was turned more or less about its vertical axis by the arriving sound waves. The waves travelled through the door, which was either open, or closed by one or more superposed panels of the respective material. The deflections observed were not steady, and some peculiar observations were made. With the door open the deflections amounted to about forty divisions, measured by a cathetometer. When the door was closed by the panels the deflections were, of course, smaller; but several layers of the same material had not always the effect to be expected from measurements made on one layer. Thus the deflection with one layer of different materials, ½-in. hair felt, ¼-in. cork board, ¾-in. cork board, ¼-in. paper-lined hair felt, ¾-in. of same, ¾-in. flax board, ¼-in. pressed fibre, ¾-in. of same, were, respectively, 22.6, 7.9, 1.15, 5.0, 6.5, 2.25, 0.32, 0.2, so that one layer of hair felt stopped least of the sound (only 43 per cent.), whilst the cork board stopped 80 and 90.5 per cent., and the pressed fibre barred practically all the sound. But the figures for one, two and three layers of hair felt were 22.6, 15.4, 10.4; for ¾-in. cork board, 1.15, 2.05, 0.85; for ¼-in. lined hair felt, 5.0, 21.7, 3.8; and for ¾-in. lined hair felt, 2.25, 0.55, 0.1. Thus two layers of cork stopped less sound than either one layer or three layers, and two layers of the ¼-in. paper-lined hair felt behaved still more abnormally compared with one and three layers of the same material. The further investigation showed that reflection, absorption, resonance, and other effects come in. To study these the sound was sent obliquely towards the door; the reflected sound was measured, and the absorbed calculated by difference, assuming that the sound can only be transmitted, reflected or absorbed, and that the three fractions together ought to make up the unit value of the whole incident sound. Arranging the materials as before, the following reflections were observed, again for one, two and three layers: hair felt, 19, 25, 40; ¼-in. cork, 61, 55, 87; ¾-in. cork, 100, 82, 85; ¼-in. paper-lined hair felt, 80, 23, 39; ¾-in. same, 40, 25, 36; ¾-in. flax board, 87, 77, 77. The amount of sound reflected and absorbed increased in most cases with the thickness, while the transmission decreased. But in the ¼-in. paper-lined hair felt reflection and transmission followed each other closely (as Professor Watson's curves clearly indicate), both being anomalous, and that is probably accounted for by resonance; certain thicknesses of the materials vibrate vigorously under the action of the sound, setting up new waves. This explanation was suggested in similar researches made by a different method in 1910 by Weisbach; porosity, density and elasticity of the material have to be considered. Porous bodies like hair felt probably transmit sound like air, and a denser material stops more sound than the same thickness of a less dense material. Thus pressed fibre cuts off the sound better than the same thickness of oak. Elastic materials vibrate in resonance to the source, creating sound waves of the same character on the further side. Hence they act as if there were no partition wall. The two thicknesses of paper-lined hair felt probably approximated such a vibration.

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### As Supplied by The Architects of Buildings Featured in This Issue

#### Building, Imperial Oil Building, Toronto, Ont.

Air Conditioning Apparatus, Carrier Air Conditioning Co., New York.
Boilers, Heine Safety Boiler Co., St. Louis, Mo.
Bronze Work, Architectural Bronze and Iron Works, Ltd., Toronto, Ont.
Casements and Window Construction, also Doors and Window Trim, A. B. Ormsby & Co., Ltd., Toronto.
Copper Work, A. B. Ormsby & Co., Ltd., Toronto, Ont.
Electric Fixtures, F. C. Henderson, Toronto, Ont.
Electric Wiring and Apparatus, L. K. Comstock & Co., New York.
Elevators, Otis Fensom Co., Ltd., Toronto, Ont.
Fire Doors, A. B. Ormsby & Co., Ltd., Toronto, Ont.
Flooring (wood), Georgian Bay Shook Mills, Ltd., Midland, Ont.
Flooring (terrazzo), Missisquoi Marbles, Ltd., Montreal, Que.
Fire Hose, Gutta Percha and Rubber Co., Ltd., Toronto, Ont.
Furniture, Canadian Office and School Furniture Co., Ltd.
Hardware, P. & F. Corbin, New York.
Heating, W. J. McGuire, Ltd., Toronto, Ont.
Heat Regulating System, Canadian Powers Regulator Co., Ltd., Toronto, Ont.
Insulation, Philip Carey, Ltd., Toronto, Ont.
Metal Lockers, Geo. B. Meadows & Co., Ltd., Toronto, Ont.
Marble, Missisquoi Marbles, Ltd., Montreal, Que.
Mail Chute, Canadian Cutler Mail Chute Co., Ltd., Montreal.
Ornamental Iron, Architectural Bronze and Iron Works, Ltd., Toronto, Ont.
Painting, Barker Painting Co., New York.
Plumbing, W. J. McGuire, Ltd., Toronto, Ont.
Sanitary Fixtures, Imperial Products, Ltd., Toronto, Ont.; Standard Sanitary Mfg. Co., Ltd., Toronto, Ont.
Plaster Work, Andrew Petrie & Co., Toronto, Ont.
Pumps, Storey Pump and Equipment Co., Toronto.
Refrigeration Equipment, Canadian Ice Machine Co., Ltd., Toronto.
Radiators, Steel and Radiation, Ltd., Toronto, Ont.
Roofing, Premier Roofing Tile, Premier Quarries, Toronto, Ont.
Skylight, A. B. Ormsby & Co., Ltd., Toronto, Ont.
Stone, Indiana Limestone, A. Witchall & Son, Toronto.
Structural Iron and Steel, Dominion Bridge Co., Ltd., Montreal.
Tile, Premier Quarries, Toronto.
Turntable, Canada Foundry Co., Ltd., Toronto.
Vacuum Traps, C. A. Dunham Co., Ltd., Toronto.
Valves, Jenkins Bros., Ltd., Montreal.
Vaults, J. & J. Taylor, Ltd., Toronto.
Ventilating System, Canadian Blower and Forge Co., Ltd., Kitchener, Ont.
Mason Contractor, A. Witchall & Son.
Contractors, General, Thompson-Starrett Co., New York.
Architects, Clinton & Russell, New York; J. L. Havill, resident architect, Toronto.

#### Building, Bank of Toronto, Montreal, Que.

Boilers, Waterous Engine Works Co., Ltd., Brantford, Ont.
Casements and Window Construction, also Doors and Window Trim, A. B. Ormsby & Co., Ltd., Toronto, Ont.
Concrete Work, Atlas Construction Co., Montreal, Que.
Electric Fixtures, McDonald & Willson, Ltd., Montreal; Canadian H. W. Johns-Manville Co., Ltd., Toronto, Ont.
Electric Wiring, Philip Lahee, Montreal, Que.
Elevators and Hoists, A. B. See Electric Elevator Co., Montreal.
Enamel, R. C. Jamieson & Co., Ltd., Montreal.
Expanded Metal, McNulty Bros., Montreal, Que.
Fire Alarm System, Dominion Gresham and Casualty Co., Ltd., Montreal.
Fire Doors, A. B. Ormsby Co., Ltd., Toronto, Ont.
Fire Escapes, Montreal Architectural Iron Works, Ltd., Montreal.
Fittings, Jenkins Bros., Ltd., Montreal, Que.
Flooring, Smith Marble Co., Ltd., Montreal, Que.
Glass, Hobbs Mfg. Co., Ltd., Montreal, Que.
Hardware, Canadian Yale & Towne, Ltd., St. Catharines, Ont.
Heating System, C. A. Dunham & Co., Ltd., Toronto, Ont.
Heat Regulating System, Johnston Temperature Control Co., Toronto.
Marble, Smith Marble Co., Ltd., Montreal.
Ornamental Iron, Montreal Architectural Iron Works, Ltd., Montreal.
Plumbing and Fixtures, Jas. Robertson & Co., Ltd., Montreal.
Plaster Work, McNulty Bros., Montreal.
Pumps (air), Connersville Blower Co., Connersville, Ind.
Reinforcements, Pedlar People, Ltd., Oshawa.
Radiators, Dominion Radiator Co., Ltd., Toronto.
Stone, Stanstead Granite Quarries, Ltd., Standstead, Que.
Tile, Smith Marble Co., Montreal.
Terra Cotta, Atlantic Terra Cotta Co., New York.
Vaults, Goldie & McCullough, Ltd., Galt, Ont.; J. & J. Taylor, Ltd., Toronto, Ont.
Valves, Jenkins Bros., Ltd., Montreal, Que.
Ventilating System, Canadian Sirocco Co., Walkerville, Ont.
Wall Enamel, R. C. Jamieson & Co., Ltd., Montreal.
General Contractors, Atlas Construction Co., Ltd., Montreal, Que.

**Architects, engineers and contractors are invited to contribute information on construction work, whether it be proposed or in progress, and such information will be published in these columns.**