

(No Model.)

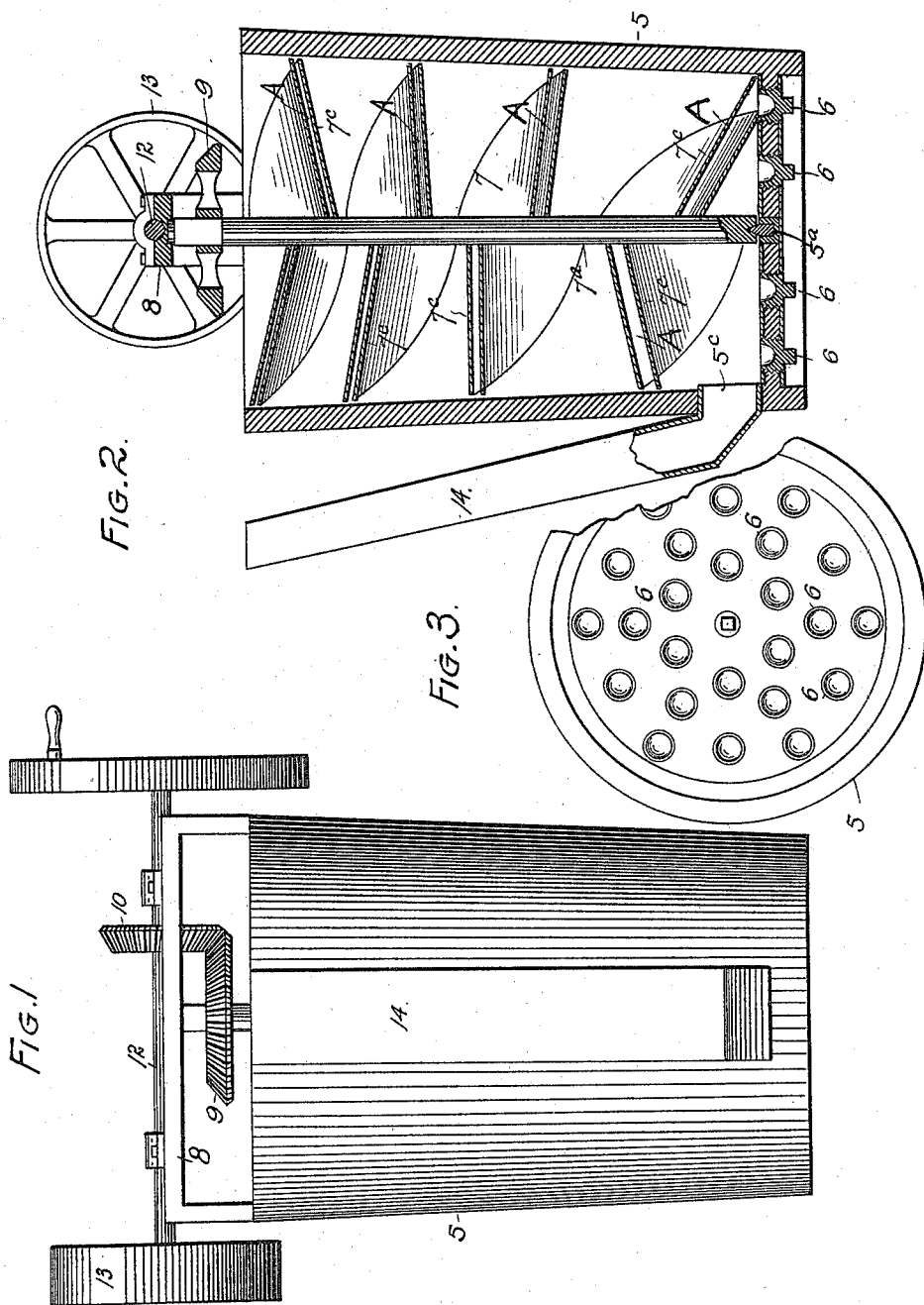
2 Sheets—Sheet 1.

C. O. MICHAELSEN.

APPARATUS FOR SEPARATING METALS FROM THEIR ORES.

No. 580,346.

Patented Apr. 6, 1897.



Witnesses
G. J. [Signature]
Lulu B. O'Brien

Inventor
C. O. Michaelsen.
By *his* Attorney *A. J. [Signature]*

(No Model.)

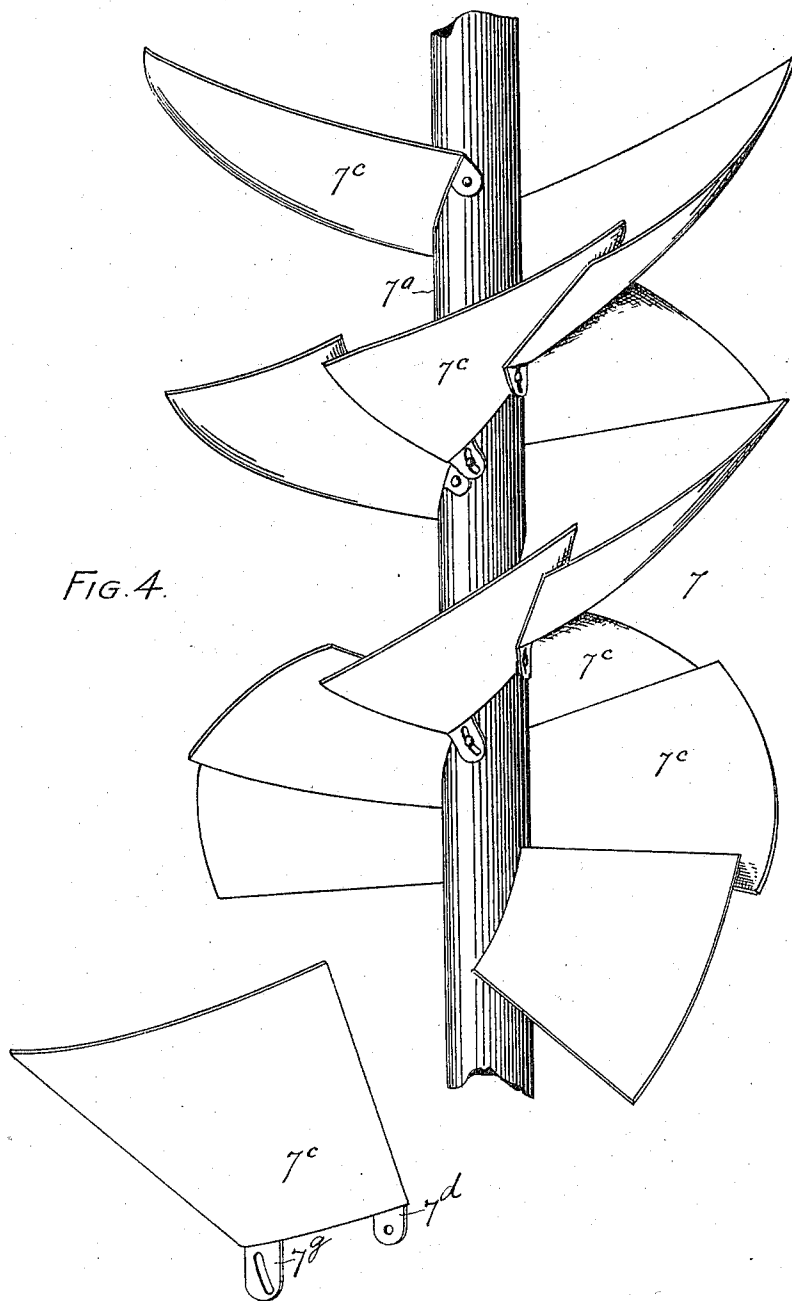
2 Sheets—Sheet 2.

C. O. MICHAELSEN.

APPARATUS FOR SEPARATING METALS FROM THEIR ORES.

No. 580,346.

Patented Apr. 6, 1897.



Witnesses
G. J. Allard
Lulu B. O'Brien

FIG. 5.

Inventor
C. O. Michaelsen.
By his Attorney *[Signature]*

UNITED STATES PATENT OFFICE.

CHARLES O. MICHAELSEN, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF
TO DAVID F. BOWEN, OF SAME PLACE.

APPARATUS FOR SEPARATING METALS FROM THEIR ORES.

SPECIFICATION forming part of Letters Patent No. 580,346, dated April 6, 1897.

Application filed August 24, 1896. Serial No. 603,815. (No model.)

To all whom it may concern:

Be it known that I, CHARLES O. MICHAELSEN, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Apparatus for Separating Metals from their Ores; and I do 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in means for the separation of metals from their ores or the gangue with which they are found mingled in placer material; and it consists of the features hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a side elevation of the apparatus. Fig. 2 is a vertical longitudinal section taken through the same. Fig. 3 is a plan view of the bottom of the tank or barrel. Fig. 4 is a fragmentary detail view of the rotatable screw or conveyer. Fig. 5 is a detail view in perspective showing one of the blades or wings which are spirally arranged on the shaft to form the screw or conveyer.

Similar reference-characters indicating corresponding parts in the views, let the numeral 5 designate an upright tank or barrel having threaded apertures formed in its bottom. Into these apertures are screwed cups, small receptacles, or cells 6, whose lower extremities are formed angular in shape, whereby they are adapted to receive a wrench which may be employed for inserting or removing the cells, which are readily detachable. These cells contain mercury, and their function is to collect and save the mineral particles as they settle to the bottom of the barrel. In this barrel is located a screw or conveyer 7 of peculiar construction. This screw is composed of a shaft 7^a and blades 7^b, attached to the shaft and arranged spirally thereon. Any desired number of threads

may be employed, whereby the said threads or spirally-arranged blades may be placed as close together as desired without interfering with their pitch or inclination. In other words, the pitch of the blades or threads may be the same whether these threads are close together or a considerable distance made. The blades of each thread may be adjustably attached to the shaft 7^a by means of screws or other suitable fastening devices. The lower extremity of each blade is located below the upper extremity of the blade next below, whereby a space is left between the blades or wings to allow the mineral particles to settle to the bottom of the tank or barrel. The adjacent extremities of any two blades or wings slightly overlap each other. As shown in the drawings, each blade or wing is provided with projections 7^d and 7^e, located at the top and bottom of the blade, respectively. The upper projection 7^d is apertured to receive a screw which passes therethrough into the shaft. The lower projection is provided with a curved slot, in which is inserted a screw to permit adjustment, which may be effected by loosening both screws and turning or moving the blade on the upper screw as a pivot. This movement of the blade changes its inclination. This feature also allows the regulation of the space between the blades to correspond with the condition or character of the material or ore under treatment.

The lower extremity of the shaft 7^a is recessed to receive a pivot 5^a, located in the center of the barrel's bottom. The upper extremity of the shaft is journaled in a frame 8, attached to the top of the barrel. This upper extremity of the shaft is provided with a horizontal beveled gear 9, which meshes with a gear 10, mounted on a horizontal shaft 12, also journaled in the frame 8. To one extremity of the last-named shaft is attached a pulley 13, which may be connected with any suitable motor for operating the screw. As power is applied to the shaft 12 the screw 7 is rotated by virtue of the construction heretofore described.

The barrel 5 is provided with an opening 5^b, formed in its lower portion, from which leads a feed-chute 14, into which the material to be treated is discharged in the form of pulp of any suitable consistency. As the screw is

rotated the material is taken from the bottom of the tank and carried upward. During this operation the pulp is thoroughly agitated and the mineral particles separated therefrom. These mineral particles under the influence of the screw pass downward between the openings or spaces left between the blades of the screw and finally settle in the bottom of the barrel and unite with the mercury to form amalgam. In cleaning up, the cells 6 may be removed and emptied of their contents, after which they are reinserted, when the machine is again ready for operation.

The lowermost blades of each spiral thread have the greatest pitch or are most inclined, while the inclination of the other blades gradually diminishes from the bottom, the uppermost blades or wings being only slightly inclined or nearly horizontal. The space between the blades also diminishes in width from the bottom toward the top of the shaft, said spaces being considerable in width at the bottom of the screw and very narrow at the top, where the blades almost touch each other. By virtue of this construction the pulp is greatly agitated at the bottom of the barrel or tank, whereby the metal particles are detached or freed from the foreign substances or gangue to which they normally adhere. Hence the greater portion of the mineral is separated from the gangue in the lower part of the barrel and settles in the mercury-cells. The agitation of the pulp, however, diminishes in degree from the bottom toward the top of the tank, where there is very little movement, since the blades have little inclination or pitch. Hence the necessary agitation is effected chiefly in the lower part of the tank, while the pulp above or at the top is comparatively quiet, allowing the mineral to settle toward the bottom of the tank, where it is finally caught in the mercury-cells, as heretofore stated.

In describing the operation of the machine it is assumed that the feeding of the material to be treated is continuous or constant, and since the top of the tank is open there is a continuous discharge or overflow of gangue from the said open top. This feature gives the apparatus great capacity as compared with closed separating-tanks, which require that any charge of material be removed before another charge can be treated.

Having thus described my invention, what I claim is—

1. The combination with an upright tank or barrel, of a rotatable screw or conveyer whose thread is composed of distinct wings or blades, whose adjacent extremities overlap each other, the lower extremity of the upper blade

projecting below the upper extremity of the lower blade, whereby the material passing downward from one blade falls beneath the adjacent lower blade.

2. The combination with an upright tank or barrel, of a rotatable screw or conveyer located therein and comprising a shaft and blades or wings attached thereto, whose adjacent extremities are separated and overlap each other, each blade being pivoted to the shaft at its upper extremity and having a slotted projection at its lower extremity through which is passed a set-screw for purposes of adjustment, substantially as described.

3. In an apparatus of the class described, the combination with an upright tank or barrel, of a rotatable conveyer located therein and comprising a series of inclined, separated, overlapping blades or wings extending from the shaft to the wall of the tank, each plate being provided with two projections located at its top and bottom respectively, the projection of the upper extremity being apertured to receive a screw which passes into the shaft, while the lower extremity is provided with a curved slot through which is passed a set-screw for purposes of adjustment.

4. In an apparatus of the class described, the combination with an upright tank or barrel open at the top and having cells in its bottom, said tank being also provided with an opening in its lower portion and a feed-chute connected with said opening, of a rotatable screw or conveyer located in the said tank and comprising a shaft and overlapping blades or wings spirally arranged to form the thread of the conveyer, the wings or blades having openings or spaces between them to allow the mineral to settle, the lower extremity of the upper blade projecting below the upper extremity of the lower blade substantially as described.

5. In an apparatus of the class described, the combination with an upright tank or barrel open at the top, of a rotatable screw located therein, the thread of said screw being composed of distinct sections, the upper and lower extremities of the adjacent sections being separated, the lower extremity of the one section projecting below the upper extremity of the other section, the upper extremity of each section being pivoted on the shaft, while the lower extremity is provided with a slotted projection through which is passed a set-screw for purposes of adjustment.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES O. MICHAELSEN.

Witnesses:

G. J. ROLLANDET,
D. F. BOWEN.