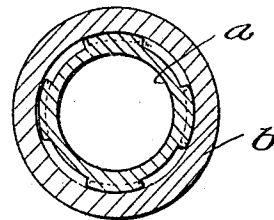
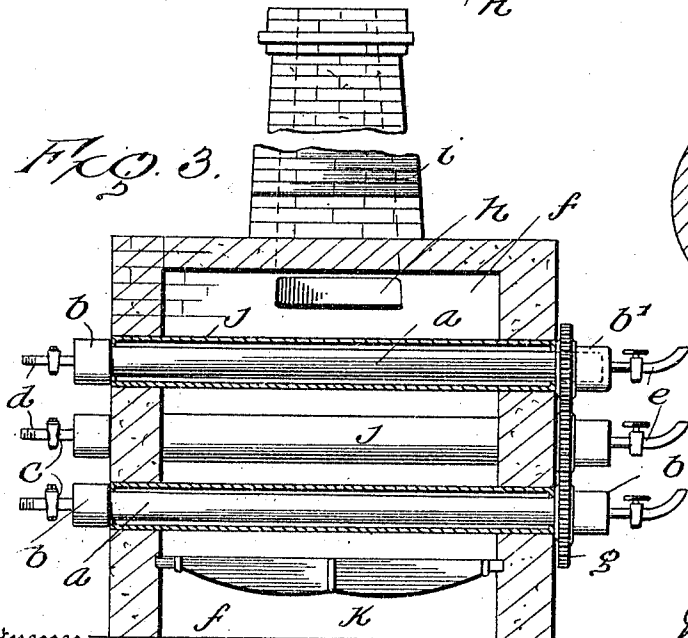
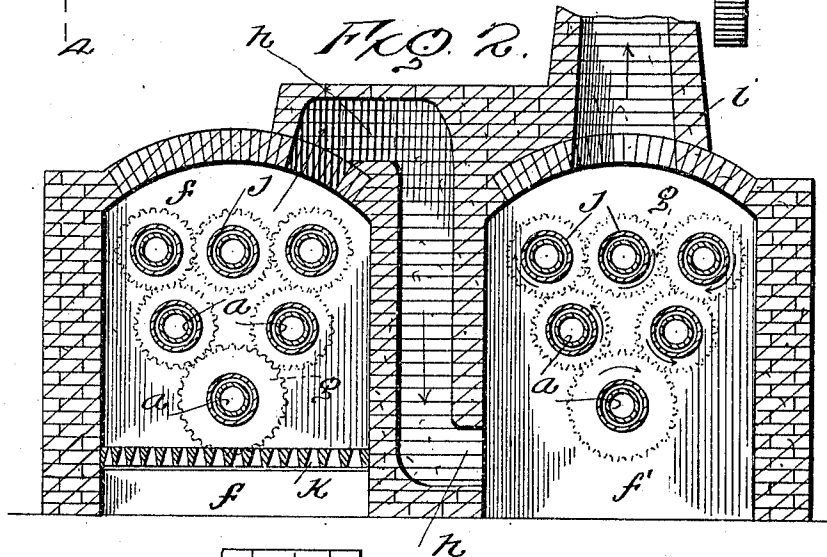
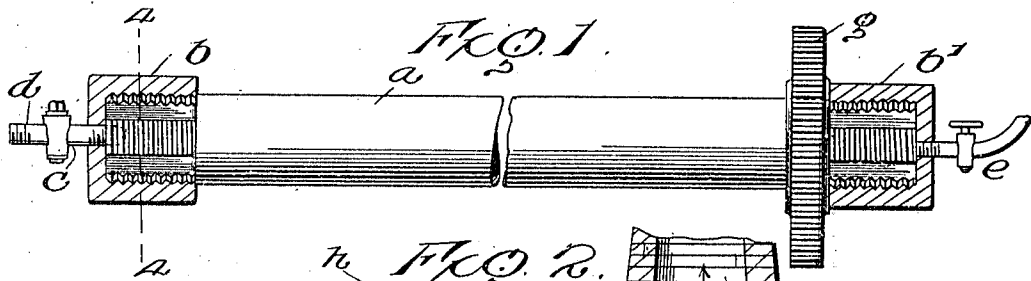


R. W. SCOTT.
 APPARATUS FOR REDUCING TIN.
 APPLICATION FILED FEB. 28, 1910.

957,111.

Patented May 3, 1910.



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ROBERT WATSON SCOTT, OF LONDON, ENGLAND.

APPARATUS FOR REDUCING TIN.

957,111.

Specification of Letters Patent.

Patented May 3, 1910.

Application filed February 23, 1910. Serial No. 546,504.

To all whom it may concern:

Be it known that I, ROBERT WATSON SCOTT, B. A., (Oxon.) a subject of the King of Great Britain, residing at 13 Milton avenue, Highgate, in the county of London, England, analytical chemist, have invented a new and useful Improvement in Apparatus for Reducing Tin, of which the following is a specification.

This invention relates to means for tin smelting or reducing, and it has reference to apparatus employed in the process of extracting tin from ore or oxid of tin by agitating the finely divided ore or oxid at or about a red heat in an atmosphere of producer or water gas in a closed cylindrical reducing chamber revoluble about its longitudinal axis.

The object of my invention is to provide an improved means of the type referred to for producing metallic tin from "cassiterite", or what is commonly known as black tin.

With the foregoing object in view, the invention consists essentially in the particular construction of apparatus for treating "cassiterite" or black tin hereinafter fully described.

Hereinafter it is to be understood that whenever gaseous fuel is mentioned it is intended to refer to producer gas whether produced in a so-called pressure gas plant or by a suction apparatus.

In order that my invention may be carried into effect and also to acquire a knowledge of the constructional details, reference will be made as the description proceeds, to the accompanying drawing, in which:—

Figure 1 is a part sectional elevation of one of the "cassiterite" treating tubes and its appurtenant parts: Fig. 2 is a broken away elevation of a suitable furnace for use in connection with my method of tin smelting, and Fig. 3 is a sectional elevation of the same. Fig. 4 is a detail section on line 4—4 of Fig. 1.

Like and corresponding parts are referred to hereinafter and indicated on the several figures by the same reference characters.

According to my invention I construct a receptacle, such, for instance, as an iron tube *a* which is adapted to be closed in at both ends by means of screwed caps *b*, *b'*, the threads being cut away at one or more parts to insure the removal of the cap by a quarter turn. Connected to one of the aforesaid

caps *b*, is a pipe *c* in communication with a convenient source of producer gas—not shown—and under the control of a stop cock *d* for regulating the flow of the gas through the tube *a*.

In order to facilitate inspection and cleaning of the tubes *a* they may be built up in sections, which, when screwed or otherwise joined together, constitute a tube with a clear or flush inner surface.

The cap *b'* is provided with a jet cock *e* for the purpose hereinafter fully explained.

In carrying out the reduction process I employ a furnace constructed as shown in Figs. 2 and 3 of the annexed drawing. This furnace comprises a heating or combustion chamber *f* and a drying and preliminary heating chamber *f'*, in each of which are arranged a series or nest of the aforesaid tubes *a*, and said tubes are provided with toothed wheels *g* adapted for operation by any convenient form of driving mechanism. In Figs. 2 and 3 the pitch lines of the wheels *g* alone are indicated and it will be understood that the entire series are driven one from another.

h is a passage or flue affording communication between the combustion chamber *f* and the drying chamber *f'*, and *i* is the stack or exit flue.

j, *j* are tubular supports arranged across the chambers *f* and *f'* for the reception of the tubes *a* while constituting at the same time journals in which the said tubes can be rotated, and *k* is the grate in the combustion chamber *f*.

Briefly stated the method of tin smelting is as follows:—"Cassiterite" or black tin, which is generally in a wet condition, is fed into the drying chamber *f'* and dried by means of the waste heat passing from the main furnace *f* through the flue *h*. When properly dried the black tin is loaded into the tubes *a* which are then placed in the supports *j*, *j*, arranged across the pre-heating and drying chamber *f'* whereupon they are rotated and preheated for a suitable length of time and then removed and placed in the main furnace *f*. The caps *b*, *b'* are then screwed into place and the supply of producer gas is turned on at the stop cocks *d* until a flame is emitted at the burners *e* whereupon the tubes *a* are set in rotation. After a predetermined period of time during which the tubes *a* are kept constantly revolving said tubes *a* are withdrawn and

the product of the reaction removed therefrom in any of the well known ways.

Preferably the current of producer gas is maintained at a pressure sufficient to
5 keep the tubes constantly full during the entire process.

The product of the reaction is metallic tin in the form of prills of various sizes which, when raised to a convenient temperature in a crucible, run together into an ingot by the addition of a suitable flux such as silica or the like.
10

What I claim as my invention and desire to secure by Letters Patent, is:—

15 1. The combination in an apparatus for reducing tin of a furnace having therein a preliminary drying chamber, and a combustion chamber, a flue connecting said chambers, an exit flue from the drying chamber,
20 and a series of tubes arranged in a nest in each chamber, said tubes being furnished with detachable caps at their ends, a connection from a source of producer gas at one end of each tube, and a burner at the
25 other end, and means for causing a rotation of said tubes.

2. The combination in an apparatus for reducing tin of a furnace having therein a preliminary drying chamber, a combustion
30 chamber, a flue connecting said chambers,

an exit flue from the drying chamber, and a series of rotatable tubes arranged in each chamber, said tubes being furnished with detachable capped ends, toothed gears on the gears whereby they may rotatably engage
35 with each other and connected to a source of power, a connection from a source of producer gas at one end of each tube, and a burner at the other end.

3. The combination in an apparatus for
40 reducing tin, of a furnace having therein a preliminary drying chamber and a combustion chamber, a flue connecting said chambers, an exit flue from the drying chamber, and a series of tubes extending through said
45 chambers and open at both ends, a series of rotatable tubes having capped ends and mounted to revolve in the said first named tubes, means for causing a simultaneous rotation of said rotatable tubes, and a connection
50 from a source of producer gas at one end of each of said tubes, and a burner at the other end thereof.

In witness whereof I have hereunto set my hand in the presence of two witnesses.
55

ROBERT WATSON SCOTT.

Witnesses:

FRANK H. URRY,
JOHN H. SCOTT.