ANTIMONIAL ORES.

Among the metallic and other minerals found associated with auriferous rocks, is antimony. With gold or antimonial ores it is possible to extract both the gold and the antimony. If antimonial ores are burned in kilns or roasting furnaces, either for the purpose of rendering the quartz more friable, or for getting rid of the antimony minerals, there is always a partial reduction, when the heat is very great and free access is given to atmospheric air. This reduction of ore producing metallic antimony is due to two causes—(1) the carbon of the fuel coming in contact with antimony oxide, either native oxide or that produced on the furnace by the oxidation of the sulphide, reducing it to a metallic condition; (2) by the action of the oxide on the sulphide, producing sulphurous acid and metallic antimony.

Metallic antimony has a great affinity for gold. It forms an alloy either when the two metals are melted together or when the vapor of antimony is passed over heated gold. The alloy produced is gray in color and very brittle, and amalgamates with mercury only after long contact and continual grinding, and by heating the two together. The amalgam when formed floats on mercury, and gradually gives up metallic antimony as a fine powder when agitated with water. This antimonial powder carries off a quantity of mercury and gold amalgam entangled with it.

Antimonial sulphide is one of the worst minerals with which the quartz worker has to deal. It divides the mercury into a black "flour" even more quickly than arsenical pyrites; and if the flour is triturated with the intention of bringing the globules of mercury together, a chemical combination takes place. The mass gradually changes color, passing from the original blue-black or dark gray to a pure black, and then through brown to a brown-red. Upon examination Cosmo Newberry finds that the remaining mercury contains antimony, and that the brown-red, non-metallic portion consists of a mixture of undecomposed antimony sulphide and mercury sulphide. Sodium amalgam he finds worse than useless in bringing together globules of mercury floured by antimony sulphide.

The process adopted by the Costerfield Co. (Victoria, N. S. W.) for treating these ores, consisting of sulphide and brown and white oxides of antimony, is as follows: The portion of the ore free from quartz is picked out and set aside for smelting, the remainder being crushed to extract the gold. The tailings are then conveyed to he .ps and prepared for smelting by a process of puddling. A sluice-box is fed with tailings, which pass on to a triangular tray, forming an inclined flume, so arranged as to cause the water and tailings to flow over it in a broad, shallow stream, into an oblong receiving pit. The purest antimony ore, from its greater specific gravity, settles in the pit at the end nearest the tray. As the sediment recedes from this end it gradually becomes mixed with an increasing proportion of sand; but much of the latter is carried away in the overflow of water from the pit.

On cleaning out the receiving pit, that portion of its contents containing quartz sand is returned to the vats, to be again passed through the puddle, and the pure ore is collected in bags and sent to the boiler-house to be dried. It is then placed in a smelting furnace, with equal proportions of uncrushed ore, and reduced to crushed antimony (sulphide), the slag and cinder resulting from this process being further treated by roasting or calcining in a reverberatory furnace to liberate the oxide, which passes off in fumes from the furnaces into the oxide flue; and as the fumes cool on their passage to the smoke-stack, the oxide is deposited in chambers constructed in the flue to receive it. The residue from the reverberatory furnace is afterwards crushed to extract any gold it may contain. The gold obtained from the mineral defrays the whole of the company's working expenses, and the yield of crude antimony and oxide is clear profit. The ore yields about 45 per cent of crude antimony.

The process adopted for treating auriferous ores containing antimony sulphide, by fusing the sulphide with a portion of metallic antimony, and using the same metal with fresh charges of the ore, until it becomes rich in gold, and then separating the metals by the oxidation of the antimony, while suitable for rich antimony ores, will not answer for those containing less than per cent of the sulphide, as they are too silicious to fuse. Hence, only large quantities of poorer auriferous antimony ores do not yield half than gold to ordinary processes, and do not return any antimony when worked for gold.

According to Lock, Mr. Cosmo Newbery has introduced the following method for treating such ores, which may also contian gold, silver, nickel, cobalt, sulphur and arsenic. The uncrushed ores are placed in a kiln or furnace with a quantity of salt sufficient to produce the amount of chlorine necessary to get rid of the sulphur, antimony and arsenic. As soon as the calcination commences a supply of steam or aqueous vapor is conducted to the bottom of the kiln or into the furnace, in such quantities as to keep the whole mass saturated. That it is so saturated is ascertainable by holding a condensing surface, such as a piece of cold iron, over the calcining mass; if the saturation is being effected, the surface soon becomes damp.

The saturation is continued until there are neither antimonial nor arsenical fumes, nor the smell of sulphurous acid or sulphereted hydrogen. The process is then completed, and the charge is drawn; it is ready for any further treatment for extracting the precious metal. A peculiar condenser for facilitating the solidification of the metallic vapors given off in these evasting processes has been perfected by the introduction of the process described.—*Ex.*

A NEW MOTOR.—The scientific commission of the Vienna Electrical Exhibition has recently made very satisfactory trials with a so-called "Hock Motor," manufactured by Messrs. Hock & Co., of Vienna. The motor consists of an air-tight fireplace, whose fire is fed by compressed air; water is injected into the resulting gases of combustion, and the resulting mixture of steam and combustion products, which the inventor calls "air steam," is led directly into the engine. We have therefore machinery without a boiler The results of the trials were exceedingly gratifying. The machine, of six normal horse power, developed 12.23 effective horse power, with a consumption of coal of 2.2 pounds per hour for each effective horse power.