J. T. HOGAN.

AMALGAMATOR AND SEPARATOR.

APPLICATION FILED NOV. 10, 1909.

987,677.

Patented Mar. 21, 1911.

Fig. 2.

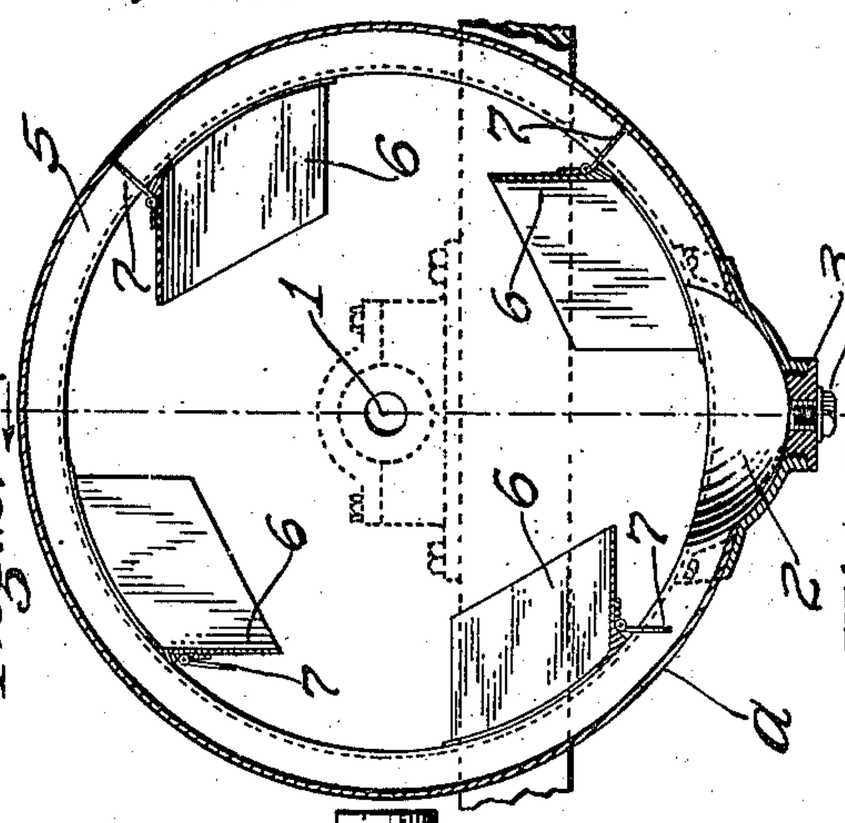


Fig. 5.

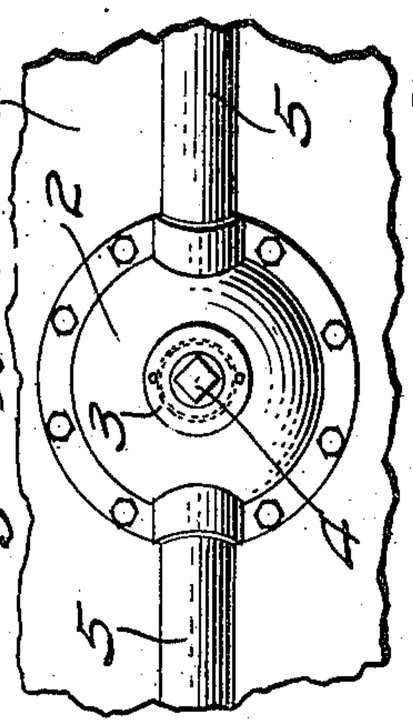


Fig. 6.

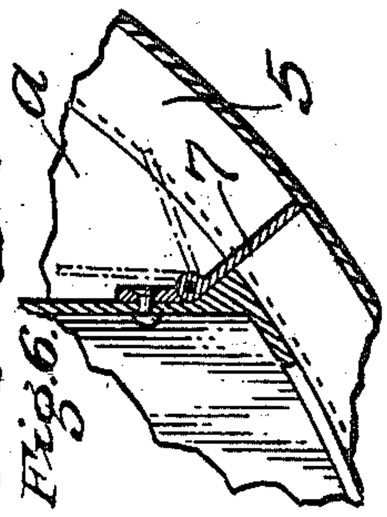


Fig. 4.

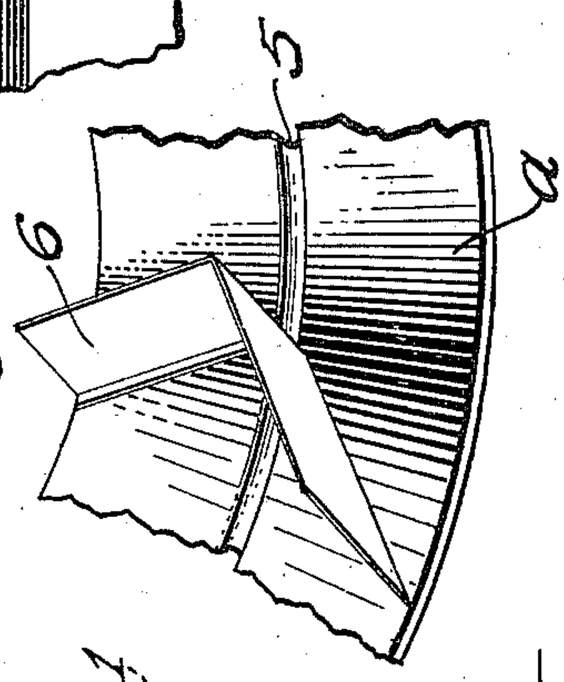


Fig. 1.

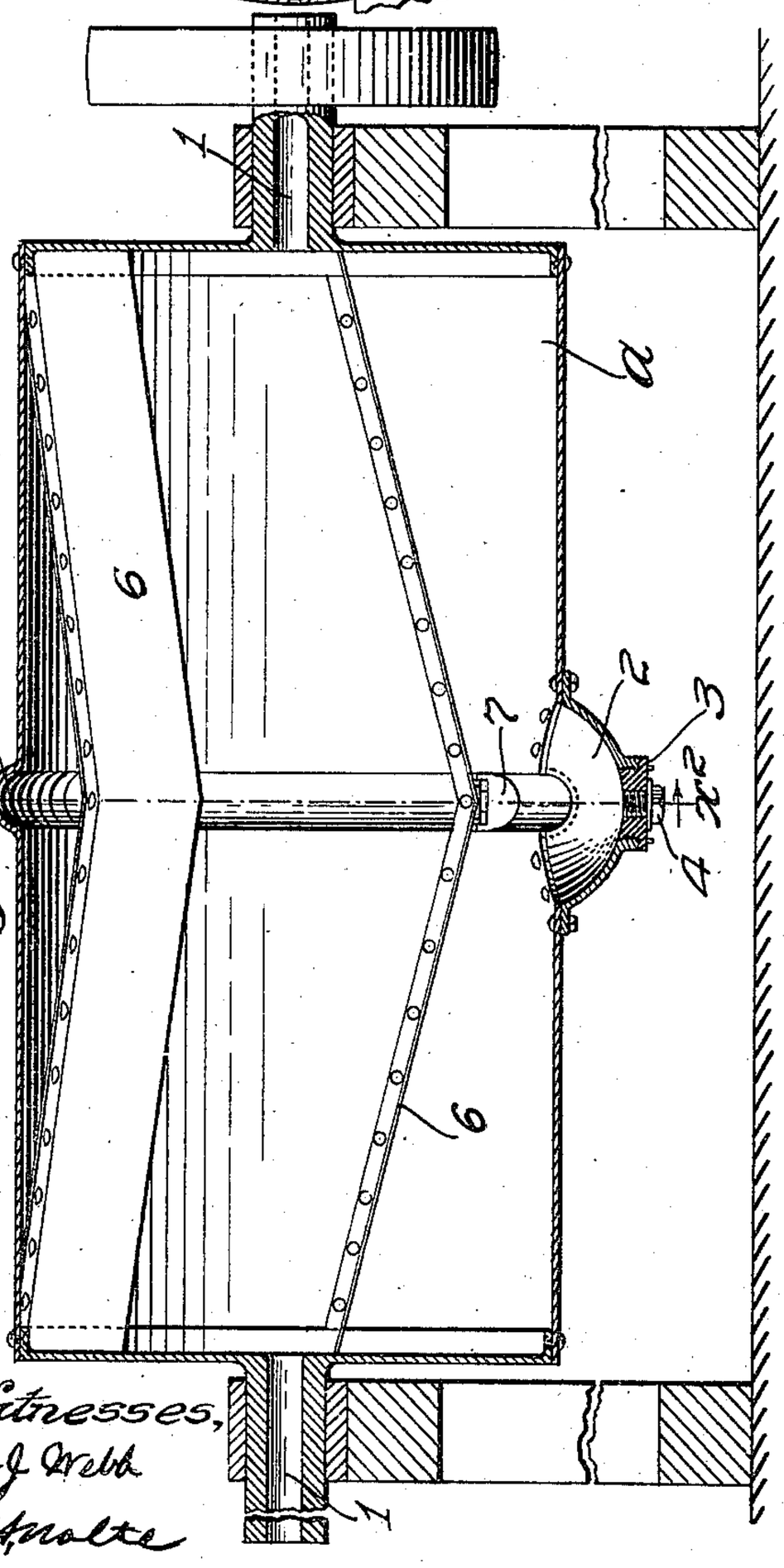
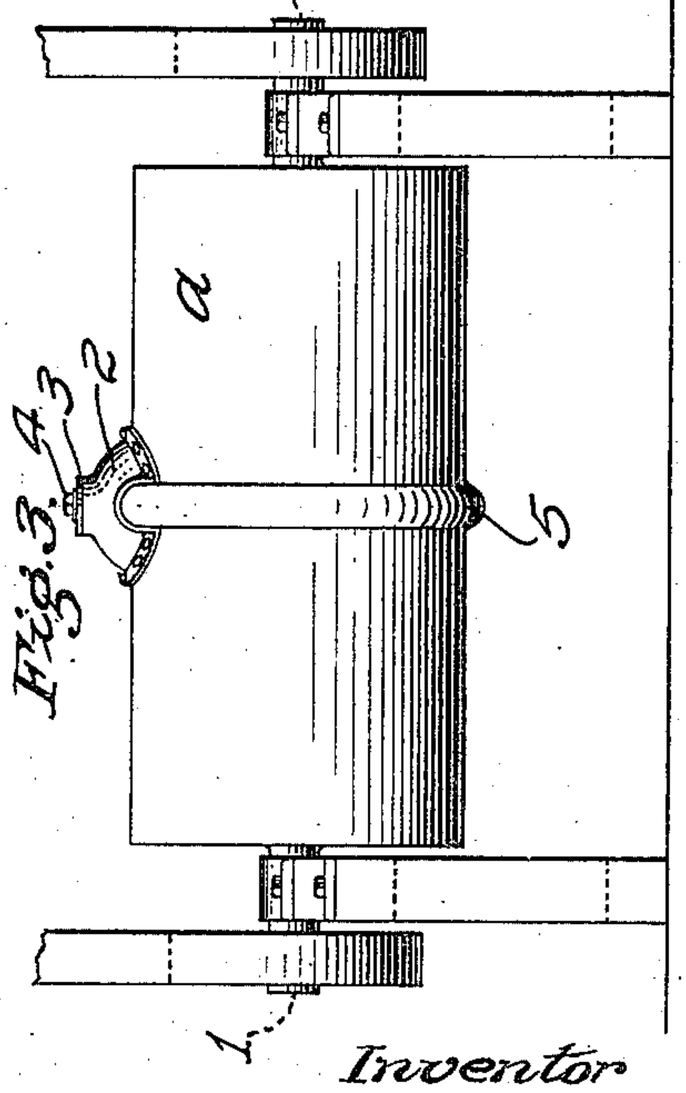


Fig. 3.



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JOHN T. HOGAN, OF DENVER, COLORADO.

AMALGAMATOR AND SEPARATOR.

987,677. Specification of Letters Patent. Patented Mar. 21, 1911.

Application filed November 10, 1909. Serial No. 527,344.

To all whom it may concern:

Be it known that I, JOHN T. HOGAN, a citizen of the United States, a resident of the city and county of Denver, State of Colorado, have invented a new and useful amalgamator and separator by which valuable metals, such as gold and silver, can be extracted from sands or pulverized ores or other materials by means of mercury and the resulting amalgam of mercury and valuable metals separated from the sands and material from which the value has been so extracted.

The objects of the invention are to provide better means of amalgamating gold, silver and other metals with mercury than are afforded by the plain barrel now in use and also to dispense with the machine known as a settler, which is used to separate the amalgam from the residue, generally called tailings. By this invention the amalgamation and the separation are performed in and by the same machine without making any additions, subtractions or changes in its parts, the barrel being revolved in the proper direction until the amalgamation is complete, when the direction of the motion is reversed and the machine then acts as a separator. I attain these results by the mechanism illustrated in the accompanying drawing, in which—

Figure 1 is a central longitudinal section of the machine; Fig. 2, a cross section taken on the line x^2—x^2 of Fig. 1; Fig. 3, a side view of the machine; Fig. 4, a detailed view of an internal shelf; Fig. 5, an exterior view of the basin in which the amalgam is collected; Fig. 6 is a detailed view of one of the internal valves.

Similar letters and similar figures refer to similar parts throughout the several views.

Fig. 3 shows the barrel in the preferred form mounted on its bearings which are hollow trunnions. The letter *a* indicates the shell; the numerals 1 and 1, hollow trunnions on which the barrel revolves; 2, the exterior of an internally concave basin which covers an opening in the shell of the barrel; 3, a central part of the basin which can be removed so that through the aperture the barrel can be charged and discharged; 4, a removable plug in the center of the basin through which aperture the amalgam can be drawn; 5, the exterior of an internal annular channel which intersects the basin and collects the amalgam in the basin.

In Fig. 5 the internally concave basin is indicated by 2; the part removable for charging or discharging being indicated by 3; the plug which is removable for the purpose of withdrawing the amalgam being indicated by 4; the intersection of the annular channel and the basin is denoted by 5 and 5. The basin is in effect an enlargement of the annular channel.

In Fig. 1 the shell is indicated by *a*, the hollow trunnions by 1 and 1, the internally concave basin by 2, the removable part of the basin through which the barrel is discharged when in the position here shown is indicated by 3, the plug removable for drawing off the amalgam when the barrel is in the position here shown being indicated by 4. The annular channel is indicated by 5, two triclinic shelves which are attached to the inside of the barrel in the direction of its length, being indicated by 6 and 6. An automatic valve, one of which is applied to each shelf at its intersection with the annular channel, is indicated by 7.

In Fig. 2, *a* indicates the shell, 1 the relative position of a bearing and a hollow trunnion, 2 the internally concave basin, 3 the part of the basin removable for charging and discharging, 4 the plug that is removable for the purpose of withdrawing the amalgam collected in the basin, 5 indicates the annular channel; 6, 6, 6, and 6 triclinic shelves attached to the inside of the barrel in the direction of its length, 7, 7, 7, and 7 automatic valves at the intersection of each shelf and the annular channel.

In Fig. 4, *a* indicates a part of the shell to which a shelf is attached, 5 the annular channel, and 6 the triclinic shelf. The shelf is inclined each way from the middle of the barrel in the direction of its length and is also inclined in the direction of its width, so that when the barrel is revolved in a certain direction it lifts and sends the pulp to the ends of the barrel, the reverse motion bringing the pulp to the middle of the barrel so that the amalgam can flow into the annular channel.

In Fig. 6 the annular channel, indicated by 5, is shown closed by the valve 7, which closes automatically when the pulp is lifted

and sent to the ends of the barrel and opens automatically when the motion is reversed, and allows the amalgam to flow in the annular channel until the separation is complete.

In the operation of the preferred form of the barrel the pulverized ore, mercury and water can be introduced through the large opening in the basin, which is then closed and the barrel revolved in the direction that will cause the shelves to lift the pulp and send it to the ends of the barrel, the motion also causing the valves to close and prevent a flow through the annular channel. The pulp thus sent to the ends of the barrel returns by gravity to its level at the middle and the operations recur until amalgamation is complete, gases, liquids, solids, or an electric current if desired, being introduced during the process through the hollow trunnions upon which the barrel revolves.

To separate the amalgam the charge is diluted if necessary, the motion of the barrel is reversed and the inclines of the shelves which during amalgamation caused a complete mixing by circulating the pulp to the ends of the barrel, now send everything to the middle of the barrel where the ingredients can separate from each other by gravity, the slight disturbance caused by the shelves while the barrel is being revolved in the reverse direction being beneficial in keeping the pulp from packing together during the process of separation. As about nine-tenths of the weight of a charge is usually water and silica with a specific gravity of less than 3, none of the ingredients having more than half the specific gravity of the amalgam, which is never less than 13, the amalgam, which is a liquid, finds its way into the annular channel, the valves being automatically open as a result of the reverse motion, and remains continually in the channel, at the lower part of the barrel, until by the continued revolving of the barrel the separation of the amalgam is complete, when the barrel is stopped with the basin underneath, the amalgam then flowing from the channel into the basin, whence it can be drawn into a bucket by removing the plug in the center of the basin.

The tailings can be removed from the barrel through the charging hole in the basin by revolving the barrel and at the same time introducing water through the trunnions on which the barrel revolves.

With barrels of large capacity, on account of the great weight of the machine, pulverized ore, water, mercury and chemicals, it is desirable to have a pulley and driving belt at each end, reversible motive power being employed. Cogs attached to the periphery of the barrel or any desirable connection with reversible motive power can be used. With small machines suitable for placer miners and prospectors when removing gold from black sand, a crank for manual power can be provided.

The opening covered by the basin can, when the basin is removed, be used as a manhole for entrance in making repairs to the valves or the shelves.

The drawing shows the preferred form of the barrel and the component parts claimed by these Letters Patent, but I do not limit myself to the form or shape of the barrel or its parts as shown therein.

I am aware that prior to my invention amalgamating barrels have been made with internal longitudinal shelves and hollow trunnions. I, therefore, do not claim such combinations broadly, but

I claim:

1. The combination, in an amalgamator and separator, of a rotary axially horizontal barrel having means for reversible motion, provided with an internal circumferential channel and valves to stop a flow through the channel when the barrel is revolved in a certain direction and allow the flow to be continuous when the motion is reversed, with hollow trunnions at the ends of the barrel, substantially as set forth.

2. The combination, in an amalgamator and separator, of a rotary axially horizontal barrel provided with an internal circumferential channel and having means for reversing the motion, with a valve or valves which stop the flow through the channel when the barrel is revolved in a certain direction and allow the flow to be continuous when the motion is reversed, substantially as set forth.

3. The combination, in an amalgamator and separator, of a rotary axially horizontal barrel provided with an internal circumferential channel, with one or more internal longitudinal shelves adjacent to the shell of the barrel, the shelves being shaped and disposed so as to remove material from the location of the channel when the barrel is revolved in a certain direction and to deliver such material to the channel when the motion is reversed, substantially as set forth.

4. The combination, in an amalgamator and separator, of a rotary axially horizontal barrel having internally one or more longitudinal shelves adjacent to the shell and a circumferential channel, with valves at the intersections of the shelves and channel, substantially as set forth.

5. The combination, in an amalgamator and separator, of a rotary axially horizontal barrel having internally a circumferential channel, the channel intersecting an internally concave basin covering an aperture in the shell of the barrel, in the center of the basin a removable plug, with valves which prevent a flow through the channel

when the barrel is revolved in a certain direction and allow the flow to be continuous when the motion is reversed, substantially as set forth.

6. The combination, in an amalgamator and separator, of a rotary axially horizontal barrel, having internally a circumferential channel, the channel intersecting an internally concave basin covering an aperture in the shell of the barrel, in the center of the basin a removable plug, with one or more internal longitudinal shelves adjacent to the shell of the barrel, the shelves being shaped and disposed so as to remove material from the location of the channel when the barrel is revolved in a certain direction and to deliver such material to the channel when the motion is reversed, substantially as set forth.

JOHN T. HOGAN.

In presence of—
M. J. WEBB,
L. H. NOLTE.