

Other than to relate the results of specific-gravity studies to existing information on working stresses, no further progress has been achieved in the derivation of structural grading rules, although a study of defects developing as a result of the use of patent connectors with green timber has been commenced as the result of a request by the Australian Forest Products authorities.

79. *Specification for Finished Products.*—The enormous expenditure of Government funds on defence construction has effectively demonstrated the necessity for reducing the multiplicity of designs in finished and manufactured wooden building products, and as a commencement a special Committee representative of all interests concerned produced during the year a wartime standard specification for doors, which is being enforced under appropriate Emergency Regulations. The Forest Service is reporting to the same Committee on standard profiles for flooring, weatherboarding, and match lining, which, together with window-sash, will be standardized immediately as an emergency measure.

80. *Structural Utilization of Timber.*—As a result of timber-control activities, constant liaison has been maintained with both the Public Works Department and the Housing Department in the development of new systems of timber construction for defence and other purposes. The most permanent and significant development is that of prefabrication for dwelling construction, and the modified system evolved by the Housing Department is believed to represent a valuable contribution to the solution of the housing problem. Favouring as it does economy in the use of timber, the Forest Service leans away from the general trend in New Zealand and towards the use of large panels or sections as well as the placement after erection of wall linings in one piece free of all joints. The elimination of laundry tubs and coppers by completely self-contained washing-machines suitable for placement in roomy kitchens, and the substitution of combined gas-electric central heating-equipment for open fires and radiators, are advocated as the most practical solution of the large-family problem.

81. *Mill Studies.*—Owing to the pressure of timber-control work, no mill conversion studies other than at the Waipa State mill proved practicable during the year, although numerous grading studies were made, as reported elsewhere, at beech and tawa mills.

82. *Utilization of Minor Species.*—Tawa is assuming ever-increasing importance for furniture in place of Japanese oak and for the expanding turnery industries—*e.g.*, as a substitute for ash for non-shock handles, and for mahogany for instrument tripods—but in all cases the finished parts before assembly should be treated against lyctus, or powder post beetle attack, particulars of which can be obtained on application. *Inter alia*, pukatea has been used for wedge-heels and clog-soles; rewarewa for turned products; mangao for handles and jack stocks; tanekaha for ladders, printers' blocks, and sweep-teeth; and alder for clog-soles.

83. *Timber Mechanics.*—Standard tests have been inclusive of material representing the full commercial bore of forest-grown insignis pine in the green condition and European larch green and air-dry. The superiority of slow over fast grown or of narrow over wide ringed insignis pine is very marked. During the year 560 standard tests have been made on various species.

Standard dry and wet shear tests of plywoods have been carried out in order to determine the efficiency of the glue bonding under conditions where the plywood is subjected to hydrolysis, severe mechanical stress, and attack by micro-organisms. The efficacy of water-repellant solutions is also under investigation. The results will be used as a basis for manufacturing specifications.

84. *Box-testing.*—Boxes for both the domestic and overseas shipment of bacon, beer, soap, nails, and various munitions have been tested in the box-tumbling tester, also barbed-wire reels and fibre board butter-boxes. Collected technical data has been of immense value in the design of numerous other containers and preparation of specifications for their manufacture.

85. *Microscopic Anatomy of Woods.*—Routine identifications have been made of forty specimens of New Zealand and foreign woods. Expert evidence has been prepared in connection with two Criminal Court cases and other related investigations. Reference collections of exotic-forest timbers have been further built up.

86. *Specific gravity Studies.*—Material from crop-thinning and suppressed trees of larch, Corsican pine, Douglas fir, and lesser species has been examined in addition to that provided by the timber-mechanics programme. Unexpectedly, the locally-grown Douglas fir has been found to possess a specific gravity closely approximating that of virgin-growth wood in North America, due probably to a relatively high percentage of springwood, indicating a long period of spring growth.

87. *Moisture-content Control.*—Lack of moisture-content control is still characteristic of many woodworking operations, and plans are under consideration for a Dominion-wide educational and propaganda campaign designed to improve the position.

Further experiments with the use of electrical moisture meters of various types show that none are yet sufficiently rugged, inexpensive, and reliable to warrant general endorsement for everyday use or as a substitute for the oven-drying method of moisture-content determination.

88. *Kiln Drying.*—An inventory of drying-facilities revealed a deficiency which is being met by the immediate installation of sufficient units to increase the output of dry timber by approximately 30 per cent.; these are concentrated principally in the main centres of utilization for defence building. Recently completed installations show considerable improvement in layout. The Service continues to give assistance to operators and advice in connection with new units. Research work has included the development of satisfactory schedules for fast-grown exotic building-grade timber. With sixteen-hour operation daily in the drying of indigenous building timbers the continued operation of