results will be obtained than at present; moreover, more work can be done on a large scale.

The Relations between the Chemical Constitution and the Physical Character of Steel. By W. R. Webster. *Trans. Am. Inst. Min. Eng.* **28**, 618–665, 876–883.—The author gives a review of the subject accompanied by a general discussion and tables, to which the reader is referred.

Notes on the Bertrand-Thiel Process. By J. Hartshorne. *Trans. Am. Inst. Min. Eng.*, **28**, 254–264.—The paper is a report on the progress made with this process since 1896. It gives the titles of the papers published on the process, discusses them briefly, and summarizes the results obtained at Kladno, using pig and scrap, cold pig iron alone, and molten metal from the blast-furnace.

An Explanation of the Rapidity of the Bertrand-Thiel Process. By H. M. Howe. *Eng. Min. J.*, **68**, 276–277.—In this process, which is a modification of the basic open-hearth process, cast-iron is melted down in one furnace and the elimination of phosphorus and silicon started; scrap and ore are melted down at the same time in a second furnace situated at a lower level, where the iron becomes somewhat oxidized; now the metal from the upper is tapped into the lower furnace and its slag diverted during the flow. The two charges react quickly, and the carbon and phosphorus are rapidly removed. By the removal of silicon and the partial elimination of phosphorus in the upper furnace, with a slag that is not very basic relatively little lime has to be added with the result that a smaller quantity of slag per unit of iron is produced than in the regular practice, which aims to remove the whole of the phosphorus in one operation. This smaller amount of slag leaves more room in the furnace for the metal charge. The partly treated metal charge free from slag meets, in the lower furnace, iron oxide containing very little slag, hence the reaction is vigorous and the amount of slag formed small, which again leaves more room for the metal. The higher temperature over that in the ordinary process is explained by the higher initial temperature of the substances brought together. The frothing of the charge in the lower furnace during the boiling period is less, on account of the smaller amount of slag and its higher temperature.

ASSAYING.

H. O. Hofman, Reviewer.

Experiments in Sampling Silver-Lead Bullion. By G. M. Roberts. *Trans. Am. Inst. Min. Eng.*, **28**, 413–427.—The conclusions arrived at by the author as a result of his experiments are that dip-samples and saw-samples give the only true results, and that the chip-samples from top and bottom are unsatisfactory. For casting a bar from a set of samples, the author advocates melting down quickly in a red-hot crucible. He found that no loss by volatilization took place in melting, and that the loss by absorption in cupelling 400-oz. bullion was not more than 0.06 oz. per ton.

The Calkins Cupel Machines. BY R. P. ROTHWELL. *Eng. Min. J.*, **68**, 639.—A compact apparatus is described for compressing cupels by a compound hand-lever with die and two disks serving as mould and support.

Scorification and Cupellation without Muffle. A New Furnace and Method for Gold and Silver Assays. BY G. A. KOENIG. *Trans. Am. Inst. Min. Eng.*, **28**, 271–288.—The author describes and illustrates a furnace constructed by him combining the crucible and muffle furnace. It consists of an oblong brick chamber closed at the bottom by a tile and at the top by a hinged roof. The heat is supplied at the back by a gas or gasoline flame, which heats the six Battersea F. crucibles that the furnace holds. For scorification- and cupellation-assays a narrow fire-clay tile is placed longitudinally in the furnace to carry the scorifiers or cupels. The gas flames travel underneath the tile and rise at the front where there are blowpipes to furnish the air necessary for oxidation. The author finds that his cupellation results compare favorably with those obtained in the muffle as to accuracy, and have the advantage of taking from one-fourth to one-sixth the time required by the ordinary method, and of making the work easier for the assayer, who has not to suffer from any heat whatever. By this new method of cupelling, the lead is little absorbed by the bone-ash of the cupel, which does not become very hot, but is rather volatilized.

Proof Gold and Silver. BY C. WHITEHEAD. *Eng. Min. J.*, **68**, 785–786.—The method for proof gold consists in rolling out the gold to a ribbon, treating in a flask with hydrochloric acid, to which nitric acid is added until the solution is completed, evaporating to dryness, with the addition of hydrochloric acid if necessary, to remove all nitric acid, adding a few cubic centimeters of hydrobromic acid, diluting with water to 1 oz. Au in 1 gal., agitating, allowing to settle, siphoning off the clear gold solution through a double filter, without disturbing the precipitate or washing the filter, and precipitating the gold with sulphurous acid. The gold is redissolved, etc., but now precipitated with a warm solution of concentrated oxalic acid solution and the precipitations are repeated and the precipitate washed with water, nitric acid, water, hydrochloric acid, and water. The pure gold is melted with one-fifth of its weight of 3 parts of fused borax and 1 part of niter in a porcelain crucible and cast into a chalked mould. The bar is cleaned by brushing and heating with hydrochloric acid, dried, cut up, rolled, the ribbons are boiled in acid, washed, and heated to redness in a muffle. The method for silver consists in wrapping fine (999) silver in filter-paper and enclosing it in a cotton bag and then electrolyzing with silver nitrate containing 1 per cent. free nitric acid as electrolyte. Pure silver crystals are deposited on the cathode. They are washed, dried, melted with the gold flux, the bar is remelted, but without any flux, and the melted silver stirred with wood to remove occluded oxygen. It is poured into a chalked mould, cleaned by brushing, and with dilute sulphuric acid, and washed, dried, and rolled out ready for use.

Assaying Telluride Ore for Gold. BY R. W. LODGE. *Tech. Quart.*, **12**, 171–174.—The author compares the scorification and the crucible methods for the assay of telluride gold ores, and concludes that satisfactory results can be obtained with either, as long as the samples are ground sufficiently fine, with rich ores through a sieve of not less than 140 meshes to the linear inch.

A New Assay for Mercury. BY R. E. CHISM. *Trans. Am. Inst. Min. Eng.*, **28**, 444–452.—The method described is a modification of the one devised by Eschka. A Battersea gold-annealing cup, size C, fitted into a circular opening of a piece of tin plate so as to protrude about 1 cm., holds the charge of $\frac{1}{2}$ to 1 gram of ore mixed with 5 grams of prepared iron filings. It is heated with a spirit lamp having a wick 6 mm. in diameter, drawn out to produce a flame 4 to 5 cm. high. The volatilized mercury is condensed on a piece of silver foil, about 5 cm. square, which is kept cool by a flat silver or copper dish $5\frac{1}{2}$ to $6\frac{1}{2}$ cm. in diameter, and somewhat over 1 cm. high, holding about 20 cc. of water. The time required for an assay is ten to fifteen minutes. After weighing the silver foil, it is placed again on the crucible, which is heated for ten minutes more to see if there is any gain in weight. The results are accurate.