to the passenger. For high buildings, underground railways and similar positions, a spiral form is used which winds round in a circular shaft to the highest level and returns in the opposite direction in a similar manner, taking up and setting down passengers as it revolves. Although this type of elevator is probably not so rapid as the vertical lift working in a straight line to the point it is desired to reach, its great advantage is that it does away with the waiting which often causes so much annoyance with ordinary lifts.

The by-laws of the London County Council contain many stipula­tions regulating the construction of staircases, and these are summar­ized below. In every public or other building of more than 125,000 cub. ft. constructed to be used as a dwelling for separate families the floors of lobbies, corridors, passages, landings, and also the flights of stairs, shall be of fire-resisting materials. The principal staircase of every dwelling-house shall be ventilated by means of a window or skylight opening directly into the external air. In buildings occupied in separate tenements by more than two families the common staircase shall be ventilated upon each storey above the ground storey by windows or skylights, or otherwise adequately ventilated. Staircases in churches, chapels, public halls, lecture rooms, exhibition rooms and buildings for similar purposes are subject to the following conditions: Stairs shall be supported and enclosed by brick walls at least 9 in. thick. The treads of each flight shall be of uniform width, and stairs, corridors or passages shall be 4 ft. 6 in. wide unless the building is for the accommodation of less than two hundred persons, when it may be 3 ft. 6 in. wide. If for more than four hundred persons the width must increase by 6 in. for each additional hundred persons up to a maximum of 9 ft. Staircases 6 ft. wide and upwards shall be divided by a hand­rail. Two staircases may be substituted for one large one, each to be two-thirds the width required for the single stair, but not less than 3 ft. 6 in. Accommodation upon different levels must be pro­vided with separate stairs leading directly to the street or open. Exit doors must open outwards. Under the theatre regulations dated 1892 the same widths hold good, but the minimum width is increased to 4 ft. 6 in. Every staircase for the use of the audience shall have solid square section steps of approved stone or concrete with treads of uniform width not less than 11 in. wide or rise greater than 6 in. Winders are prohibited, and the flights must have not more than twelve steps nor less than three steps each. Both ends of each step shall be pinned into the wall. The several flights shall be supported and enclosed on all sides by brick walls not less than 9 in. thick carried down to the level of the footings. Not more than two flights of twelve steps each shall be constructed without a turn. Landings to be 6 in. thick, square on plan and supported under the middle by 9 in. brick arches. A continuous handrail supported on strong metal brackets to be fixed on both sides of steps and land­ings, and if possible chased into the wall to avoid projection. The roof over the staircase shall be of fire-resisting materials. Separate exits are required for different parts of the theatre or hall.

The Factory and Workshop Act 1901 contains somewhat similar conditions, but in this case the staircases communicate with each floor and the roof. The minimum width of tread shall be 10 in. and the maximum rise 71/2 in. Steps of spandrel section may be used having a thickness of 3 in. at the smallest part for staircases 3 ft. 6 in. wide, and not less than 41/2 in. thick for staircases 4 ft. 6 in. wide. External fire escape stairs must be constructed with dead bearings and without cantilever work. They must comply with the require­ments for enclosed staircases as regards width, going, width of treads, height of risers, doors, handrails, &c. They must deliver at the ground-level into a public way or some large space. Where in general use the treads must be of non-slippery material as distinguished from perforated iron or chequered iron plates.

The second schedule of the London Building Act 1894 sets forth the materials that are deemed fire-resisting under the act, and specific in the case of staircases “ oak or teak or other hard timber with treads and risers not less than 2 in. thick.”

The law regulating the construction of buildings in the city of New York provides that “stairways serving for the exit of fifty people must, if straight, be at least 4 ft. wide between railings or between walls, and if curved or winding 5 ft. wide, and for every additional fifty people to be accommodated 6 in. must be added to their width. In no case shall the risers of any stairs exceed 71/2 in. in height, nor shall the treads exclusive of nosings be less than 101/2 in. wide in straight stairs. In circular or winding stairs the width of the tread at the narrowest end shall not be less than 7 in.”

Authorities.—The principal works of reference on this subject are J. Riddell, *Carpenter, Joiner, Stair-builder and Handrailer;* W. H. Wood, *Stair Building, and Handrailing;* J. H. Monckton, *Stair Building in its Various Forms;* J. Newland, *Carpenter and Joiner's Assistant)* G. L. Sutcliffe, *Modern Carpenter, Joiner and Cabinetmaker)* W. Mowat, *Handrailing and Stair Building)* W. R. Purchase, *Practical Masonry)* F. E. Kidder, *Building Construction and Superintendence,* pt.ii. (J. Bt.)

**STALACTITES** (Gr. *σταλακτός*, from *σταλάσσειv,*to drip), pendent masses formed where water con­taining mineral solutions drops very slowly from an elevation. They are seen, for example, beneath bridges, arches and old buildings as water per­colating through the joints of the masonry has dissolved very small quantities of the lime present in the cement and mortar between the stones. On exposure to the air part of the water evaporates and the solution of carbonate of lime becomes supersaturated; a deposit of this substance ensues ∙and as the drop continues to fall from the same spot a small column of white calcite very slowly grows downwards in a vertical direc­tion from the roof of the arch. In a very similar manner stalactites of ice are produced in frosty weather as the water dropping from eaves of buildings, beams, branches of trees, &c., very gradually freezes. Other minerals than ice and calcite often occur in stalactitic growths. Thus we find in mines and in the cavities of mineral veins stalactites of limonite, fluorspar, opal, chalcedony and gibbsite. These stalactites are never of great size, usually not more than 2 or 3 in. in length, and probably the method of origin is exactly the same as that of the larger and more common stalactites of ice and of calcite.

The conditions essential to the perfect development of stalac­tites appear to be (1) a very slow trickle of water from a fissure; (2) regular evaporation; (3) absence of disturbance, such as currents of air. If the discharge of water is fast, irregular encrustations may be produced, or the precipitate of solid matter may be entirely washed away by the mechanical force of the currents. Changes of temperature will interfere with evapora­tion, sometimes accelerating and sometimes retarding it, and the stalactites tend under such circumstances to stop growth or to develop irregularities and excrescences. Currents of wind produce the same effect. For these reasons ice stalactites form most readily on calm cold nights, and stalactites of ice or calcite are seen in greatest perfection in the interior of caves,