

each flight. The strength of the stair depends a good deal upon the rigidity of these newels and the method of jointing the strings to them. The bottom newel is continued through the floor and well nailed or bolted to a 3-in. thick joist (see also c, Fig. 36). The central newel is continued to the floor (see c, Fig. 32) to which it is nailed; whilst this is a common practice, greater rigidity is obtained if it is continued through the floor and secured to a convenient joist; this newel is also notched to the trimmer joist to which it is securely nailed or bolted (see also Fig. 33). The upper newel is also notched to the 9-in. by 3-in. trimmer (see c and g, Fig. 32).

Details of the draw-pinned joints between the newel and the strings at B, Fig. 34, are given in Fig. 33. These show at the end of each string two oblique haunch tenons which are fitted into mortises formed in the newel and secured by a pin or hardwood dowel at each tenon. The tenons are formed in the centre of the strings (see sketch in Fig. 33), and if the tenon holes for the dowels are bored slightly nearer to the shoulders than the distance the newel holes is from the edge of the newel, a tight fit between the shoulders and the newel will be assured when the slightly tapered glued dowels are driven in. An alternative but inferior joint, adopted in cheap work, is to form barefaced tenons on the outside of the strings with shoulders on the inside.

Note that the nosings of the treads are set slightly back from the edges of the newels.

LANDINGS.—The half-space landing is constructed of 4-in. by 2-in. joists, supported by the wall at one end and dovetail housed at the other to a 7-in. by 3-in. trimmer which spans the opening and is carried by the walls (see c and d, Fig. 32, Fig. 33 and A, Fig. 34); the narrow top tread of the lower flight is rebated over the trimmer and is tongued and grooved to the floor board. The construction at the top landing is similar (see c, d, e and g, Fig. 32), but one end of the 9-in. by 3-in. trimmer joist is tusk tenoned into a 9-in. by 4-in. joist (see Q at B) supported on the wall between the dining-room and hall and that dividing the vestibule and stair; this latter joist also supports the 4-in. by 2-in. vertical studs forming the small box-room partition (see also A, Fig. 34 and p. 42). The 4-in. by 2-in. bearer or rough carriage of the lower flight is well nailed at the foot to the floor and joist below, and its upper end is birdsmouthed and nailed to a 4-in. by 3-in. *pitching piece* or trimmer which is tenoned to the newel at one end and supported by the wall at the other (see c). The upper carriage is well secured to the trimmers.

HANDRAIL.—The handrail for the upper flight is housed, tenoned and dowelled (draw-pinned) to the two newels (see c, Fig. 32 and Fig. 33). The interception of the upper end of the lower handrail by the upper outer string is unavoidable. Besides the unsatisfactory appearance thus presented, the absence of a handrail at the top of this flight is inconvenient, if not dangerous, and therefore an additional handrail (similar to that shown at H, Fig. 30) is sometimes fixed to the wall at the lower flight. The handrail of the balustrade provided at the top of the landing is 3-ft. high (see p. 82) and is fixed between

a 4-in. by 4-in. newel and a 4-in. by 2-in. newel (known as a *half-newel*) plugged to the wall (see c and e, Fig. 32).

Alternative details of the balustrade are shown in Fig. 34. Sections through handrails are indicated at E and F. The strings at L and M have already been referred to; the cover fillet at the lower edge of the string at L provides a suitable finish to the plaster, the groove being sufficiently deep to cover the ends of the laths which are nailed to the string; this has a better appearance than the cheaper alternative at M, where the string is grooved to receive the laths and plaster. An alternative finish, suitable when the laths are fixed direct to the steps, is shown in section in Fig. 33. The appearance is also improved if a capping is fixed to the upper edge of each string; two simple cappings are shown at J and K, Fig. 34; the strings shown in Fig. 33 are without cappings.

It will be noted that in all these details no unsightly gaps will be caused if the timber shrinks.

Two plain, but effective, solid moulded caps to the newels are shown at C and D, Fig. 34, and a drop, similar to C, is shown at N.

BALUSTERS.—The 2-in. by 1½-in. balusters shown in Fig. 32 are detailed at G and H, Fig. 34. They are usually spaced at 3 to 4-in. apart and arranged so that one is central at the intersection between the lower handrail and the upper string. If square balusters are used, they should be out of not less than 1¼-in. stuff (see A and B, Fig. 38), as 1-in. square balusters look spindly when dressed. Balusters may be either housed (as at E, Fig. 34) or tenoned (as at F) into handrails, and housed (see J) or tenoned (see K) into the cappings or strings (see also Fig. 33). A continuous groove is sometimes formed in the underside of the handrail and the upper ends of the balusters are slid into it. Alternatively, especially when the balustrade is to be painted, a continuous groove is formed in the upper edge of the string; after the balusters have been fixed, the portions of the groove between them are filled in. For inferior work, and owing to the difficulty of housing or tenoning the balusters, they are cut to the pitch of the handrails and strings and simply nailed to them.

Additional balustrade details are illustrated in Figs. 35, 36, 37, 38 and 39.

Bronze or similar metal balustrades are sometimes employed for wood stairs. Some details of this type are shown at K, L and M, Fig. 45, Vol. II, and could be applied here if modified to show the bottom of each baluster secured to a continuous bar (or provided with a flange) and screwed to the string, etc.

A detail showing a suitable finish to the upper floor, where the balustrade is returned to the wall, is shown at G, Fig. 32. The trimmer is covered with an apron lining, which is sloped to conform to the risers, and tongued and grooved to the nosing and cover fillet; the lining may be of 3-ply. As the nosing is only slightly set back from the edge of the newel, it is advisable to provide small packing pieces as shown; a solid bearing for the balustrade is thus afforded. The nosing is rebated over the trimmer and either tongued and grooved or splay-jointed to the floor board. Note that there is a slight margin between the