

### Building Materials and Heat Insulators.

THE Department of Scientific and Industrial Research has issued two special reports on floors and thin walls, the result of work undertaken by an *ad hoc* Building Materials Research Committee appointed to investigate new materials and constructional methods in connection with housing schemes (H.M. Stationery Office, 1s. 3d. net and 6d. net respectively). Some eight types of floors were dealt with, comprising hollow tiles, brick and tile, reinforced concrete, ash concrete, and ordinary wood joists. Suitable sections or units of these floors were erected and tested for carrying capacity to destruction. The results are summarised in tabular form, showing the weight of the floor, load carried, deflection, breaking load, age on testing, elastic limit, and so on. These results are also plotted diagrammatically, and drawings are given showing the construction of each floor to scale. The ash concrete proved weak, and the ordinary joisted floor, though possessing obvious disadvantages from some aspects, appeared to hold its own in the matter of strength. The experiments on thin walls included the testing of brick and concrete blocks and slabs and coke-breeze materials. Consistent results showed that the crushing strength of the walls varied from 67 to 83 per cent. of that of cubes of the materials respectively employed. Lengths of wall of 14 in. and 3 ft. 6 in. and  $2\frac{3}{8}$  in. to  $4\frac{1}{2}$  in. thick were dealt with. These strips were 8 ft. 6 in. high, and the horizontal pull necessary to make the wider strips collapse was measured. The materials built in lime mortar on account of early failure under test give rise to criticism of lime as a binding agent, but surely the behaviour of walls so built after only twenty-four days cannot be fairly compared with that of similar walls built in cement which sets in a day or two. Lime was used in all our national buildings until comparatively recent years; it is cheaper in actual cost and labour than cement, and its wider use merits revival. These experiments are valuable and interesting; it has to be

remembered, however, that the country builder usually fears new methods, and is apt to put unduly high prices on unknown forms of construction.

The fifth special report of the Food Investigation Board, issued by the Department of Scientific and Industrial Research, consists of an account of experiments on heat insulators suitable for use in cold stores. The work has been carried out at the National Physical Laboratory by Dr. Ezer Griffiths, and so far has been devoted to the determination of the thermal conductivity of a number of materials adapted to low-temperature insulation. In the experiments a warm surface, consisting of a metal plate electrically heated, was maintained at a steady temperature and placed opposite to a similar plate cooled by brine circulation, the material under test filling the space between the two plates. Special precautions were taken to eliminate errors arising from edge effects in the warm plate and air convection in the material, and when a steady temperature had been attained in both plates the heat passing through the lagging was deduced by measuring the watts furnished to the warm plate. The results obtained show that the conductivity in C.G.S. units for slab cork is 0.00011; granulated cork, 0.00011 to 0.00019; slag wool, 0.000102; and dry charcoal, 0.000122. A number of other substances giving higher values were also tested, and mention is made of a cellular form of rubber which from preliminary tests appears to be superior to any other material examined, its conductivity being about 0.000085. As an appendix to the report, a description is given of the apparatus devised by Dr. Griffiths for determining the specific heats of the materials under notice. Although other factors, such as moisture absorption and liability to organic growths, have to be taken into account in choosing a lagging for a cold store, the figures obtained by Dr. Griffiths should prove of much practical value to those engaged in the refrigerating industry.

### Industrial Fatigue.

THE Industrial Fatigue Research Board, which has recently been reconstructed as an advisory body under the Medical Research Council, is to be congratulated upon the publication of two highly valuable and most interesting reports. These are doubtless a legacy to it from the older Board the wider sphere and greater liberty of action of which were recently brought to an end by the Treasury under the pretext of economy. They are published by H.M. Stationery Office at 1s. and 2s. respectively, Report No. 12 being on vocational guidance and Report No. 15 on motion study in metal polishing. The former of these reports, written by Mr. B. Muscio (who has since accepted a professorship in the University of Sydney), gives a detailed review of the literature on vocational selection. The list of nearly sixty books and papers at the end of the report indicates the diligence which the author has brought to bear on his task. The report is divided into three sections: (1) introductory, (2) summary of special investigations, and (3) future investigations. The second section, filling forty-two of the fifty-seven pages, contains a most able and critical account of the psychological tests that have been applied to clerical, engineering, and metallurgical occupations, music, printing, salesmanship, telegraphy, telephone

exchange work, transport work, war experiments, etc. Prof. Muscio indicates in his last section the wide field which is now open for future investigations conducted on a broader scale and on a more systematic basis than hitherto.

Not less valuable is the Board's Report No. 15 on motion study in metal polishing by Messrs. E. Farmer and R. S. Brooke. These investigators prove very conclusively what an enormous wastage of effort now occurs in the "buffing" (spoon and fork polishing) trade owing to the lack of a systematic course of training for newly entering workers. They indicate the principles on which such a course should be based, and give data derived from the actual application of those principles, which "prove conclusively that a beginner, given adequate training, can become an expert doliier within a very few days, but left to herself, without proper instruction, she probably will never become highly skilled, and will continue all her life to waste her energy in unnecessary and unproductive movements." The influence of fatigue was ingeniously studied by means of a recording wattmeter which they applied to the machines employed for removing scratches and other imperfections from spoons and forks. It was found that as towards the end of the day the girls' output diminished and their