

No. 618,622.

Patented Jan. 31, 1899.

P. SOMERVILLE.

APPARATUS FOR EXTRACTING METALS.

(Application filed Feb. 2, 1898.)

(No Model.)

Fig. 2.

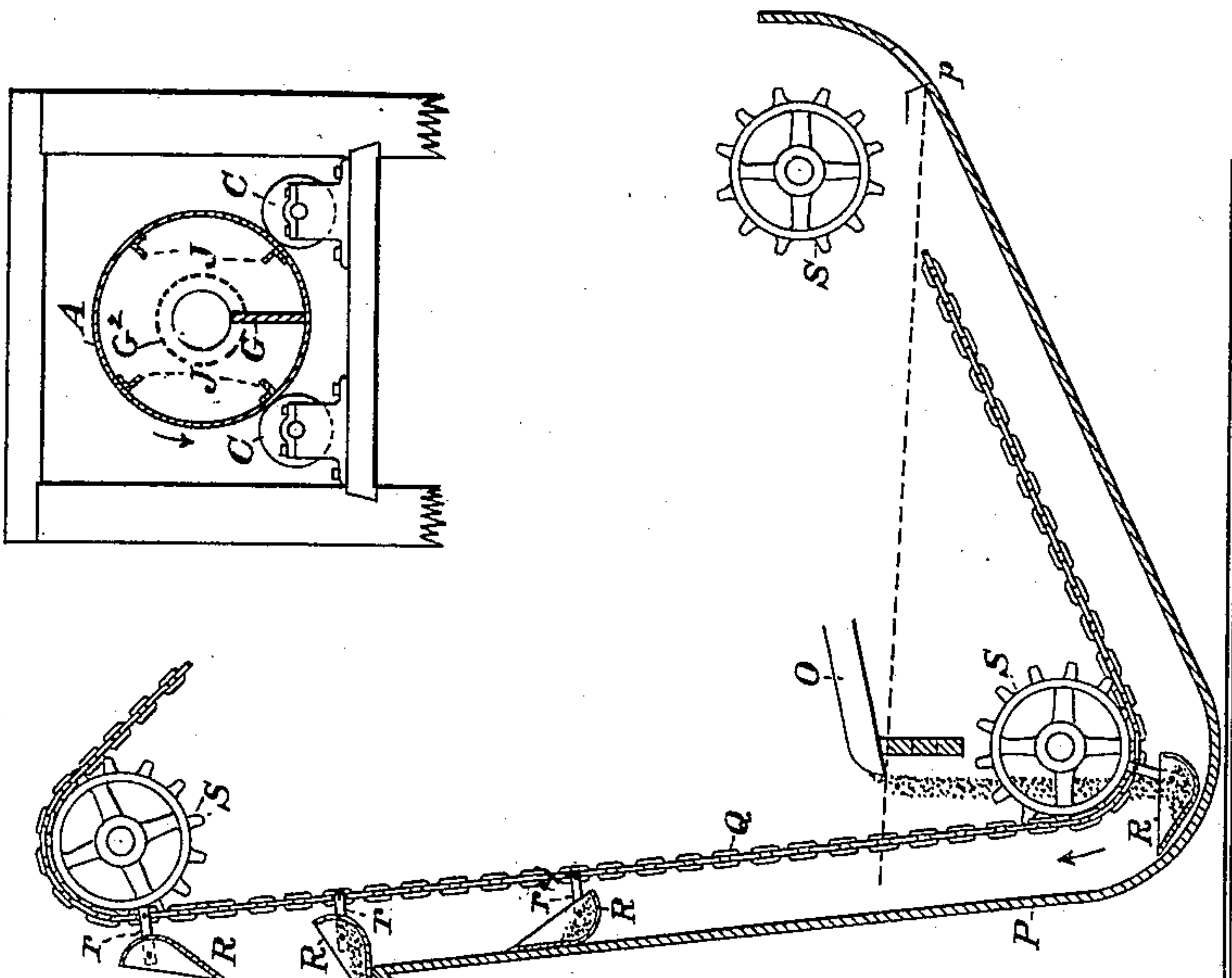
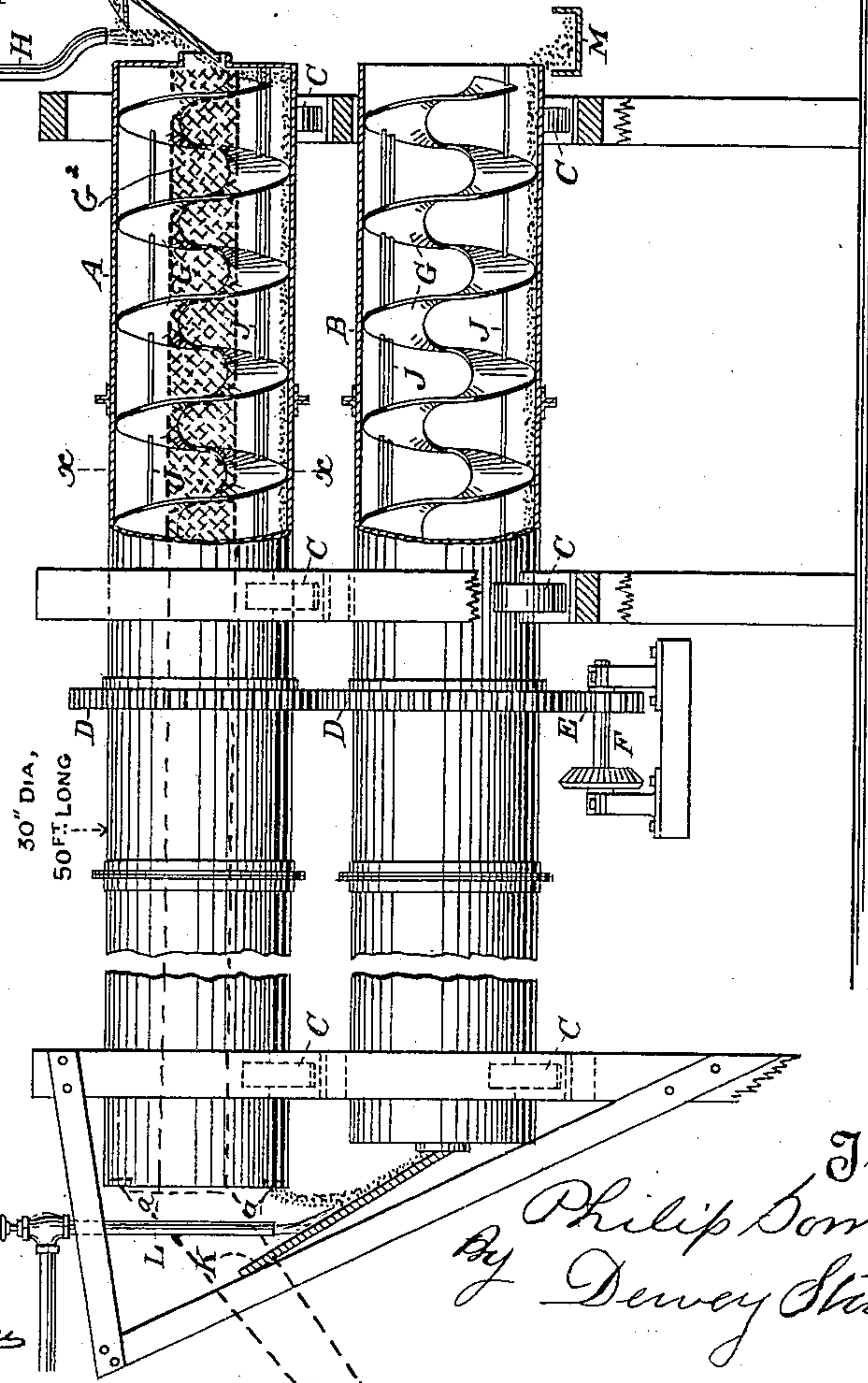


Fig. 1.



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UNITED STATES PATENT OFFICE.

PHILIP SOMERVILLE, OF BISHOP, CALIFORNIA, ASSIGNOR TO THE CALIFORNIA AGITATING AND LEACHING MACHINE COMPANY, OF SAME PLACE.

APPARATUS FOR EXTRACTING METALS.

SPECIFICATION forming part of Letters Patent No. 618,622, dated January 31, 1899.

Application filed February 2, 1898. Serial No. 668,838. (No model.)

To all whom it may concern:

Be it known that I, PHILIP SOMERVILLE, a citizen of the United States, residing at Bishop, county of Inyo, State of California, have invented an Improvement in Apparatus for Extracting Metals; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus for extracting metals from their ores and which is capable of being used for separating coarse from fine material; and my invention consists of the constructions and combinations of devices, which I shall hereinafter fully describe and claim.

Figure 1 is a side elevation of the apparatus and partial section thereof. Fig. 2 is a section on the line *xx* of Fig. 1.

The object of this invention is to separate valuable heavy substances, whether metal or other material, from worthless gangue or material with which it may be mixed.

The apparatus is capable of use without change in two or more ways—first, for the leaching of ore containing valuable precious metals, and, secondly, for the separation of free gold or other valuable heavy material from earth, sand, or gravel with which it may be mixed.

I will first describe the operation of the apparatus when employed for leaching.

A and B are two horizontal barrels or cylinders located one at a sufficient height above another so that a discharge may take place from one to another. They may be made cylindrical, as here shown, or angular or polygonal, the operation being practically the same in either form of construction. These barrels are supported upon journaled bearing-rollers C and are provided with gears D, which are engaged by a pinion E upon the power-shaft F or equivalent mechanism, through which power may be applied to slowly rotate the barrels. These barrels may be made of any desired proportions. I have found that about thirty inches in diameter and of a length from thirty to fifty feet each, having spiral blades or flanges G extending from one end to the other, will provide a sufficient surface and a sufficiently-extended

trough or sluice for the proper treatment of such solutions as I desire to employ the apparatus for.

The blades or flanges G may have any desired pitch, and they are continuous from end to end of each barrel, extending from the periphery toward the center, but leaving an open space through the center for the free admission of air, which is necessary in the treatment of cyanid solutions.

The inlet end of each of the barrels is closed by a diaphragm, with the exception of the central opening, through which the material may be delivered into the barrels.

If ore has been crushed or pulverized dry or pulp which is in a dry condition is to be treated, it may be delivered directly into the uppermost barrel by any suitable feeding mechanism which will deliver it regularly and gradually.

In conjunction with the foregoing I employ a means for delivering into the barrel with the pulp a weak solution of cyanid of potassium. In the present case I have shown a pipe H with a suitable controlling-cock I, by which the amount of the solution introduced is regulated in proportion to the amount of ore.

Within the barrel and extending longitudinally between the flanges at intervals are low ribs J, projecting radially inward from the periphery of the barrel, and these serve to lift the pulp as the barrel rotates, spilling it over the rib and dropping it down to the bottom, thus agitating the material continually as it passes through the barrel. If the barrel is of angular interior form, these ribs are less necessary than when it is cylindrical, as the angles serve to a considerable extent to produce the necessary agitation. The solution acts in its well-known manner, but by means of the spiral sluice formed through the barrel it is passed over a great distance and continually agitated during its passage until all portions of the ore have been sufficiently brought into contact with the solution. At the end of the barrel the material discharges, and by means of an inclined directing-chute K it is returned into the end of the next barrel below.

L is another supply-pipe through which a stronger cyanid solution is discharged, so as to mingle with the ore passing into the second barrel B, and the rotation of this barrel gradually returns the mass to the opposite end, where it is delivered into a chute M or a settling-tank, where the liquor may be separated from the solid material and prepared for further treatment.

When the ore is crushed wet or the pulp is in a wet condition, it is delivered through a sluice O directly into the tank P, which in the present case is shown made in an essentially triangular form, and the water is introduced into the tank with the ore discharged into it from the battery or other source, the ore settling to the bottom of the tank and the water and lighter material eventually discharging over the outer end at *p*.

Q is a chain having fixed upon it the carrying-buckets R, which are adapted to collect the ore from the bottom of the tank P and lift it up to a point where it is discharged into the uppermost barrel A. These buckets may be of any suitable description, which will allow the water to drain out of the ore, so that when it is delivered into the barrel there will not be too great a quantity of water.

In the present case I have shown the chain Q as passing around direction sprockets or pulleys S, and the buckets R are suspended from the chain by arms or links *r*, between which the buckets are pivoted and turnable.

The front ends of the buckets have an essentially flat bottom, while the rear ends are curved into an arc of a circle, as shown, the top being, as hereshown, essentially straight.

The lower angle of the tank adjacent to the barrel is curved, so that when the buckets are moved by the chain they pass through the curvature of the tank and fill themselves with the material which is being deposited therein. The buckets following the curvature of the tank P will assume the various positions as shown in the drawings, the bottom moving up against the inclined and approximately vertical side of the tank until the bucket passes above the upper edge of the tank, when the weight outside of the pivot-points will cause it to tilt automatically and discharge into the barrel, or it may be tilted by contact with a stationary lug or projection. The bucket then passes over the upper sprocket and by its weight hangs in a vertical position until it reaches the inclined bottom of the tank, when it will assume a position with its bottom resting upon the bottom of the tank, passing in this manner over the tank-bottom and becoming filled with the deposit, thence passing up the vertical side again, as previously described. In this manner the water is mostly drained out of the ore, and it is properly prepared for introduction into the barrel.

Fixed within the center of one or both of the barrels is a screen G^2 , which lies in the cen-

tral opening of the spiral and extends the entire length of the barrel. The essential purpose of this screen is to separate coarse material from the fine, so that the cyanid solution will act more evenly upon pulp of the same degree of fineness and free gold may be separated from sand or earth with which it is mixed. The inlet end of the screen is proximate to the discharge end of the chute which delivers the material to the barrel, and the said material falls upon the screen, the fine material passing through its meshes and the coarse material being held in the screen and discharged at the opposite end in any well-known manner. The part which falls upon the bottom of the barrel will there encounter a body of mercury, which is placed within the barrel and will be constantly agitated in contact with it until all the gold has been amalgamated and taken up. In this case the discharge end of the barrel has an annular rim or flange *a* extending inwardly from the periphery of sufficient height to prevent the mercury from passing out, but allowing the dirt to discharge over the upper edge of this flange.

Although I have described the apparatus as being especially used for the separation of valuable precious metals from the gangue, it may be also employed for the separation or washing of any material which is heavier than the waste which is mixed with it.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus for extracting metals, including a frame or support, a rotatable barrel mounted therein and having a spiral flange fixed to its interior and extending from one end to the other, a screen extending longitudinally through the flange, an inlet at one end of the barrel and an outlet at the opposite end thereof, and devices at said inlet end for feeding material and fluid matter to the barrel.

2. An apparatus for extracting metals consisting of parallel barrels having annular disks closing one end with central inlet-openings for the material, a framework and roller support for said barrels, means whereby the barrels are rotated in opposite directions, spiral flanges fixed to the interior of the barrels for advancing the material therethrough, devices for feeding material and fluid matter to the uppermost barrel, means for separating the coarse from the fine material and delivering them separately, and means for transferring material from the discharge end of one barrel into the inlet end of the barrel below.

In witness whereof I have hereunto set my hand.

PHILIP SOMERVILLE.

Witnesses:

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