afforded by them. Holes are cut through this plate to receive the *needles* (or joggles as they are sometimes termed to distinguish them from the needles used in dead shoring, which are large horizontal

members usually of balk timber), which are pieces of wood about 1 ft. long and 4 in. square in section, cut with a shoulder to butt against the wall-plate. A portion of a brick or stone is removed from the wall and the end of the needle is passed through the rect­angular hole in the wall-plate and fitted into the recess in the wall.

The head of the needle projects about 4⅛ in. beyond the face of the wall-plate and forms an abutment for the head of the shore. The head of the shore is notched to fit the underside of the needle toprevent any movement sideways. If this is not done the shore is liable to be acted upon by the wind and be blown down. A small

block of wood, cut somewhat after the fashion of a wedge and termed a *cleat,* is fixed above the needle to keep the latter quite firm. Cleats are used also in other positions to keep timbers in position. *Wedges* are used to obtain a tight bearing for the rider shores and are used at their base. As little force as possible must be employed in driving them as vibration is liable to injure the already weakened wall.

*Horizontal shores,* or *flying shores* as they are more often termed by the workman, may be employed for spans up to about 35 ft. They are used to support the party walls of the houses adjoining the premises being rebuilt. They are erected during the pulling down operations and removed as the new building is raised and there is no further need for them. A system of flying shores consists of one or more horizontal timbers, sometimes known as dog shores, cut in tightly between the wall- plates fixed with hooks to the faces of the walls of the ad- joining buildings (fig. 3). These horizontal members are supported at each end by cleats and needles fixed in the wall-plate as described for raking shoring. The shores are supported in their length by inclined braces springing from needles fixed near the lower ends of the wall-plates and serving to strut the shore at a point about a third of its length from the wall. Corresponding braces are carried from the upper surface of the shore and abut against needles at the upper ends of the plates. Straining pieces are secured to the upper and lower faces of the shore to serve as abutments for the ends of the braces. The best angle for these braces is one of 45°, but a smaller inclination than this is frequently adopted. Wedges are inserted, usually at the end of the *flyer* so as to tighten this up between the wall-plates, and sometimes between the braces and the straining piece, and carefully driven to tighten up the whole and cause each timber to find a close bearing. If the adjoining premises are of considerable height and especially if it is proposed to undertake extensive excavations, the systems of flying shores may need to be somewhat complicated, each consisting of several horizontal members spaced from 10 to 13 ft. apart and well strutted one to another and to the wall-plate (fig. 4). In the application of this form of shoring, as in raking shores, the same rules apply as regards placing the shores on the face of the wall in a proper position to obtain a solid abutment on a floor or roof on the other side. The members should be securely dogged and spiked together to form a homogeneous frame- work capable of resisting the attacks of a strong wind, which in an exposed position will sometimes destroy a poorly constructed framework.

Horizontal shores should be adopted wherever possible in preference to raking shores. Besides being more economical, they are more convenient and more effectual than rakers springing from the ground, especially if the height of the building is considerable and the span at the most not much over 30 ft. Apart from the economy effected, they present a direct resistance to the thrust and are well out of the way of any building operations that may be carried on below them, so that there is no risk of their being accidentally disturbed, whereas the feet of raking shores are generally in the way of the workmen, and if not disturbed by accidental blows from materials or carts will very likely be loosened and rendered useless by the digging and pumping which is going on around them.

*Needle shoring* is the next method of temporary support to come under consideration. It is known also as *vertical shoring* and *dead shoring,* and is the means usually adopted to support temporarily