No. 805,939. PATENTED NOV. 28, 1905.

C. C. WILSON.

RABBLING DEVICE FOR ORE ROASTING FURNACES.

APPLICATION FILED FEB. 25, 1904. RENEWED OCT. 9, 1905.

2 SHEETS—SHEET 1.

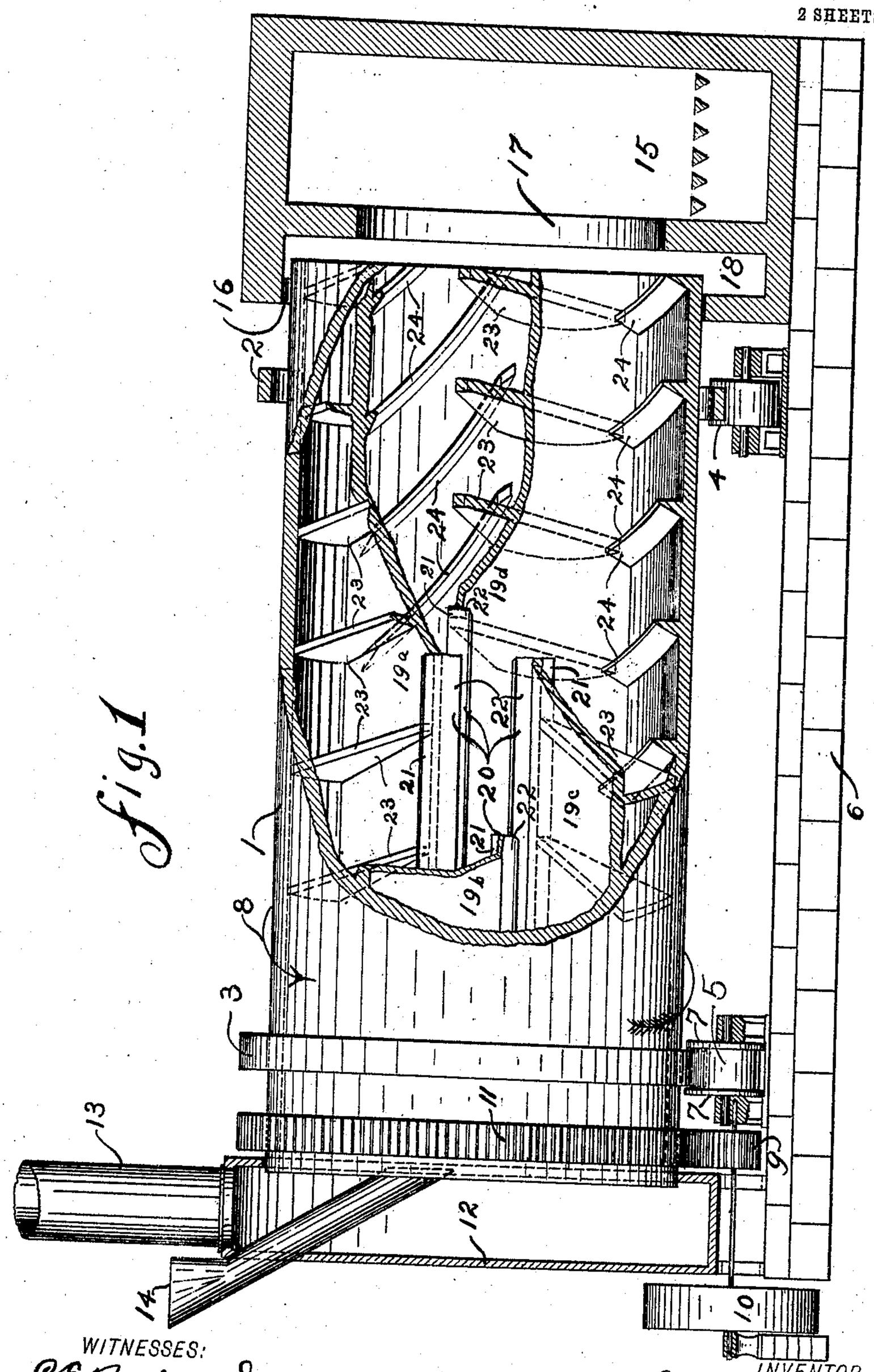

Fig. 1

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2 SHEETS—SHEET 2.

Fig. 2

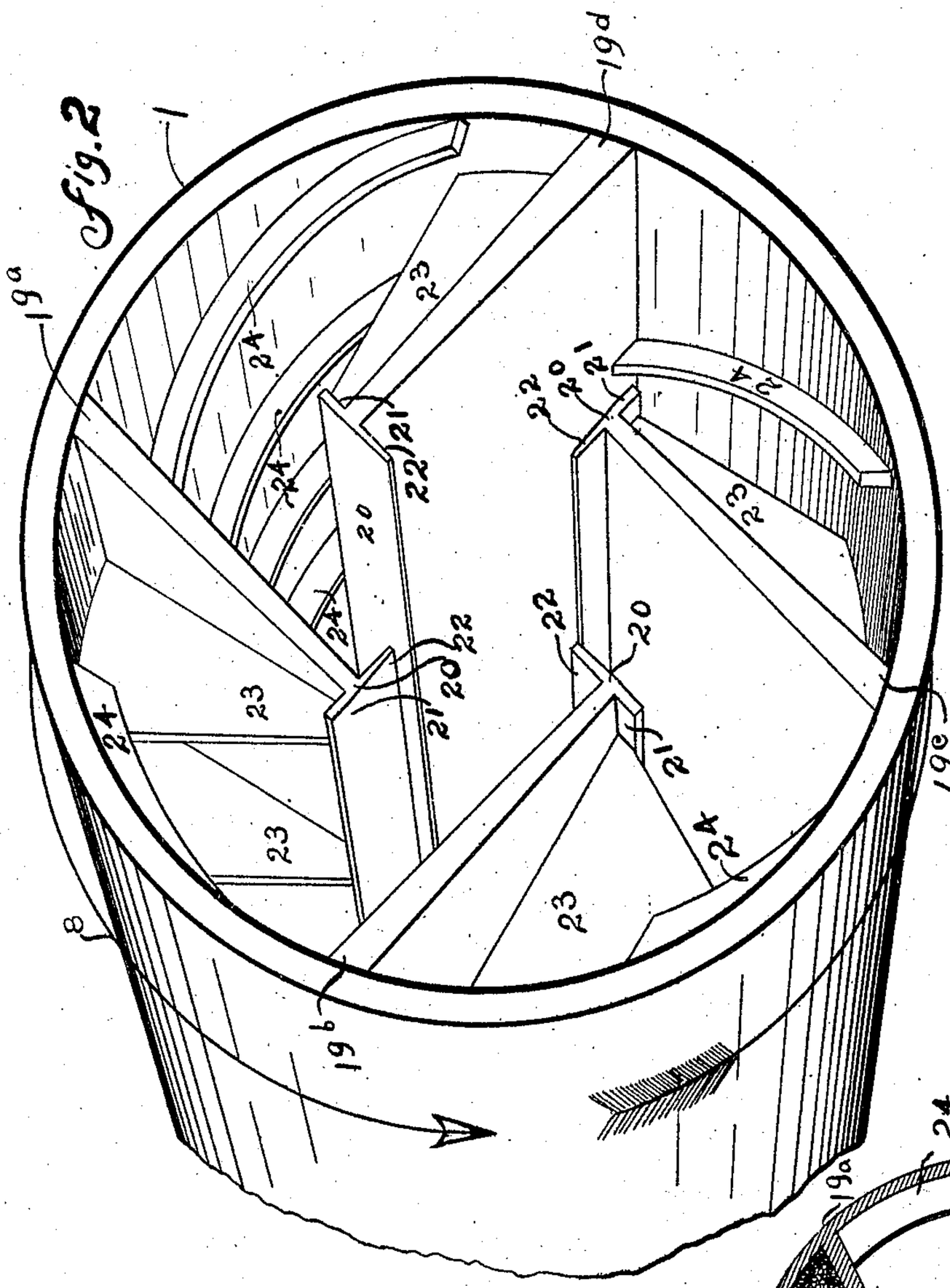
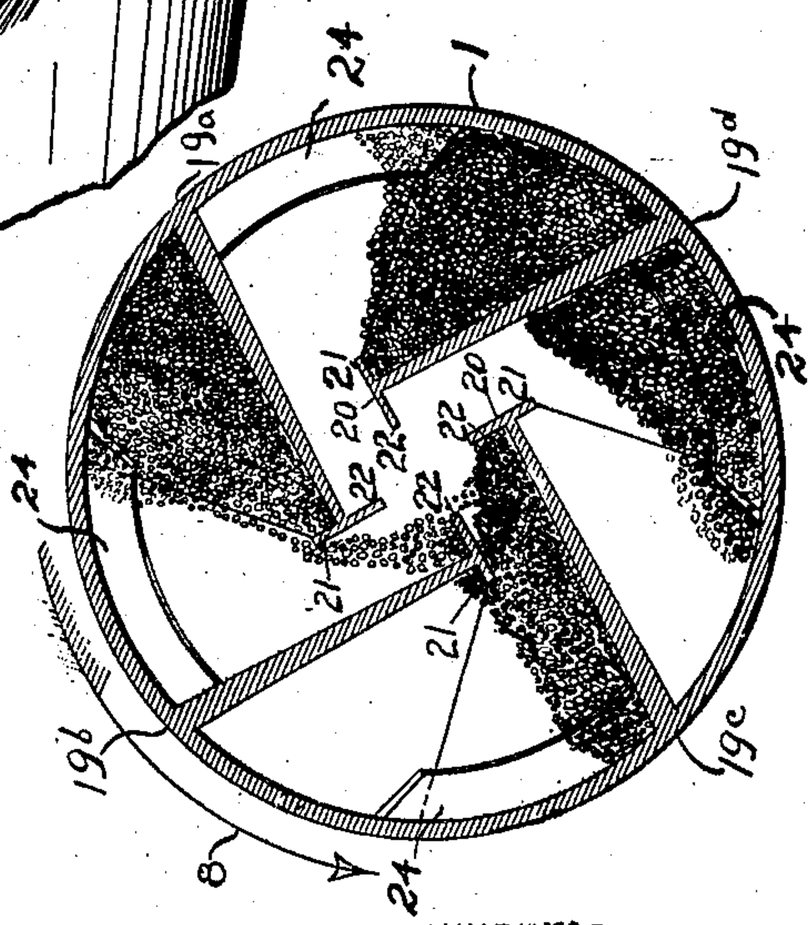


Fig. 3



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UNITED STATES PATENT OFFICE.

CHRISTOPHER C. WILSON, OF DENVER, COLORADO.

RABBLING DEVICE FOR ORE-ROASTING FURNACES.

No. 805,939. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed February 25, 1904. Renewed October 9, 1905. Serial No. 282,016.

To all whom it may concern:

Be it known that I, CHRISTOPHER C. WILSON, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Rabbling Devices for Ore-Roasting Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to rabbling devices of cylindrical ore-roasting furnaces, and has for its object to provide an improved and simple construction of such rabbling devices; and to these ends it consists of the various features of construction and arrangement of parts having the general mode of operation substantially as hereinafter more particularly described.

In the accompanying drawings, Figure 1 is a side elevation of the cylinder, partly broken away to show its internal rabbling devices and smoke-stack hood, the furnace being in vertical longitudinal section. Fig. 2 is an isometric perspective view of the discharge end of the cylinder. Fig. 3 is an end view looking into the cylinder from its discharge end, and may be stated as taken on any diametric line of the cylinder.

While my invention may be used for any purpose for which it is adapted and may be modified in details of structure and arrangement to adapt it for various purposes, it is primarily intended for use in connection with ore-roasting furnaces.

I have elected to show my invention as applied to the cylinder of a furnace of the reverberatory type—that is to say, one in which the direct flame from the furnace-fire passes within the cylinder in direct contact with its contained ore.

Referring to the drawings, 1 is the roasting-cylinder, axially supported by its circumferential rings 2 and 3 upon rolls 4 and 5, suitably positioned upon the foundation 6 at either end of the cylinder. The circumferential ring 3 at the receiving end of the cylinder rests upon its supporting-rolls 5, which are provided with side flanges 7, which extend on either side of the circumferential ring 3 and position the cylinder longitudinally.

To allow for the expansion and contraction of the cylinder, the ring 2 may slide longitudinally on the rolls 4, which have no flanges. The cylinder is revolved in the direction of the arrow 8 by means of the power-pinion 9, driven by the belt-wheel 10 and meshing with a circumferential rack 11, preferably at the receiving end of the cylinder. The receiving end of the cylinder is inclosed by the stationary hood 12, from the top of which projects the smoke-stack 13. The ore is introduced into the receiving end of the cylinder through the hopper 14, which penetrates the walls of the hood and leads a slight distance into the cylinder, but not far enough to interfere with the passing shelves. The furnace 15 is located at the discharge end of the cylinder.

The discharge end of the cylinder fits closely the peripheral walls of a hole 16 in the side of the furnace and is free to turn therein. The joint between the cylinder and the hole 16 is closed by any suitable loose packing. The communication between the open end of the discharge end of the cylinder and the fire-box of the furnace is through the opening 17 in its inner side wall. The ore discharged by the cylinder is caught in the pit 18 in the side wall of the furnace, from which it is removed in any suitable manner.

The rabbling devices consist of a series of longitudinal shelves 19^a 19^b 19^c 19^d, which interiorly project from the walls of the cylinder in lines traversing the vertical area of the cylinder tangential to the axis thereof and from bases equally distant apart. Along the longitudinal projecting edge of each shelf are dams 20, having the short legs 21 and the longer legs 22 extending approximately at right angles from either surface of the shelf.

From those surfaces of the shelves which are upward when on the right-hand side of the cylinder, as shown in the drawings, hereinafter called the "lifting-surfaces," partition-plates 23 extend at equal longitudinal distances apart in a line inclined from the circumferential edge of the shelves to the short legs 21 of the dams 20 forward toward the discharge end of the cylinder. These plates 23 are higher or wider at the circumferential edge of the shelves and are joined at that end to the interior face of the cylinder. They are lower at the end where they join the short legs 21 of the dams, so as to form pockets gradually increasing in depth toward the circumference of the cylinder.

Within the spaces between two adjacent shelves rabbling-ribs 24 project at equal lon-

gitudinal distances apart from the interior circumferential wall of the cylinder. At one end these circumferential rabbling-ribs join that surface of the shelves on the other side of the shelf from which the partition-plates project, hereinafter called the "lowering-surface." The other end of these rabbling-ribs 24 is inclined longitudinally forward or toward the discharge end of the cylinder at approximately the same degree of inclination as have the partition-plates. The forwardly-inclined ends of the circumferential rabbling-ribs 24 terminate at a point longitudinally between the points where two adjacent partition-plates join the circumference of the cylinder. The forward inclination of these circumferential rabbling-ribs is such that the points where they join a shelf are longitudinally rearward of the points of the termination, so as to place the rearward end of the circumferential rabbling-ribs diametrically in line with the pocket between two adjacent partition-plates and their forward ends diametrically in line with the next adjacent pocket between two partition-plates forwardly positioned.

The ore which falls from the hopper into the end of the revolving cylinder falls upon the lowering-surface of the shelves which are descending and the lifting-surface of the shelves which are ascending and some of it upon the bottom of the revolving cylinder. That which falls upon the lifting-surface of the shelves falls in the first pocket formed by the partition-plates 23; that which falls upon the lowering-surface of the shelves is held upon such lowering-surface by the long leg 22 of the dam 20; that which falls upon the bottom of the cylinder falls between the pockets formed by the first two circumferential rabbling-ribs 24.

Assuming the ore to be discharged from the hopper, as seen in Fig. 3, upon both lifting and lowering surfaces of the shelves and also upon the bottom of the cylinder, that ore which falls within the pocket on shelf 19^a, Fig. 3, which is the topmost ascending shelf, will be confined within said pocket behind the short leg 21 of the shelf-dam, and during the ascension of the shelf the ore not held by the dam will fall over toward the lowering-surface of the next preceding shelf 19^b, Fig. 3, and be held thereon in its proper quantity by the long leg 22 of the dam.

During the revolution of the cylinder the ore upon the topmost ascending shelf 19^a and that upon the topmost descending shelf 19^b is impelled by gravity toward the dams at the projecting ends of the shelves, while that upon the lowermost descending and lowermost ascending shelves is impelled by gravity from the dam toward the circumference of the cylinder. In falling toward the circumference of the cylinder the mass upon the lowering-surface of the lowermost descending shelf 19^c, Fig. 3, gradually slides into the partition-pockets formed by the circumferential rabbling-ribs 24.

In passing out of the first pocket formed by the partition-plates 23 on the uppermost ascending shelf 19^a the ore is guided by the inclination of those pockets so as to fall longitudinally forward upon the lowering-surface of the next adjacent shelf 19^b. Now when said next adjacent shelf 19^b passes in its descent a horizontal position the ore begins, as stated, to fall toward the circumference of the cylinder, but its fall over this surface is along a diameter. This position is shown by the ore upon the lowermost descending shelf 19^c, Fig. 3.

The ore which slides diametrically down the lowering-surface of the shelf 19^b (when said shelf reaches the position of the shelf 19^c, Fig. 3) falls into the circumferential pocket formed by the circumferential rabblings-ribs 24, which is longitudinally next beyond the partition-pocket on the lifting-surface of the shelf 19^a, from which the ore first started. During the continued revolution of the cylinder this same portion of ore is guided longitudinally forward into the shelf-pocket from which it started by reason of the forward inclination of the circumferential rabbling-ribs 24. Thus the main body of the ore upon each shelf is transferred from its lifting side to a forward position on the lowering-surface of the preceding shelf and from thence without forward movement toward the circumference of the cylinder into the rabbling-pockets formed by the circumferential rabbling-ribs 24 and from thence back again to the shelf from which it started, but into a pocket on said shelf which is longitudinally forward of the pocket from which it started. Any excess ore falling behind the dam of the topmost descending shelf will overflow upon the lowering-surface of the next preceding descending shelf, as shown in Fig. 3, and be forwarded in the usual manner. Each shelf is supposed to be fed with its quota so that there will be no excess in some grades of ores. In other grades of ores the delivery to each shelf exceeds its quota, so that there is a constant excess, and therefore an overflow. I have shown this cylinder with only four shelves in order that the coactive function of the shelves and their inclined partition-plates and the function of the circumferential rabbling-ribs might appear more distinctly; but I do not limit myself to the number of the inwardly-projecting shelves. On the contrary, I anticipate that the number of these shelves will be increased.

I claim—

1. In an ore-roasting furnace or the like, a longitudinally-revoluble cylinder provided upon its interior surface with longitudinal shelves projecting inwardly tangential to an imaginary cylinder, whose axis coincides with

that of the cylinder and whose diameter is less than that of the cylinder, and equally distant apart, and rabbling-ribs extending from the walls of the cylinder between adjacent shelves, substantially as described.

2. In an ore-roasting furnace or the like, a longitudinally-revoluble cylinder provided upon its interior surface with the longitudinal shelves projecting inwardly tangential to an imaginary cylinder whose axis coincides with that of the cylinder and whose diameter is less than that of the cylinder, and equally distant apart, and partition-plates extending from the lifting-surface of said shelves having a longitudinal inclination forward in the direction of the travel of the ore from the circumference of the cylinder to the projecting edge of the shelves, substantially as described.

3. In an ore-roasting furnace or the like, a longitudinally-revoluble cylinder provided upon its interior surface with longitudinal shelves projecting inwardly tangential to an imaginary cylinder, whose axis coincides with that of the cylinder, and whose diameter is less than that of the cylinder, and equally distant apart, rabbling-ribs extending from the circumferential walls of the cylinder between adjacent shelves in a line inclined longitudinally forward from their ascending ends, substantially as described.

4. In an ore-roasting furnace or the like, a longitudinally-revoluble cylinder provided upon its interior surface with longitudinal shelves projecting inwardly tangential to an imaginary cylinder, whose axis coincides with that of the cylinder, and whose diameter is less than that of the cylinder, and equally distant apart, partition-plates extending from the lifting-surfaces of said shelves having a longitudinal inclination forward in the direction of the travel of the ore from the circumference of the cylinder, to the projecting edge of the shelves, and rabbling-ribs extending from the walls of the cylinder between adjacent shelves so that the forward inclined end of each rabbling-rib terminates at a point opposite the shelf-pocket which is forward of the shelf-pocket diametrically in line with the other end of the rabbling-rib, substantially as described.

5. The combination with the revoluble cylinder, of an ore-roasting furnace, of shelves projecting from the interior surface of said cylinder tangential from an imaginary cylinder, whose axis coincides with that of the cylinder, and whose diameter is less than that of the cylinder, and equally distant apart, of partition-plates extending from the lifting-surfaces of said shelves in lines longitudinally inclined forward from their joining with the circumference of the cylinder to their termination at the projecting edge of said shelves, and rabbling-ribs extending from the walls of the cylinder joined at one end to the non-lifting or lowering surface of the shelves and terminating at their other end longitudinally forward, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHRISTOPHER C. WILSON.

Witnesses:

A. ROLAND JOHNSON,

C. E. BRAINARD.