depend. The former are of large type, having six muffle-hearths each with 18 sections, and should be capable of dealing with 20 tons of raw concentrate per day. Special care has been taken in the design to ensure easy renewal of the hearth as required.

The acid plant, of platinum "contact" type, was originally built by the Government, and has been used for the manufacture of sulphuric acid from Sicilian sulphur. With the necessary additions for cleaning the roaster gases from arsenic, etc., this plant will be available to deal with the sulphur di-oxide evolved from the 20 roasting-furnaces it is proposed to erect.

In view of the present high cost both of labor and material and the improved extraction now called for, much attention has lately been given to the question of treating retort-residues for their metallic contents, both as to still contained zinc, and other metals such as lead and silver, if present. It has been proposed to blow such residues on Wetherill grates, but this yields a mixed product of zinc oxide and lead sulphate and affords only an incomplete elimination of the silver. Other objections are the inferior quality of the product (due to a certain amount of fine grit being carried over with the fume), while if silver be present the blown fume acquires a pinkish tint, rendering it unsuitable for paint purposes; further, the silver, both in the fume and the ultimate residues is lost. In the absence of silver, a market exists for the zinc oxide-lead sulphate product, if free from grit and carrying about 20% of lead; such a mixture makes a paint of covering power superior to pure zinc-white, besides being cheaper. For ores of a less complex character, 'blowing' the residue offers fair possibilities, and it has even been proposed to modify the usual distilling practice in the direction of only recovering the more easily distilled portion of the zinc, calling for the employment of a smaller amount of reducing coal and leaving a richer zinc-residue for blowing. Such a procedure would increase the capacity of the distilling furnace and result in longer life of retorts, as they would not require to be submitted to the high final temperature necessary to drive off the last units of zinc.

Wet Processes for zinc extraction with the subsequent recovery of the metal by electrolysis have not become firmly established; Ashcroft's pioneer work in this direction will be remembered. The conditions necessary for success, notably roasting at a low temperature to avoid the formation of insoluble ferrite, and the subsequent perfect purification of the solution are now well understood, the latter condition being demanded by the necessity for keeping the deposited zinc in a passive state to prevent re-solution. As a necessary consequence electrolytic zinc will always be highly pure compared even with the re-distilled zinc producible from retorted metal. Much discussion has taken place as to the possibility of the electrolytic process displacing the older method; but it seems probable that for some years to come both processes will survive, and that local conditions with regard to nature of ore, power-cost and facilities, etc., will determine which method shall be adopted for any particular case. It may be said for the electrolytic process that it certainly permits the utilization of low-grade and complex zinc ores which could never be available to the retort process. As an example, the Consolidated Mining & Smelting Co. is treating ores by this method at Trail that assay as low as 20% zinc and carry 14% of lead. Further, combination dry-and-wet processes are likely to develop wherein the zinc oxide (and lead if present) are concentrated as a 'fume' for subsequent treatment by solution of the zinc followed by electrolysis. Such methods have the advantage of yielding a zinc solution requiring the minimum of purification, while leaving other metallic contents in a form recoverable by smelting.

At Anaconda, Laist has proceeded in a reverse direction, by first extracting roasted flotation concentrate with acid, electrolyzing the purified solution, and treating the residue by volatilization in a reverberatory furnace, the contained zinc being recovered as oxide. According to recently published information, Laist no longer recovers the zinc by volatilization, confining this operation to the saving of the lead, while the zinc passes into the slag. How far this is due to more perfect original extraction of the zinc in solution in the previous operation is not stated.

These developments are due in large degree to the work of American metallurgists, who have at their disposal large supplies of ores of varying character offering scope and opportunity for special methods of treatment. But in this country also zinc has been regularly produced by electrolysis from ores, though on a smaller scale; given, however, equal opportunity we may certainly claim to possess the necessary technical knowledge to compete with foreign producers.

The War brought about a large demand not only for the highly-pure electrolytic zinc of 99.95% grade, but also for metal of 99.9% purity obtainable by the redistillation of ordinary brands, and even of 'hard' spelter, which contains about 90-92 zincs, the remainder being mainly iron. The method chiefly adopted in this country was devised by Fricker, who distils the metal in vertical closed crucibles provided with connecting pipes leading into a brick condensing-chamber common to a number of pots, generally eight. The lead and other impurities are prevented from passing over with the zinc-vapor by covering the surface of the molten metal with a floating filter of crushed coke, or similar porous material. By this process large quantities of refined metal have been produced for cartridge-brass and other purposes. How far the demand for high-grade zinc will persist for ordinary commercial uses is uncertain. For most alloys containing a substantial percentage of zinc, as also for galvanizing, ordinary brands of spelter are sufficiently pure; hence consumers are not likely to pay the higher price demanded for 'purity' metal.* The latter will therefore have to compete with G.O.B., and producers may perhaps be forced to accept a price only greater in proportion to the higher unit of the purer product.

Zinc Oxide. Before leaving the subject of zinc metallurgy, reference may be made to the manufacture of zinc oxide in this country. Before the War practically the whole of our requirements were met from Continental and American sources; indeed, our secondary products were in some cases bought by German firms, exported to the Continent for treatment, and the zinc-oxide produce again sold to us. War conditions have since brought about the establishment of a domestic

*The galvanizer would prefer pure zinc if obtainable at a reasonable price, as a more durable product results from its use.