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R. TEATS.

Revolving Ore-Roasters.

No. 155,123. Patented Sept. 15, 1874.

Fig. 1.

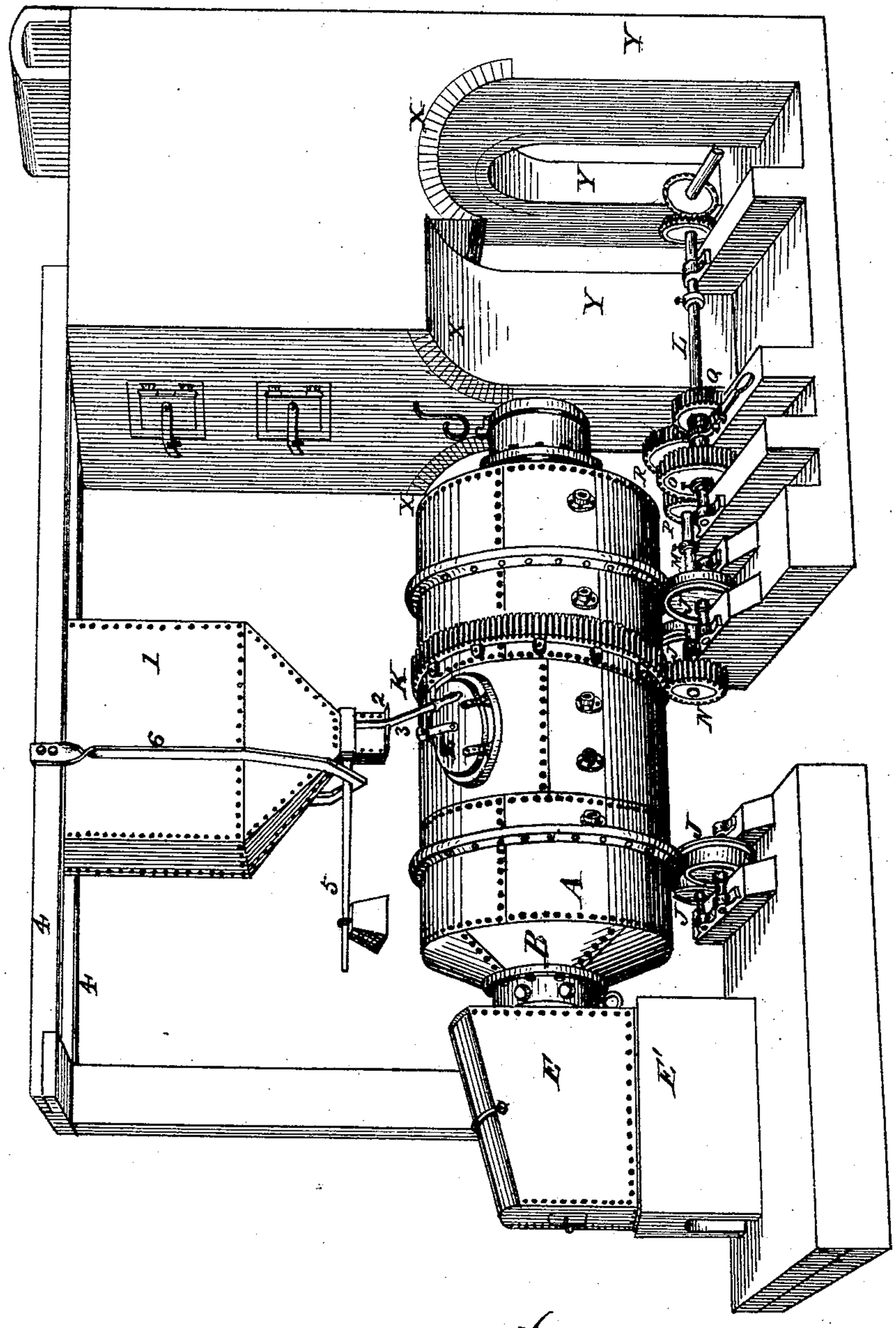

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Fig. 2

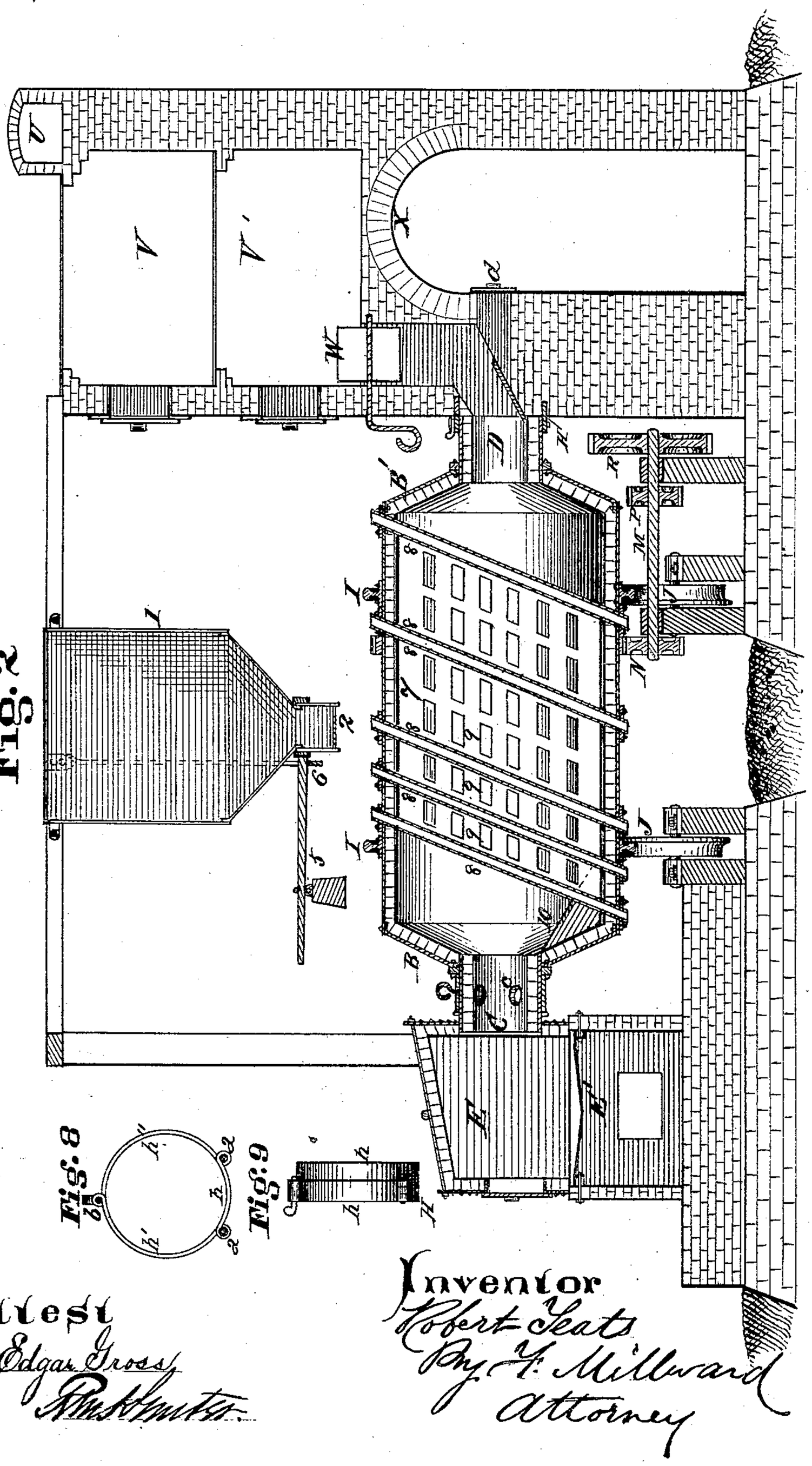

Fig. 8

Fig. 9

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Fig. 3

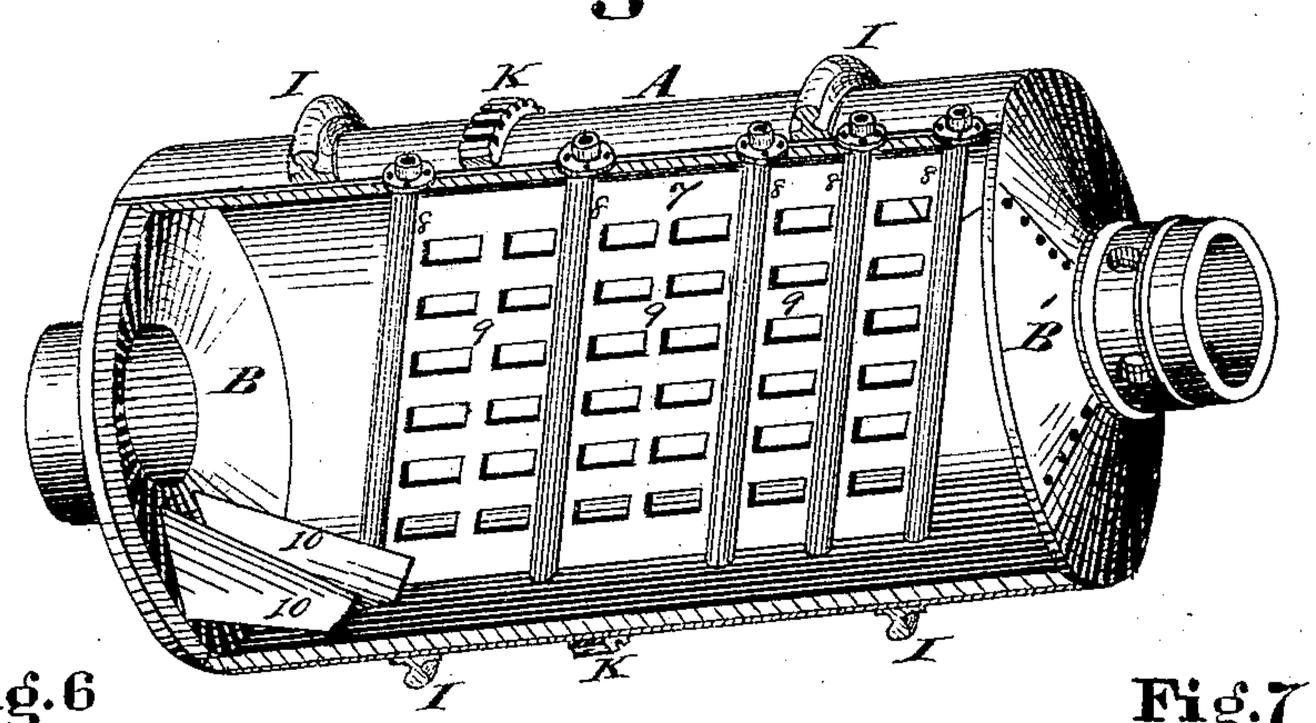


Fig. 6

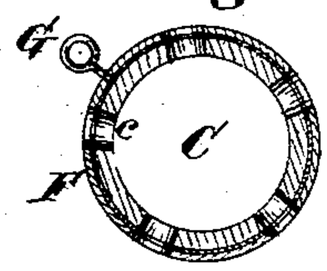


Fig. 7

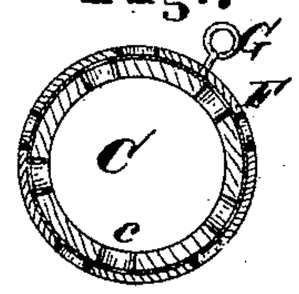


Fig. 4

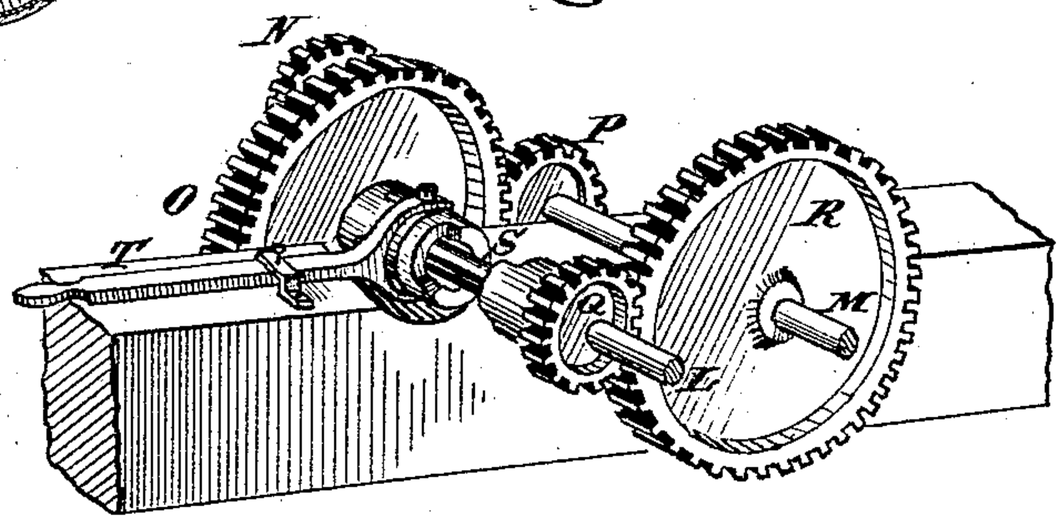
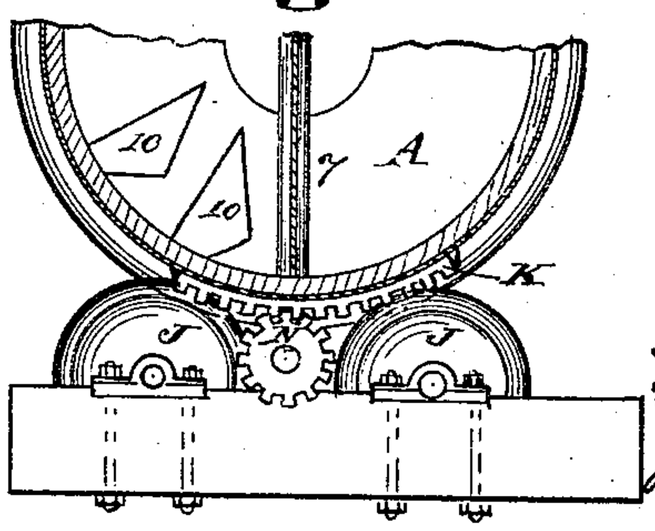


Fig. 5



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UNITED STATES PATENT OFFICE.

ROBERT TEATS, OF CENTRAL CITY, COLORADO TERRITORY, ASSIGNOR TO HIMSELF AND ABEL D. BREED, OF NEW YORK, N. Y.

IMPROVEMENT IN REVOLVING ORE-ROASTERS.

Specification forming part of Letters Patent No. **155,123**, dated September 15, 1874; application filed March 21, 1874.

To all whom it may concern:

Be it known that I, ROBERT TEATS, of Central city, county of Gilpin, Territory of Colorado, have invented a certain new and useful Cylinder-Furnace for uniformly mixing, chloridizing, roasting, and desulphurizing gold, silver, and other ores and substances, of which the following is a specification:

My invention consists, first, in the provision, in connection with the peculiarly-formed furnace and conveyer, of angle-pieces which act in conjunction with the parts named to uniformly mix the ores in the revolution of the furnace; second, in the provision and construction of a series of apertures around the throat of the furnace, governed by a ring-door for admitting and graduating a supply of air to the furnace; third, in connection with the back throat of the furnace, of a hinged neck or rim, which, by opening, will admit of the removal of the furnace without the disturbance of the brick-work.

Figure 1 is a perspective view of an apparatus embodying my improvements. Fig. 2 is a vertical section of the same. Fig. 3 is a sectional perspective view of the revolving furnace, with its conveyer and angular pieces. Fig. 4 is a perspective view of the gearing or mechanical movement for operating the revolving furnace. Fig. 5 is a section through the furnace, showing the supporting-wheels of the furnace and a portion of the driving-gear. Figs. 6 and 7 are cross-sections of the front throat of the furnace, with its air-passages and governing-rim in the open and closed positions, respectively. Fig. 8 is a cross-section of the hinged rim of the back throat, the opening of which permits the removal of the furnace, a side view of the same being shown in Fig. 9.

A is the revolving furnace, constructed of boiler-plate, substantially as shown, and lined with brick, as shown in the sections. It is made with conical ends B B′, for the purpose of dispensing with square corners in which the ore would be likely to collect and remain undisturbed. The ends of the furnace are formed with hollow throats C D. The throat C revolves within an iron front in the stationary furnace E. The furnace E is in two parts, E E′, the lower part of which incloses the ash-pit and supports the grate-bars. The part E is supported upon an angle-iron bottom, (which is made a part of it,) which simply rests on the part E′, so that it is adapted to move backward and forward to a slight degree to permit of the removal of the revolving furnace A without the disturbance of any brick-work in the apparatus. Through the throats C a number of apertures, *c*, are made for the admission of air to the furnace A, the said apertures being governed by an exterior ring, F, correspondingly perforated, as shown in the sections, Figs. 6 and 7. The ring F, by means of handle G or otherwise, can be moved around the throat so as to open or close the apertures, and thus govern the supply of air to the furnace A.

The admission of air at the throat C, between the furnace E and the revolving furnace A, provides for a greater supply of oxygen than is possible when the air is admitted only through the furnace E E′. The other throat, D, revolves within the ring H, which, as shown in Figs. 8 and 9, is made in three parts, *h h′ h″*, the part *h* being at one point the full width of the ring, half of which width is inclosed in the brick-work, as shown in Fig. 2. The parts *h′ h″* are hinged, at points *a*, to the part *h*, as shown in Fig. 8, so as to be capable of opening and closing, to admit of the removal of furnace A without disturbing the brick-work, the parts being, when closed, secured together at point *b* by any suitable fastening.

It will be seen that when it is necessary to remove the furnace A, (which cannot be moved endwise, owing to its connection with the wheels that support it,) it is simply necessary to move forward the furnace E a short distance and then open out the hinged parts *h′ h″*, when the furnace is left free for lateral movement and removal.

The exterior of the furnace A is fitted with circular rails I, which rest on and between the flanged supporting-wheels J J J J, as shown in Figs. 1 and 2, and a circular gear-wheel, K, is also secured to the periphery of the furnace A, by which it may be rotated.

In order that the furnace A may be revolved

and governed in the manner before indicated, I provide the following mechanical gear-movement:

L is the driving-shaft, operated by the motive power of the apparatus, and M the driving-shaft of the revolving furnace A, a pinion, N, being secured to this shaft, which gears into the wheel K and drives it. The two shafts L M are connected together by gear-wheels O P Q R. The large and small wheels alternate on the two shafts L M, so that each large wheel gears into a small wheel upon the opposite shaft, as shown. The wheels P R are fast upon the shaft, and the wheels O Q revolve loosely on the shaft L.

A revolving clutch, S, sliding upon a groove and feather in shaft L, is arranged by sliding (moved by lever T) to connect with and drive either of the gear-wheels O Q. When placed midway between these wheels the clutch revolves, but imparts no motion to the gear-wheels, and, consequently, the furnace A remains stationary. When the clutch S is brought in connection with the pinion Q a slow motion is given to the furnace A, and, on the contrary, when the clutch S is moved into connection with the wheel O, a high velocity is given to the furnace A. This change of motion or stoppage can be conveniently accomplished by the operator at any time during the process of roasting the ores.

U is the flue from the furnace to the chimney connecting with the dust-chambers V V′, which, with the damper W, are of the customary construction.

I prefer that the dust-chambers shall be supported by arches X, resting on the columns Y Y Y, in place of the customary framework of timber used heretofore for this purpose. This provision affords ample space for the occupancy of the driving-shafts and gearing.

The furnace A is provided with one or two doors, Z, through which it may be charged or discharged, and the furnace is charged from a hopper, 1, the mouth of which is fitted with a sliding door, 2, opened or closed by a handle, 3.

When the ore is not being weighed the weight of the hopper rests on angle-iron flanges upon the bars 4, between which it is inclosed. When, however, it is necessary to weigh the ore in the hopper, the weight is taken up by the weighted lever 5 and yoke 6, the location of the weight indicating by proper graduations the weight of the ore in the hopper, as the short end of the lever then supports the entire weight of the ore and hopper.

The dividing conveyer 7 is diametrically located in the furnace A, and is in the plane of the axis its entire length. It is composed of cast-iron inclined pipes 8 and perforated or slotted plates 9, fitting into grooves in the pipes 8. The plane of the plates 9 being in line of the axis no obstruction is offered to the free passage of the currents of heated air through the furnace and the pipes 8, in connection with the conical heads B B, and angle-pieces 10 serve to convey the ore backward and forward from end to end of the furnace, and thoroughly mix it, the angle-pieces throwing the ore from the conical ends of the furnace onto the conveyer 7 at opposite ends.

The operation is as follows: The furnace is heated with wood or coal, (light wood is preferable,) and after the furnace E and the revolving furnace A are hot the ore is introduced by stopping the revolution of the furnace and opening one of the doors Z, this door being stopped immediately under the mouth of the hopper. By means of the slide 2, which is opened after the ore is weighed, the ore is dropped into the furnace A in sufficient quantity to form a charge. After the door Z has been closed the furnace is revolved very slowly until the sulphur commences to burn, so as to raise as little dust as possible, then the speed can be increased to the fastest speed. After the sulphur is removed, salt may be thrown through the door *d*. For low grades of ores from four to five per cent. of salt is sufficient, and for rich ores some of them requiring a much larger per cent. of salt. After the salt has been thoroughly mixed, which will be in a few revolutions of the furnace, the speed of the furnace should be changed to a slow motion, and occasionally allowed to stand still for several minutes at a time until the ore is thoroughly chloridized. This can be ascertained at any time by taking a test with a long-handled spoon from the door *d* in the rear. After this a car may be run under the furnace A, and the door Z should be opened and a fast motion given to the furnace A, which will result in the discharge of the ore from the furnace in a very few minutes, and the furnace is then ready for another charge.

In a furnace having a capacity of two tons, (the cylinder A being for this capacity about twelve feet long, exclusive of the throats, and five and one-half feet in diameter outside,) the time of roasting a charge of silver ore, having very little base metals, is from three to five hours — ores containing a large proportion of zinc, lead, and other base metals, requiring as high as eight hours.

It requires but one man upon each watch to run from five to eight furnaces, he tending the furnaces, firing the same, and charging and discharging.

A man of ordinary ability can be taught to tend the same in a very few days.

It requires from three-fourths to one cord of wood for twenty-four hours for one furnace.

I claim—

1. In combination with the cylinder A and conveyer 7, located as described, the angle-pieces 10, operating in connection with the conveyer and cylinder, substantially as and for the purpose specified.

2. The furnace E E′ and cylinder A, in combination with the register F, encircling

the perforated throat C *c*, connecting the furnace and cylinder, substantially as and for the purpose specified.

3. In combination with the cylinder A and the sliding furnace E, the hinged ring H *h h' h''*, substantially as and for the purpose stated.

In testimony of which invention I hereunto set my hand.

ROBERT TEATS.

Witnesses:
FRANK MILLWARD,
H. M. HUNTER.