

CHAPTER SIX

PLUMBING

Syllabus.—Brief description of the manufacture of milled and cast sheet lead; characteristics; weights of sheet lead used for various purposes; terms, including rolls, drips, flashings and soakers. Details of leadwork at gutters, flats, chimney stacks, ridges, hips and valleys. Cast iron rain-water pipes. Lead pipe joints.

LEAD is chiefly produced from an ore, called galena, which is a compound of lead and sulphur. The principal sources of supply are the United States of America, Spain, Australia, Canada, Germany and Mexico; comparatively little of the ore is now obtained from English mines.

MANUFACTURE OF LEAD.—One of several methods of abstracting the lead is to smelt (roast) the ore in a furnace to remove certain impurities; the metal is run into pots, transferred to large copper pans, remelted to eliminate further impurities, and the soft refined metal is finally cast into bars called *pigs*. These pigs weigh from 80 to 120-lb. each and are used for the manufacture of sheets, pipes, etc.

Sheet lead is used for covering roofs, gutters, ridges, etc. There are two methods of manufacturing sheet lead, *i.e.*, (a) milled or rolled sheet lead, and (b) cast sheet lead.

(a) *Milled or Rolled Sheet Lead.*—The pigs of lead are melted and cast into slabs which are from 5 to 7-ft. long, 4 to 6-ft. wide, and approximately 5-in. thick. Each slab is passed to the mill, the bed of which consists of a series of steel rollers, and situated in the middle and across the bed is a pair of heavy rollers; the bed rollers are caused to rotate, the slab is passed backwards and forwards between the large rollers until its thickness is reduced to a sheet which is approximately but uniformly 1-in. thick, 15 to 40-ft. long and 7 to 9-ft. wide; the sheets are cut into suitable sizes, each piece is passed through the finishing mill to reduce it to a sheet of the required weight and thickness, and finally the sheet is rolled into a coil for dispatch to the plumber. Most of the sheet lead used at the present time is manufactured by this process.

(b) *Cast Sheet Lead.*—This is produced by melting the pigs and pouring it over a bed of sand prepared on a casting bench, which is from 12 to 15-ft. long and 4 to 6-ft. wide, and the height of the frame is about 2-ft. 3-in. from the floor; the sand bed is prepared, the levelled surface being slightly below the edges of the bench, depending upon the required thickness of the lead. The molten lead is poured into a trough, semicircular in section, which extends to the full width of the bench to which it is hinged at one end; the trough is rotated to tip the lead on to the sand bed and the lead is pushed forward by means of

a strike or bar which runs on guides on the long edges of the frame at a height corresponding to the required thickness of the lead.

Cast lead is considered to be the best form of sheet lead—it being tougher than milled sheet—but it is relatively expensive. It is used for first-class work.¹

Ornamental leadwork, such as rain-water heads and coverings to architectural features, is produced from cast lead; the sand bed on the casting bench is levelled off and a mould of the required shape and the reverse of the surface decoration is impressed on the sand; the molten lead is poured over this prepared surface, the upper surface is levelled off by the strike, and the undersurface is ornamented with the decoration in relief; each piece of lead is trimmed, cut to the required length, shaped as required, and finally jointed by lead-burning or soldering.

CHARACTERISTICS OF LEAD.—This is a heavy metal, weighing approximately 710-lb. per cub. ft.; soft, very malleable, tough and flexible; easily worked and readily cut; very durable (provided it is not subjected to certain acids and not in contact with certain cements); is bluish grey in colour with a bright metallic lustre when freshly cut, but this tarnishes when exposed to the air.

Lead has a *high coefficient of linear expansion* (it being 0.00029 per °C., or approximately two and a half times that of steel) and it therefore readily expands and contracts when subjected to considerable variations of temperature. It is because of this characteristic that very large sheets of lead must be avoided (especially if used to cover vertical surfaces) and ample provision made to permit of this movement. In this connection, defects such as wrinkling, bulging and cracking will be avoided if the *area of each piece of sheet lead is limited to 24-sq. ft., and if only two of the adjacent sides of a rectangular sheet are fixed*. Attention is drawn to the various details shown in Figs. 71, 72 and 73, which make provision for movement due to expansion and contraction.

WEIGHTS OF SHEET LEAD.—Lead is specified by weight in lb. per square foot. The weights recommended for various purposes are:

Flats, pitched roofs and gutters	6, 7 or 8-lb. lead per sq. ft.
Hips and ridges	6 or 7-lb. lead per sq. ft.
Flashings	5-lb. lead per sq. ft.
Soakers	3 or 4-lb. lead per sq. ft.

¹ The roofs of the Manchester Central Reference Library and the Town Hall Extension, Manchester (completed in 1938), are covered with 8-lb. *cast* sheet lead and the total weight of lead used was approximately 600 tons.