to be the most desirable, producing the best results: Take of coarse gravel or broken stone and sand, 4 parts, and 1 part each of lime and cement. Mix in a shallow box, shovelling over, from end to end, till thoroughly mixed. The sand, gravel and cement, are mixed together dry. The lime is slaked separately and mixed with just enough mortar to cement it well together. Six or eight inches of the mixture is then put on the bottom, and when well set, another coating put on, consisting of 1 part of cement and 2 of sand. The same process will serve for building a cistern where no brick is intended to be used in bottom or side walls. A cement of 1 part sand, 2 parts ashes and 3 parts clay, mixed with linseed oil, spread over a base of concrete just described, makes a surface very hard and durable and smooth, and said to resist the weather, almost, if not quite as well, as marble.

*Abridgement of paper by Prof. Kermot, Professor of Engineering at the Melbourne University, and published in the *Australian Builder and Contractors' News*.