

with each other, and with a 3in. pipe running over the lixiviation-vats, and the valves are so arranged that each tank can be used separately.

"The discharge-pipe of the lixiviation-vats is 1½in. in diameter, made of lead or hard rubber, and inserted in the centre of the bottom. It is secured by a threaded cast-iron flange bolted to the outside. The bolts holding the flange pass through the bottom, the heads being countersunk in the wood and bedded in white-lead. This pipe, slightly inclined, is connected with the Korting injector, which discharges into the double distributing-trough (one portion is for solution, and the other for wash-water) standing above the precipitating-tanks. A short piece of rubber-hose is attached to the end of the discharge-pipe, so that the liquor can easily be turned from one portion of the distributing-trough to the other. Near the discharge end of the pipe there is a valve, and between it and the Korting injector a T joint receives the pipe for circulating the extra solution, whereby the latter is returned to the vat if the valve is closed, and the injector is in operation. The false bottoms for the filter and the latter itself are prepared as follows: Wooden slats, 1½in. high and 1in. wide, and separated 1in. from each other, are fastened to the bottom of the vat by iron screws, bedded in thick white-lead. The side of the slats next the bottom is cut out in several places ½in. deep and 3in. wide, so that a passage for the solution is established everywhere. Between the ends of the slats and the staves of the vat a clear space of 1½in. wide is left all round. A strip of wood, 1½in. high and 1in. wide, previously cut by a saw in many places and well soaked in water, so that it will bend easily, is now fastened round the slats, leaving an annular space between the strip and the staves. One thickness of stiff matting, covering the slats and circular strip but not the annular space, forms the foundation for the filter-cloth proper. The latter is of No. 10 canvas duck, cut to a diameter of 6in. greater than the diameter of the vat, so that the ends can be pressed into the annular space described above, and kept in position by forcing down a ½in. rope. The sluice-gate is fastened to the vat by iron belts bedded in white-lead, having its bottom about ¼in. below the surface of the filter. The gate proper is covered with rubber, which protects the iron, and at the same time forms a gasket. The cast-iron frame is protected with asphaltum varnish. The sodium-sulphide manufacturing-tank is provided with a steam-pipe reaching close to the bottom.

"The precipitating-tanks have two outlets. A short piece of 3in. pipe with valve passing through the stave close to the bottom discharges the sulphide into a trough leading to the filter-press sump. The clear solution is drawn by a swing-pipe, 2½in. in diameter, standing inside the tank. This pipe has a joint formed by two elbows and a nipple; one of the elbows is attached to a short piece of pipe passing through the stave 4in. above the bottom of the tank, and discharges into a trough leading to the solution-pump. The filter-press sump is provided with a false bottom, sloping to the outlet, which communicates with the filter-press pump. All vats should be painted outside with white-lead or asphaltum varnish.

"The number of lixiviation-vats, of dimensions given above, necessary for works of stated capacity will vary with the time of leaching or the number of tons of ore in rotation and with the weight of the ore per cubic foot, which can easily be determined for any mill after preliminary tests have been made with the ore to be treated. A mill of 50 to 100 tons daily capacity will always require two storage-tanks, one extra-solution tank, two sumps, one tank for manufacturing sodium-sulphide, two tanks for storage solution of the latter, one tank for purifying soda-ash (provided pure soda cannot be obtained), two storage-tanks for soda solution, one filter-press, one solution pump, and the necessary number of Korting injectors. There should be from two to three tanks for precipitating lead and two to four tanks for precipitating the sulphides. Properly constructed tanks should also be provided for extracting copper and silver from the first wash-water. It is hardly necessary to mention that in special cases a portion of this plant may not be required.

"*Plant for the Treatment of Sulphides.*—It is not the intention to go into a description of the plant required for the treatment of sulphides for two reasons. First, because the lixiviation process proper ends with the production of the sulphides as they leave the filter-press; and, second, because neither the treatment proposed has, so far, been practically applied, nor has this been done by any other new method. A plant for this purpose should always be adapted to local circumstances, and its designing must be left to the discretion of an experienced metallurgist.

"*Arrangement of the Lixiviation Plant.*—The lixiviation-plant, and, in fact, the whole mill should be planned and arranged by an experienced metallurgist, not by a millwright or a foundry-draughtsman, who turn out mills after a fashion of their own, and without the least knowledge of any essential requirements. However, it is necessary to draw attention to some of the important points which should not be neglected. For charging the ore a slightly-inclined car-track should be constructed, passing over the lixiviation-vats and connected with a track leading to the cooling-floor or to the line for raw ore. All other arrangements with conveyers, elevators, and ore-hoppers above the vats, as they exist in some mills, are severely condemned. The lixiviation-vats should not be placed on a solid floor, but should rest upon joists, so that the bottom may be exposed and accessible in case of leakage. Between the joists and the solid floor below sufficient working room must be left. The same applies to the setting up of all other wooden tanks for the storage solutions. The top of the precipitating-tanks should be about 3ft. below the bottom of the lixiviation-vats. If lead is to be precipitated separately and the grade of the mill-site does not permit the placing of the silver precipitating-tanks below those of lead all the precipitating-tanks are placed on the same level, and the solution, after precipitation of the lead, is transferred to the silver precipitating-tanks by Korting injectors. The filter-press and solution-pump stand above their respective sumps; but the pump filling the filter-press is placed on a level with the bottom of the sump from which the sulphides are drawn, because, on account of the weight and thickness of the sulphide slimes, this pump has not much suction-power. The refinery for the sulphides is best located in a building by itself, separated from the mill. Finally, abundance of room about the apparatus and well lighted and ventilated buildings are most desirable features.