(No Model.) 2 Sheets—Sheet 1.

W. S. REESE & E. E. ARMSTRONG.

CONTINUOUS SMELTING PLANT.

No. 605,451. Patented June 7, 1898.

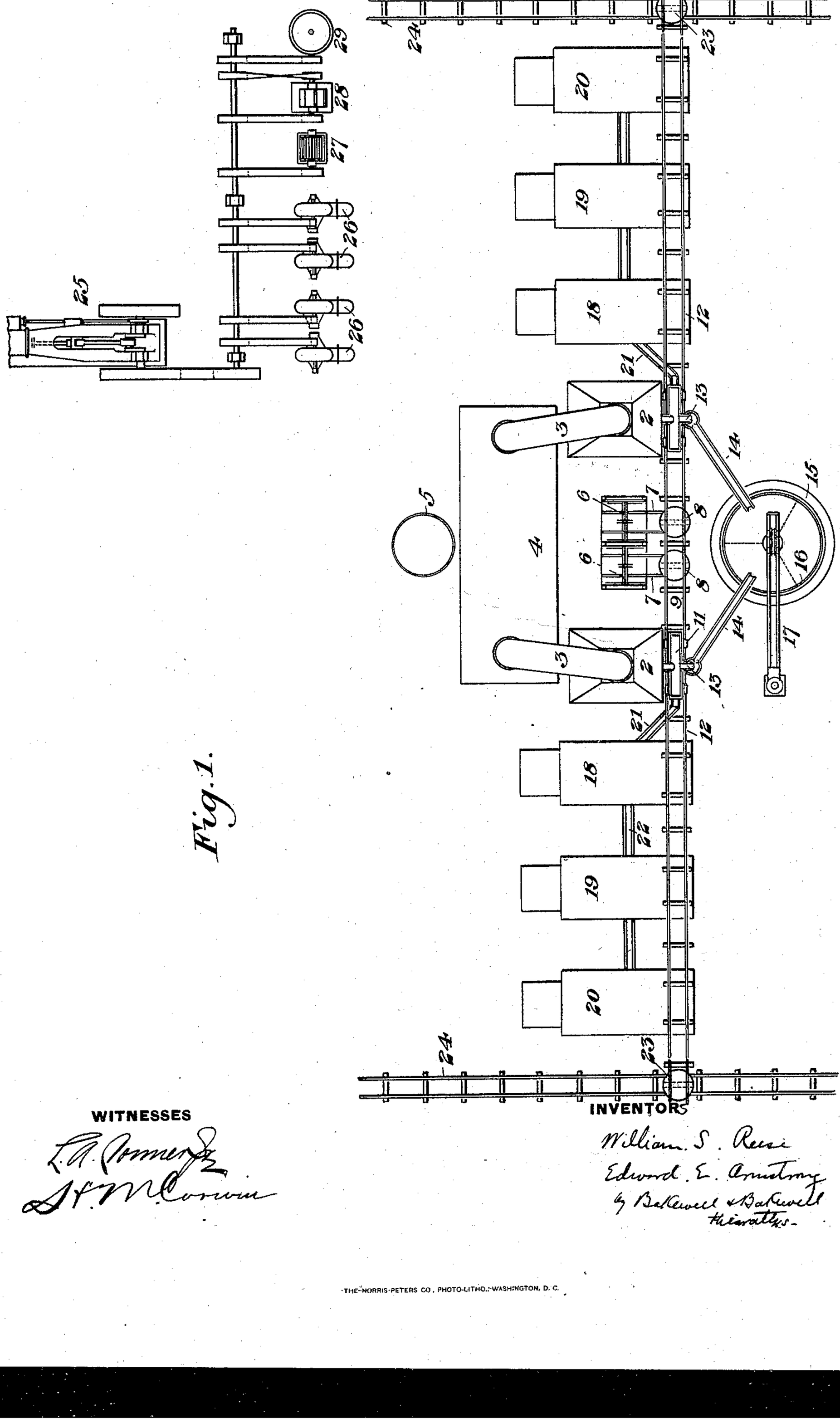

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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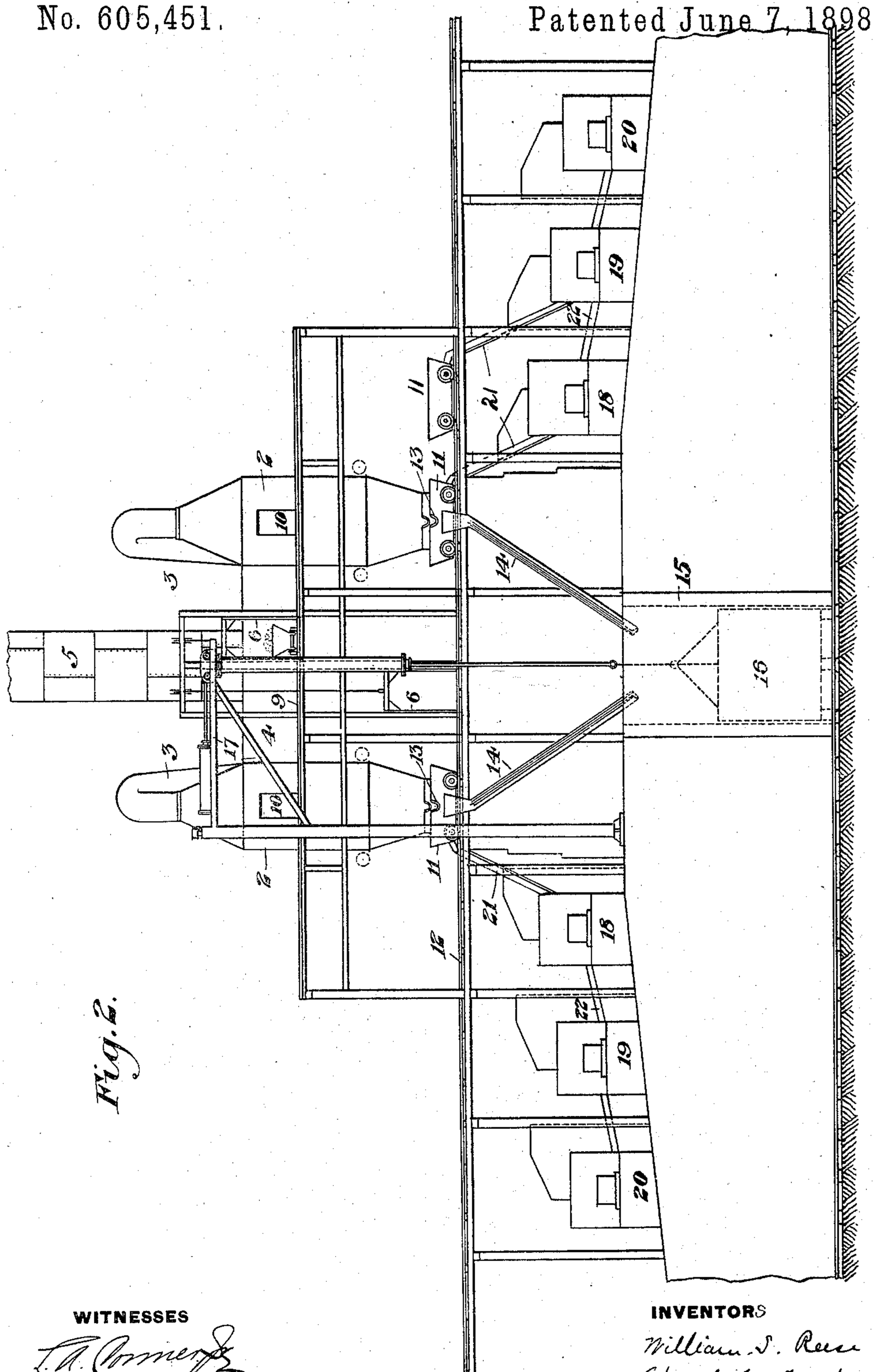

Fig. 2.

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UNITED STATES PATENT OFFICE.

WILLIAM S. REESE AND EDWARD E. ARMSTRONG, OF NATRONA, PENNSYLVANIA, ASSIGNORS TO THE PENNSYLVANIA SALT MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA.

CONTINUOUS SMELTING PLANT.

SPECIFICATION forming part of Letters Patent No. 605,451, dated June 7, 1898.

Application filed January 5, 1897. Serial No. 618,028. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM S. REESE and EDWARD E. ARMSTRONG, of Natrona, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Continuous Smelting Plants, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagrammatic plan view, partly broken away, of our improved plant; and Fig. 2 is a side elevation of the same.

Our invention relates to the smelting of ores and mattes, more especially mattes containing copper, whether argentiferous or not, and is designed to afford a continuous smelting plant in which handling and remelting of the metal is almost entirely done away with, while the output is greatly increased and the mattes quickly and continuously reduced.

Heretofore the mattes from the blast smelting-furnace have ordinarily been cast into pigs, these pigs being charged into a reducing-furnace, where they are blown down, smelted, and tapped into pigs, which were charged and remelted in another reducing-furnace, and so on, until the requisite purity of metal was attained. These operations were expensive and slow and have led to extensive use of the bessemerizing of copper. Our invention, however, so reduces the cost of treating the mattes from a blast smelting-furnace in reducing-furnaces that it is cheaper and more efficient than the bessemerizing operation.

In the drawings, in which similar numerals indicate corresponding parts, 2 2 represent a pair of blast smelting-furnaces located at some distance above the floor-level, these furnaces having downtakes 3 3, leading to a dust-catcher 4, from which the stack-flue leads to a stack 5. Between these furnaces are provided the two elevators 6 6, whose platforms are provided with tracks registering with tracks 7 7, leading from turn-tables 8 8, these turn-tables being located in a charging-track 9, which runs past the charging-door 10 of the furnaces, so that the cars containing the material to be charged pass from the elevators to this track, on which they are taken to the charging-doors. Each smelting-furnace is provided with a settler 11, which has wheels resting upon the rails of a common track 12, running past the bases of the furnaces. From the slag-spouts 13 of these settlers lead adjustable inclined troughs 14, through which the slag is directed into a slag-pit 15, this pit being supplied with water, so that as the slag enters the water it will be granulated and drop into a receptacle 16 within the tank or pit, by which the granulated slag is lifted out of the pit by means of a crane 17 and dumped onto a car or elsewhere, as desired. Adjacent to each smelting-furnace and at a lower level is a series of reducing-furnaces 18 19, &c., of which there may be any desired number, those of each series being at successively lower levels, so that the material tapped from one may run by gravity into the next. The metal passing from the blast-furnace into the settler is led from the settler through a trough 21 into the nearest and uppermost reducing-furnace 18, where air is blown in and the metal reduced, so as to give a larger percentage of metal, after which the metal or matte is tapped therefrom through a trough 22 into the next lower reducing-furnace, where it is again similarly treated, and so on until the desired percentage of metal is obtained—in the case of copper, about ninety-six per cent., or what is known as "blister-copper." A refining-furnace 20 may be placed below the last reducing-furnace, so that the metal can be tapped from the reducing-furnace into the refining-furnace, where the operation is completed, the copper or other metal being cast into cakes, bars, or ingots.

At the ends of the track 12 are provided turn-tables 23, by which a settler or other wheeled truck may be transferred from the track 12 to two tracks 24, crossing the same, by means of which either settler may be taken away and replaced or otherwise changed, if desired.

It is evident that in the operation of the plant either settler may be moved along the track and the metal therein tapped into any one of the reducing-furnaces desired. If the

matte is to be calcined, it may be run from the settler into the pit 15 and granulated therein, so as to prepare it for the calcining operation.

In Fig. 1, 25 represents an engine; 26, blowers, one for each blast-furnace and one for each series of reducing-furnaces. 27 and 28 are crushers, and 29 represents a sample mill. These parts of the plant may be arranged in any way desired, as our invention lies in the arrangement of the smelting and reducing furnaces and the parts operating in conjunction therewith.

The advantages of our invention will be apparent to those skilled in the art, since in our improved plant in reducing from, say, a forty-per-cent. matte to fine copper about eleven handlings of the metal are done away with and a large amount of labor saved, while the output is practically doubled with the same number of furnaces as before. A large amount of fuel is saved, as the metal is not chilled, but flows in liquid form from one furnace to another, the furnaces being kept hot. There is, moreover, no mechanical loss owing to the many handlings of the metal or matte.

Many variations may be made in the form and arrangement of the furnaces and allied parts without departing from our invention, since

What we claim is—

1. A continuous smelting plant, comprising a blast smelting-furnace, a movable settler therefor, a series of reducing-furnaces, and means for feeding the metal from the settler into any one of said reducing-furnaces.

2. A continuous smelting plant, comprising an elevated smelting-furnace, a movable settler therefor, a series of reducing-furnaces at successively lower levels, and means for feeding metal from the settler into any one of the reducing-furnaces.

3. The combination with a blast smelting-furnace, of a wheeled settler therefor resting upon a track, a series of reducing-furnaces at successively lower levels than the smelting-furnace and located along the track, and means for feeding the metal from the settler into any one of said reducing-furnaces.

4. A continuous smelting plant, comprising a smelting-furnace, a movable settler therefor, a series of reducing-furnaces, means for feeding the metal from the settler into any one of said reducing-furnaces, a slag-pit arranged to contain water, and means for feeding slag from the settler to said pit.

5. A continuous smelting plant comprising two elevated smelting-furnaces located side by side and provided with wheeled settlers resting on a common track, a series of reducing-furnaces for each smelting-furnace and located at successively lower levels than the smelting-furnace, and feeders arranged to transfer the metal from the settlers to the reducing-furnaces, and from one reducing-furnace to the next lower one.

In testimony whereof we have hereunto set our hands.

WILLIAM S. REESE.
EDWARD E. ARMSTRONG.

Witnesses:
JONAH J. REESE,
ABRAHAM L. HERBST.