

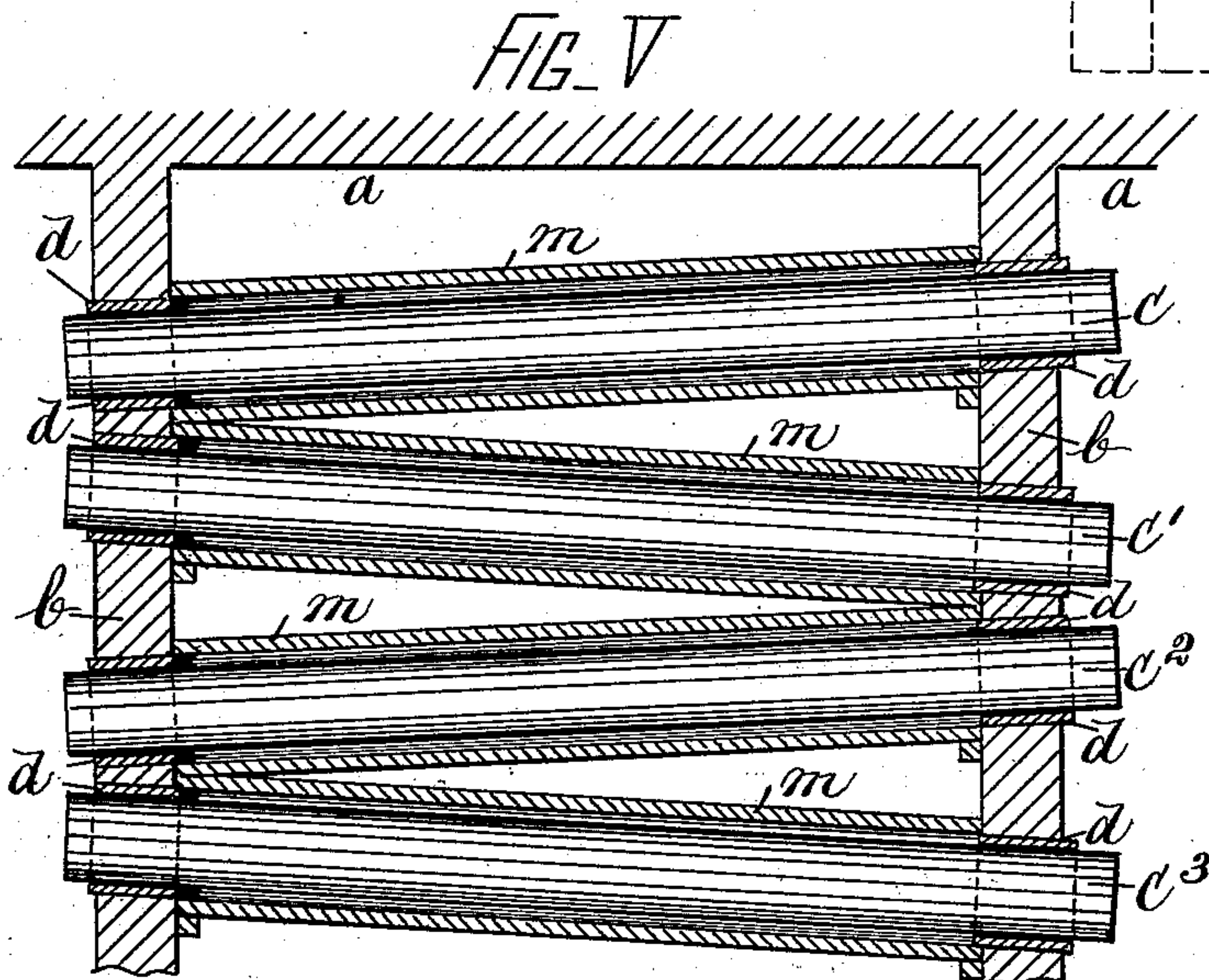
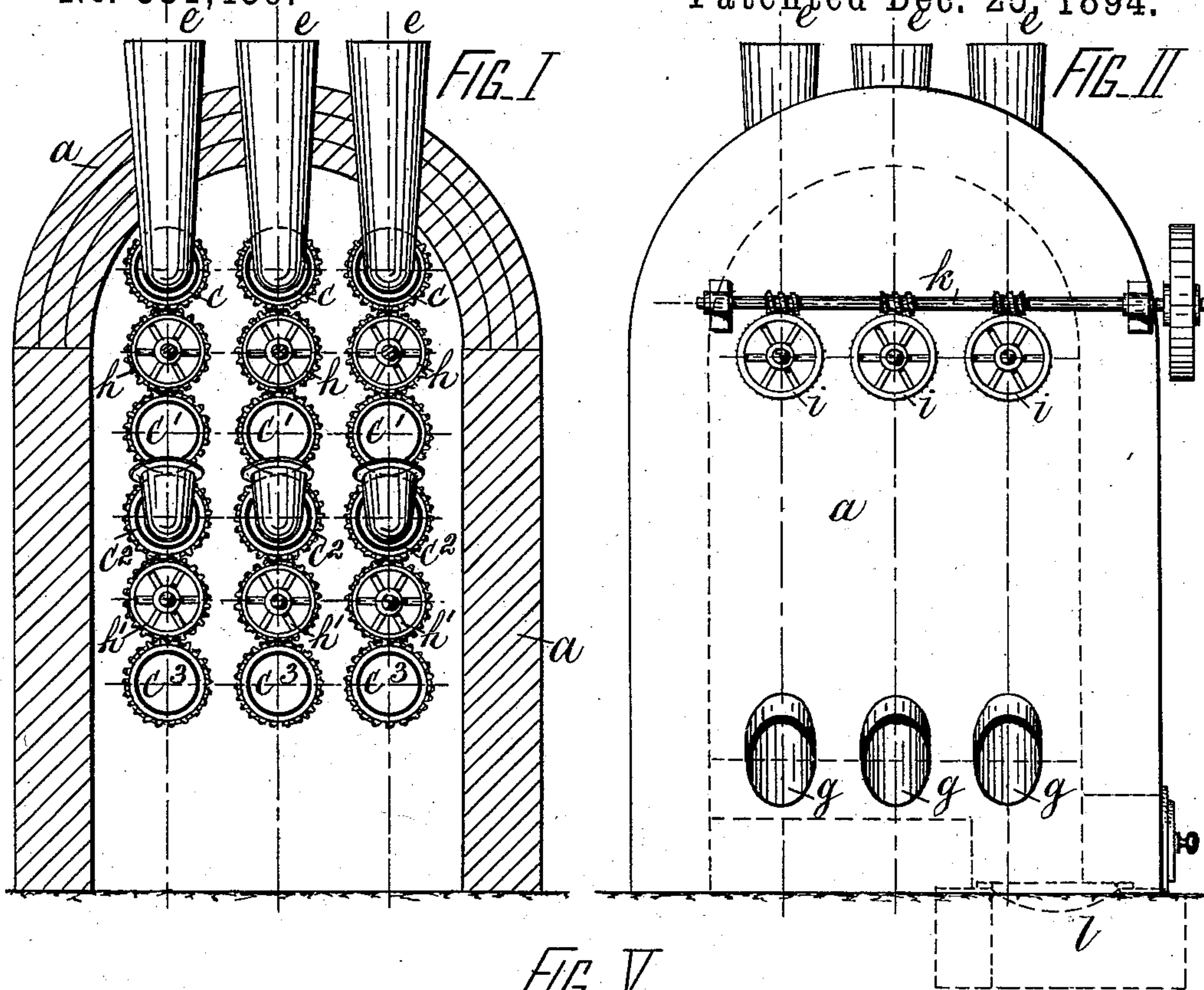
(No Model.)

2 Sheets—Sheet 1.

A. CROSSLEY.
APPARATUS FOR PRODUCING OXIDS.

No. 531,459.

Patented Dec. 25, 1894.



Witnesses:
C. S. Whitman Jr.
M. J. Linnell

Inventor:
A. Crossley
by Whitman & Millman,
Attys

(No Model.)

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FIG. III

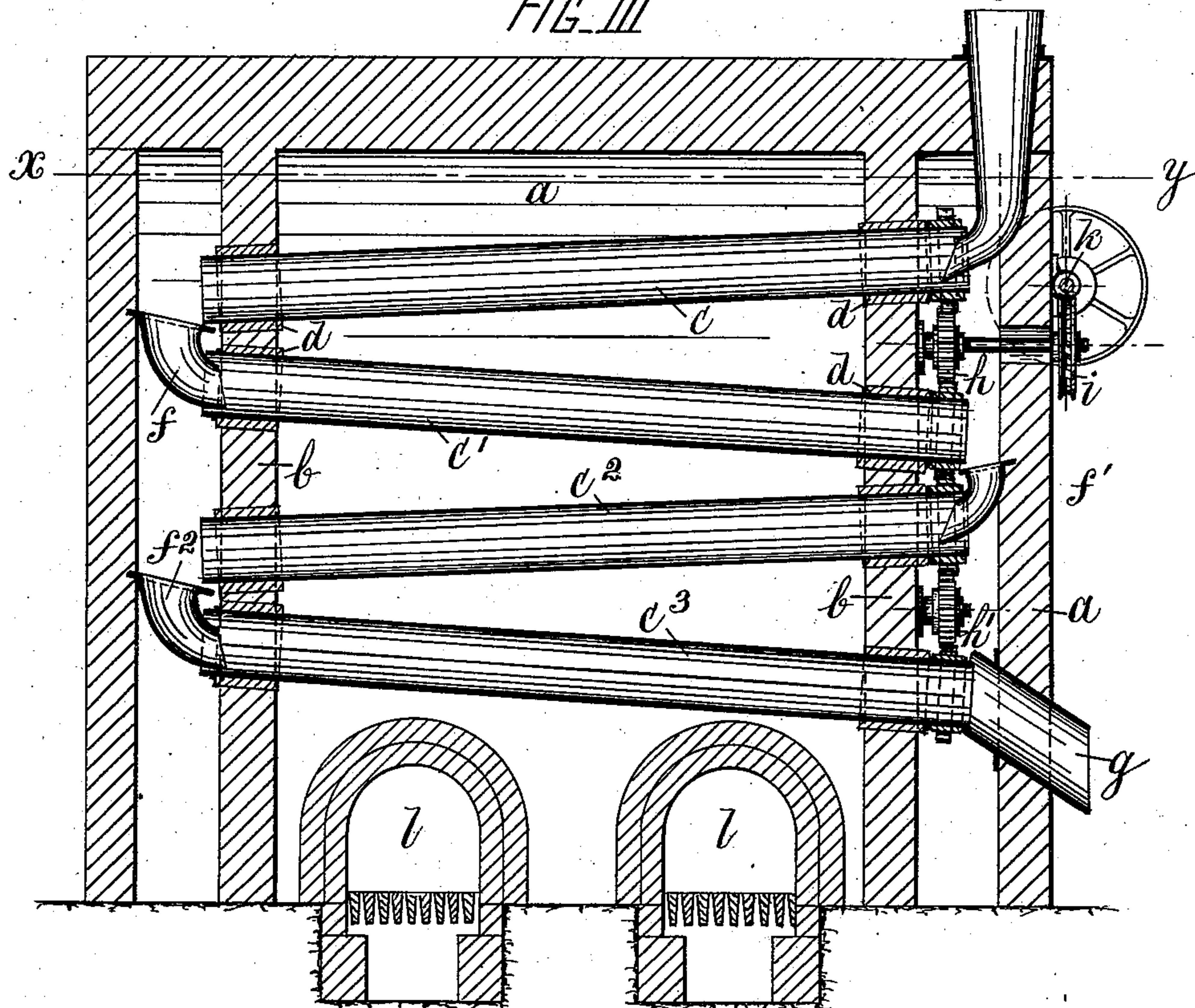
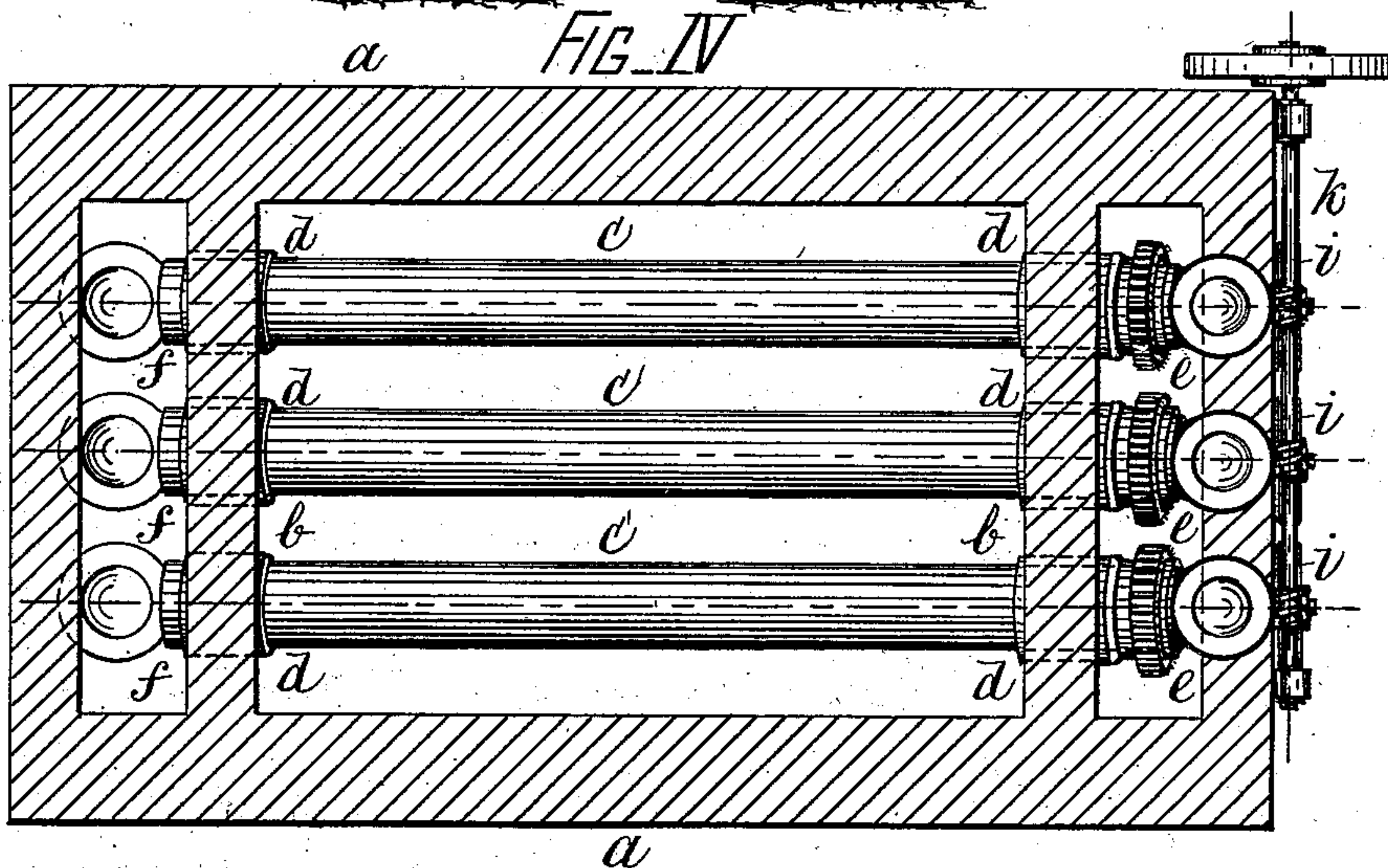


FIG. IV



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UNITED STATES PATENT OFFICE.

ATKINSON CROSSLEY, OF CWMAYON, ENGLAND.

APPARATUS FOR PRODUCING OXIDS.

SPECIFICATION forming part of Letters Patent No. 531,459, dated December 25, 1894.

Application filed June 22, 1894. Serial No. 515,421. (No model.) Patented in England July 28, 1891, No. 12,813.

To all whom it may concern:

Be it known that I, ATKINSON CROSSLEY, manufacturing chemist, a subject of the Queen of Great Britain, residing at Cwmayon, in the county of Monmouth, England, have invented a new and useful Apparatus for Producing Ferroferrie and Ferric Oxids, (for which I have obtained a patent in Great Britain, No. 12,813, bearing date July 28, 1891,) of which the following is a specification.

My invention relates to improvements in apparatus for producing ferroferrie and ferric oxides, in which powdered salts from which such oxides are to be obtained are submitted to heat in retorts, and the object of my improvement is to economize time and labor by rendering the process continuous, and to reduce the cost of the manufacture.

By my present invention I use heated hollow cylinders or tubes of metal, such as steel, or other suitable material, inclined at an angle so that the powdered salt can be fed in at the upper end of one cylinder (which is made to revolve continuously upon its axis) and slowly descends to the lower end, whence it passes into the upper end of a similar revolving cylinder inclined at the opposite angle, down which it passes to a discharge opening, or to the upper end of a third cylinder inclined in the same direction as the first one, and so on successively through as many cylinders as are necessary to complete the oxidation of the salts.

My improved apparatus is illustrated in the accompanying drawings, in which—

Figure I is a transverse section through a furnace. Fig. II is a front view of the same. Fig. III is a longitudinal section through the center of the furnace, and Fig. IV is a horizontal section through the line xy , in Fig. III. Fig. V is a longitudinal section showing a slight modification of the method of construction shown in Fig. III.

Similar letters refer to similar parts throughout the several views.

a is the furnace, and $b\ b$ the end walls of the same, in which are made openings through which pass the ends of the revolving tubes. These tubes are shown in three sets side by side, each containing four tubes arranged one

above the other, but any other convenient number may be used. The ends of the tubes are shown revolving freely in sockets or bearings d built into the walls b, b , as little air space as possible being left round them. The upper tube c of each set is higher at its front end than at the back, and into this front open end the powdered salts or materials are fed gradually in through the hopper e or other suitable feeding apparatus. They then pass along and down to the other or lower end of the tube whence they are directed by a hopper or guide f into the open back end of the next tube c' which is higher than its front end. The salt or material accordingly passes along and down this tube and out at its front end into the hopper or guide f' which directs it into the front higher end of the next tube c^2 after passing down which it is directed by the hopper f^2 into the back end of the lowest tube c^3 , down which it passes and is finally delivered through the open end of the latter into a delivery chute or pipe g , the front end of which may be closed by a movable door. (Not shown in the drawings.)

The tubes c are made to revolve slowly in the bearings d , in order that the salts in them may be thoroughly and uniformly acted upon and may be caused to pass along and down them as described. For this purpose the front ends of the tubes are shown provided with toothed wheels, those upon the tubes c , and c' being driven by an intermediate wheel h , itself driven by the tangent toothed wheel i and screw and shaft k by steam or other power, the wheel upon c' driving that upon c^2 and the latter driving by an intermediate wheel h that upon the lowest tube c^3 .

The revolving cylinders may be of any suitable diameter and length, and are preferably supported upon rollers or in sockets and they are made to revolve slowly by means of toothed wheels, friction gear, or chain wheels, actuated by steam or other available machinery.

The passages by which the salts are introduced and removed when oxidized as well as the passages from the one cylinder to the other, are made so as to be as nearly air tight as possible, air or steam being admitted in

regulated quantities to effect the oxidation, and the acid vapor and gases being conveyed away to a tunnel or acid chamber or tower.

5 The tubes as they revolve are exposed to the heat in the furnace which I prefer to fire by means of fireplaces *l, l*, arranged across the length of the tubes, and one or more of which may be used.

10 Any desired number of the revolving tubes may be used in the furnaces described.

The openings above described for the admission of air or steam, and for conveying away the acid vapor and gases are not shown in the drawings which accompany my present specification, as they may be arranged in any part or parts of the apparatus which may be most convenient.

20 Instead of the toothed wheels shown the tubes may be driven by friction gear, chain wheels, or other equivalent means.

In Fig. V, the revolving tubes *c, c', c²*, instead of being exposed to the direct heat of the furnace are shown surrounded with a casing *m* of fireclay or other material sufficiently refractory to heat, the inside of the casing *m* being at a sufficient distance from the outside of the tube to prevent it from interfering with the free revolution of the latter, while its outside is exposed to the heat of the furnace.

30 In this way a perfectly even, uniform, and steady heat is communicated to the revolving tubes and their contents, and the product ob-

tained is of the highest and most uniform character.

By my present invention the process is continuous and the oxidation of the salts is effectively and uniformly carried on, and at little cost, as most of the labor ordinarily required can be dispensed with.

What I claim, and desire to secure by Letters Patent, is—

The combination with a furnace having double front and back walls, of inclined tubes extending through the two inner walls and opening into the space between the two walls at the ends of the furnace, an outer casing *m* inclosing said tubes, bearings *d* for the ends of the tubes, toothed wheels upon the front ends of the tubes meshing with each other and also with idle toothed wheels between the said ends of the tubes, means for driving the said toothed wheels to rotate the tubes, and funnel-shaped hoppers between the double walls of the furnace communicating with the ends of the tubes, substantially as and for the purposes described.

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

ATKINSON CROSSLEY.

Witnesses:

ALEX. RIDGWAY,

Notr. Pub.

ARTHUR E. EDWARDS,

Patent Agent, London.