The introduction of trunnionless guns recoiling axially through a fixed cradle enabled sights to be attached to the non-recoil parts of the mounting, so that the necessity of removing a delicate telescopic sight every round disappeared, and telescope sights on the rocking-bar principle (see below) were introduced for 4∙7-in. Q.F. guns on field mountings; these sights admit of continuous laying, *i.e.* the eye need not be removed when the gun is fired. The increased importance of concealment for one’s own guns and the certainty of being called upon to engage concealed targets, brought indirect laying into great prominence (see also Artillery). This form of laying is of two kinds: (1) that in which the gun can be layed for direction over the sight on the target itself, or on some aiming point close by, but from indistinctness or other causes quadrant elevation is pre­ferred ; and (2) that used when the target is completely hidden and an artificial line of fire laid out and the guns layed for direction on pointers, or the line transferred to a distant aiming point. The old method of giving quadrant elevation by clinometer was obviously too slow. Scott’s sight (see above) was the first attempt to obtain indirect laying for elevation by means of the sight itself, and in that sight the angle of sight was taken into account; in modern guns this is effected by what is technically' called the “independent line of sight’’ (see Ordnance: *Field Equipments).* It is obtained by different means in different countries, but the principle is the same. There must be two sets of elevating gears, one which brings the axis of the gun and the sights together on to the target, thus finding the angle of sight and also pointing the axis of the gun at the target, and a second by which, independent of the sight which remains fixed, the elevation due to the range can be given to the gun and read by means of a pointer and dial marked in yards for range. This latter is shown in the Krupp equipment (Plate, fig. 14), in which the sight is attached to the cradle, but does not move with it. The hand-wheel that screws the gun and cradle down at the same time screws the sight up, and vice versa. When the target is completely concealed it is necessary to lay the gun on an aiming point more or less out of the line of fire, or to lay on a “ director" with a large amount of deflection, and to align aiming posts with the sights at zero to give the direction of the target, and afterwards perhaps to transfer the line of sight to some other distant object, all of which require a far greater scope of deflection than is afforded by the deflection leaf. In the South African war improvised detachable deflection scales of wood or iron placed over the fore-sight, called gun arcs, were used, but this device was clumsy, inaccurate and insufficient, as it only gave about 30°right or left deflection, and only a sight that admitted of all-round laying could really satisfy the requirements. “ The goniometric sight in its simplest form is a circular graduated base plate on which a short telescope or sighted ruler is pivoted. Besides the main graduations there is usually a separate deflection scale ’’ (Bethell). In this form, which is found in British field artillery, the goniometric or dial sight is used for picking up the line of fire. In the pillar sight used in the French 80- and 90-mm. Q.F. guns it is used for laying for direction.

The *collimateur,* or sight proper, has a lateral movement of 9°, and is actuated by the drum on the right turned by the mill­headed screw. The drum is divided into 100 graduations, each equal to 5∙4'. The gonio plate below is divided into 4 quadrants, and each quadrant into 10 spaces of 9° each numbered in hundreds from 0 t·o 900. The stem is turned by pressing down on the mill­headed screw. The *collimateur* which is used in many sights is a rectangular box closed at one end by a darkened glass with a bright cross. Its use is graphically described in a French text-book thus: “The layer, keeping his eye about a foot from the *collimateur* and working the elevating wheel, makes the horizontal line dance about the landscape until it dances on to the target; then working the traversing gear he does the same with the vertical line ; then bringing his eye close, he brings the inter­section on to the target.’’ In the Krupp arc sight (see Plate, fig. 14), the goniometric sight is placed on the top of the arc. In the French field Q.F. artillery the inter­mediate carriage (see description and dia­gram in article Ordnance: *Field Equipments)* carries the sight.

Fig. 15 shows the reciprocating sight for the 2∙5-in. gun. The sight drops through a socket in a pivoted bracket which is provided with a level and a clamp ; the level is fixed at the correct angle for drift ; if the sight (as is especially liable to be the case on steep hillsides) is tilted away from the angle it can be restored by moving the bracket till the bubble of the spirit-level is central, and then clamping it.

With howitzers indirect laying is the rule, elevation being usually given by clinometer, direction by laying on banderols marking out the line of fire; then, when the direction has been established, an auxiliary mark, usually in rear, is selected and the line transferred to it. At night this mark is replaced by a lamp installed in rear and in line with the sights. The normal method of laying these is from the fore-sight over the tangent sight to a point in rear. Special sights were designed for this purpose by Colonel Sir E. H. French, called cross-bar sights, and were in the year 1908 still in use with British 6-in. B.L. howitzers. The principle of these sights (see fig. 16) is that the tangent sight has a steel horizontal bar which can slide through the head of the tangent scale for deflection, and is graduated for 3° left and 1° right deflection. One end of the bar is slotted to take the sliding leaf ; this end of the bar is graduated from 0° to 6°, and in conjunction with the fore-sight affords a lateral scope of 6° on either side of the normal for picking up an auxiliary mark. The fore­sight has a fixed horizontal bar slotted and graduated similarly to the slotted portion of the tangent sight. The leaves are reversible, and provided with a notch at one end and a point at the other, so that they can be used for either forward or reverse laying. The leaf of the fore-sight has a pinhole, and that of the tangent sight cross-wires for fine reverse laying. Fore-sights are made right and left; tangent sights arc interchangeable, the graduations are cut on the horizontal edges above and below, so that the sight can be changed from right to left or vice versa by removing and reversing the bar. Howitzer sights are vertical and do not allow for drift; they are graduated in degrees only. Goniometric sights have recently been introduced into British siege artillery. The pattern is that of a true sight, that is to say, the base plate is capable of movement about two axes, one parallel to and the other at right angles to the axis of the gun, and has cross spirit-levels and a graduated elevating drum and independent deflection scale, so that compensa­tion for level of wheels can be given and quadrant elevation.

In smooth-bore days the term mortar meant a piece of ordnance of a peculiar shape resting on a bed at a fixed angle of quadrant elevation of 45°. It was ranged by varying the charge, and layed for line by means of a line and plumb bob aligned on a picket. The term mortar, though not used in the British service, is still retained elsewhere to signify very short, large-calibre howitzers, mounted on a bed with a minimum angle of elevation of 45°, which with the full charge would give the maximum range. Range is reduced by increasing the angle of elevation (by clinometer) or by using reduced charges. In the 9∙45-in. Skoda howitzer, which is really a mortar as defined above, direction is given by means of a pointer on the mounting and a graduated arc on the bed. For a description of Goerz panoramic. “ ghost ’’ and other forms of sights, see Colonel H. A. Bethell, *Modern Guns and Gunnery* (Woolwich, 1907), and for sights used in the United States, Colonel O. Μ. Lissak, *Ordnance and Gunnery* (New York and London, 1907).

*Sights for Coast Defence Artillery (Fixed Armaments).*

In coast defence artillery, owing to the fact that the guns arc on fixed mountings at a constant height (except for rise and fall of tide) above the horizontal plane on which their targets move, and that consequently the angle of sight and quadrant elevation for every range can be calculated, developments in sights, in a measure, gave way to improved means of giving quadrant elevation. Minor improvements in tangent sights certainly were made, notably an automatic clamp, but quadrant elevation was mainly used, and in the case of guns equipped with position-finders (see Range-finder) the guns could be layed for direction by means of a graduated arc on the emplacement· and a pointer on the mounting. A straight-edge or vertical blade (see fig. 17) was placed above the leaf of the tangent sight, and in some cases on the fore-sight as well, to facilitate laying for line. This enabled the gun to be layed from some little distance behind, so that the layer could be clear of recoil, and continuous laying was thus pos­sible. The arrangements for giving quadrant elevation con­sisted of an arc, called index plate (see fig. 18), on the gun, graduated in degrees read by a “ reader ’’ on the carriage. A yard scale of varnished paper, made out locally for quadrant eleva­tion with regard to height of site, was usually pasted over this. A correction for level of tide was in many cases necessary, and was