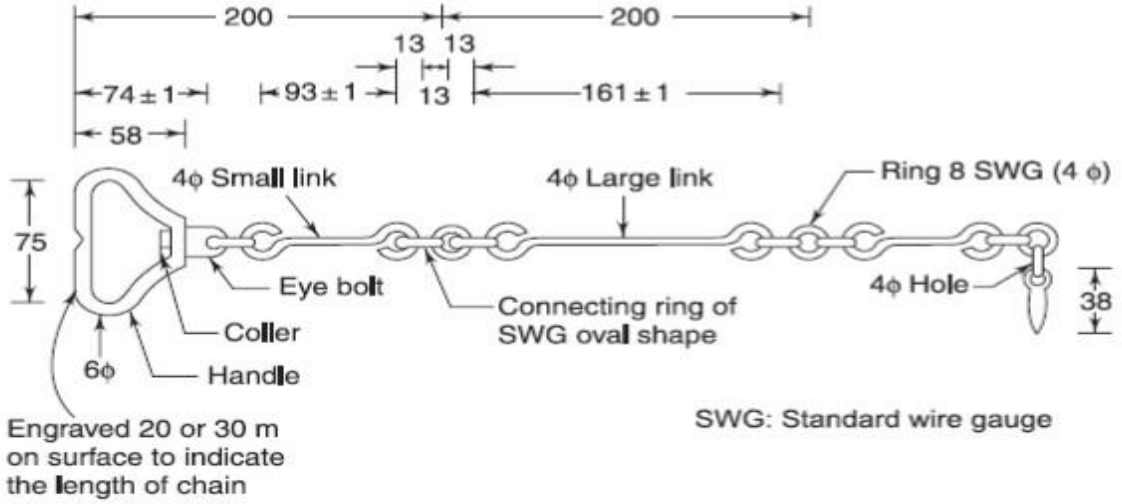
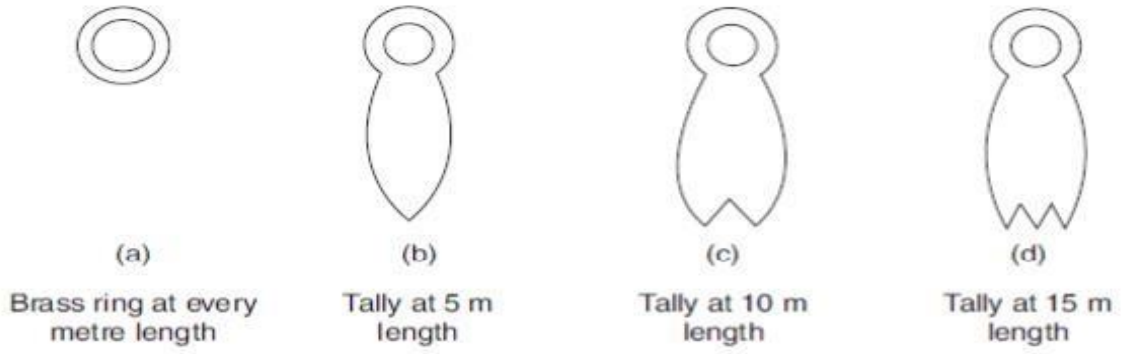
THE EQUIPMENT'S AND ACCESSORIES REQUIRED FOR CHAINING

(A) CHAIN

Gunter, revenue, engineer and metric chain are the various types of chains which are normally used for surveying. The chains are mostly divided into 100 links. While Gunter's chain is 66 ft. long (100 links), the revenue chain is 33 ft. long (16 links) and the engineer's chain is 100 ft. long (100 links). Metric chains are either 30 m (150 links) or 20 m (100 links) in length.



Details of Metric Chain



Ring and Tallies of a Chain

(B) TAPE

Tapes are available in a variety of materials, lengths and weights. The different types of tapes used in general are discussed as follows.

(a) Cloth or Linen Tape:

This is closely woven linen or synthetic material and is varnished to resist the moisture. These are available in lengths of 10 –30 m and widths of 12–15 mm. The disadvantages of such a tape include: (i)

it is affected by moisture and gets shrunk; (ii) its length gets altered by stretching; and (iii) it is likely to twist and does not remain straight in strong winds.

(b) Metallic Tape:

It is a linen tape with brass or copper wires woven into it longitudinally to reduce stretching. As it is varnished, the wires are not visible. These are available in lengths of 20 –30 m. It is an accurate measurement device and is commonly used for measuring offsets. As it is reinforced with wires, all the defects of linen tapes are overcome.

(c) Steel Tape:

These are 1–50 m in length and are 6 –10 mm wide. At the end of the tape a brass ring is attached, the outer end of which is zero point of the tape. Steel tape cannot be used in ground with vegetation and weeds.

(c) Invar Tape:

This is made of an alloy of nickel (36%) and steel, having very low coefficient of thermal expansion (0.122 10 – 6/°C). These are available in lengths of 30, 50 and 100 m and in a width of 6 mm.

The advantages and disadvantages of an invar tape are as follows:

Advantages

1. Highly precise. 2. It is less affected by temperature changes.

Disadvantages

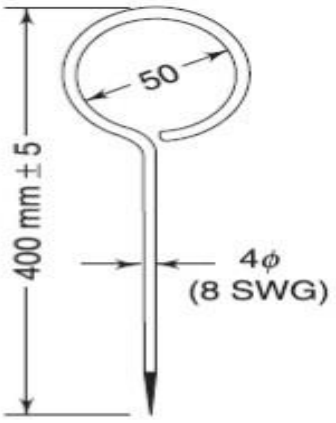
1. It is soft and so deforms easily. 2. It requires much attention in handling.

(C) PEGS

These are used to mark definite points on the ground either temporarily or semi permanently. The size of a peg depends on the use to which the pegs are to be put and the nature of the ground in which they are to be driven.

(D) ARROWS

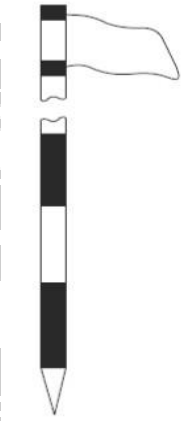
These are also known as chaining pins and are used to mark the end of each chain during the chaining process. These are made of hardened and tempered steel wire 4 mm in diameter. The length of arrow is kept 400 mm. These are pointed at one end whereas a circular ring is formed at its other end. As the arrows are placed in the ground after every chain length, the number of arrows held by the follower indicates the number of chains that have been measured.



Arrow

(E) RANGING RODS

These are also known as flag poles or lining rods. These are made of well-seasoned straight grain timber of teak, deodar, etc., or steel tubular rods. These are used for marking a point in such a way that the position of the point can be clearly and exactly seen from some distance away. These are 30 mm in diameter and 2 or 3 m long. These are painted with alternate bands of either red and white or black and white of 200 mm length. A cross-shoe of 15 mm length is provided at the lower end. A flag painted red and white is provided at the top.

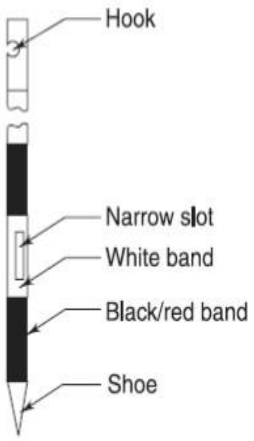


Ranging Rod

(F) OFFSET RODS

These are similar to ranging rods except at the top where a stout open ring recessed hook is provided. It is also provided with two short narrow vertical slots at right angles to each other, passing through the centre of the section, at about eye level.

It is mainly used to align the offset line and measuring the short offsets. With the help of hook provided at the top of the rod, the chain can be pulled or pushed through the hedges or other obstructions, if required.



Offset rods

PLUMB BOB

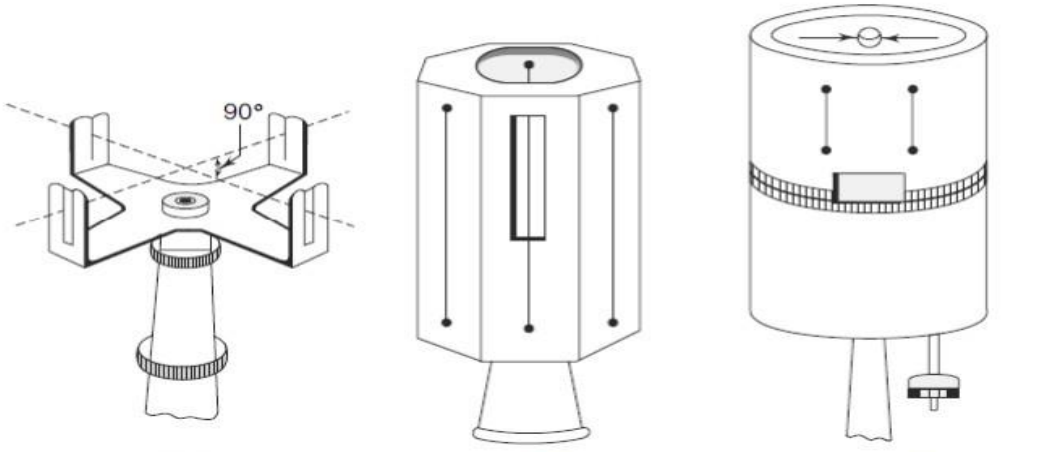
It is made of steel in a conical shape, as shown in Fig. It is used while measuring distances on slopes and in all the instruments that require centring. Before starting the work, it should be ensured that there are no undesirable knots in the thread of the plumb bob.

Plumb bob.

CROSS-STAFF

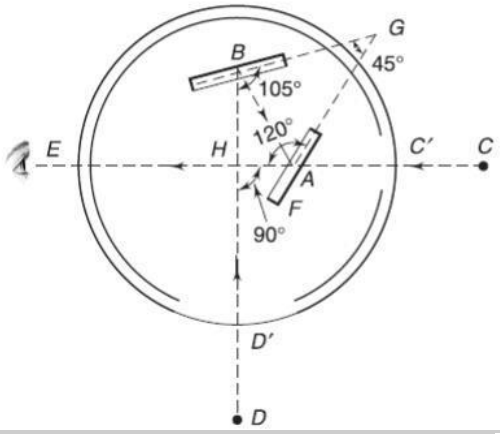
It is essentially an instrument used for setting out right angles. In its simplest form it is known as open cross-staff (Fig. 2.11(a)). It consists of two pairs of vertical slits providing two lines of sight mutually at right angles. Another modified form of the cross-staff is known as French cross-staff (Fig. 2.11(b)). This consists of an octagonal brass tube with slits on all eight sides. This has a distinct advantage over the open cross-staff as with it even lines at 45° can be set out from the chain line. The latest modified cross-staff is the adjustable cross-staff (Fig.).

It consists of two cylinders of equal diameter placed one above the other. The upper cylinder can be rotated over the lower one graduated in degrees and its subdivisions. The upper cylinder carries the vernier and the slits to provide a line of sight. Thus, it may be used to take offsets and to set out any desired angle from the chain line.



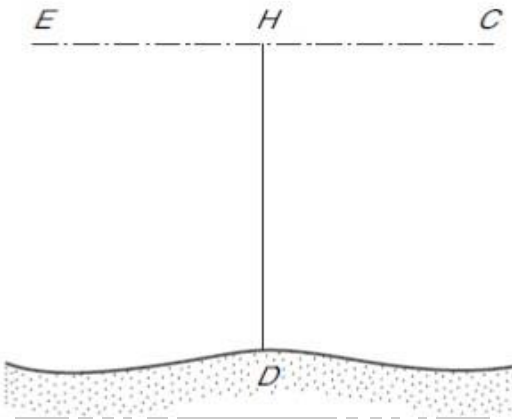
OPTICAL SQUARE

This is a compact hand instrument to set out right angles and is superior to the cross-staff. It is a cylindrical metal box about 50 mm in diameter and 12.5 mm in depth. Figure. shows the plan of its essential features. It has two oblong apertures C and D on its circumference at right angles to each other. E is a small eye-hole provided diametrically opposite to C.



SETTING OUT A RIGHT ANGLE FROM CHAIN LINE

Suppose the optical square is required to set out a perpendicular from a point H on a chain line EC, to a curved boundary, as shown in Fig. 2.13. The surveyor stands at H with the optical square at the eye level and turns it until a signal at C is seen directly through the transparent portion of the horizon mirror. The curved boundary will also be visible through the silvered portion of the horizon mirror. The surveyor then directs the assistant at the curved boundary to move left or right until the signal D held by the assistant appears to coincide exactly with the signal C seen directly. The line HD will be the required perpendicular to the chain line EC.



Offset with optical square