R. T. CARTER.

CONCENTRATOR AND AMALGAMATOR.

APPLICATION FILED OCT. 27, 1910.

1,006,433. **Patented Oct. 17, 1911.**

2 SHEETS—SHEET 1.

Fig. 1.

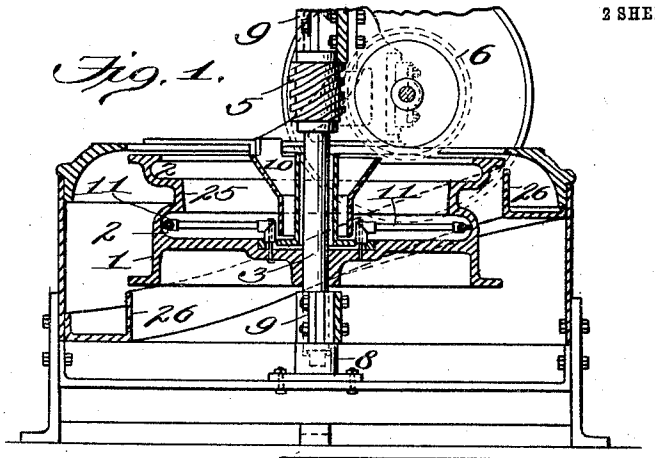


Fig. 2.

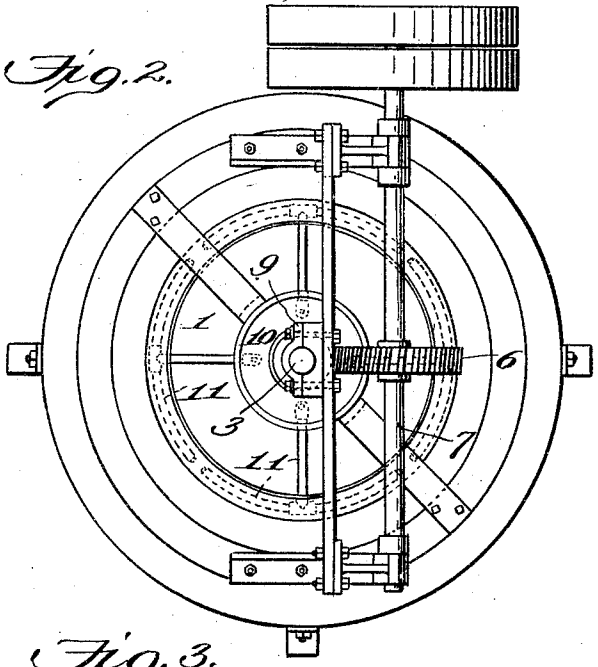
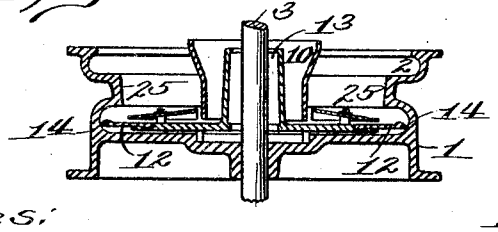


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

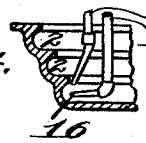


Fig. 5

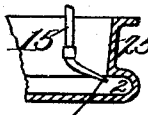


Fig. 7.

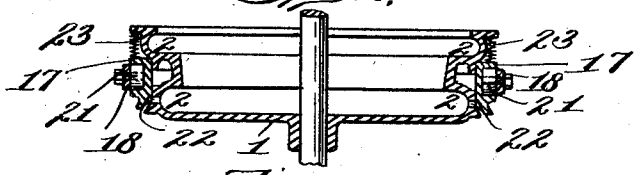


Fig. 6.

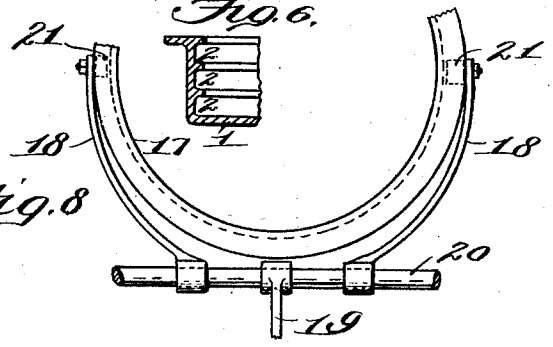


Fig. 8

Fig. 9.

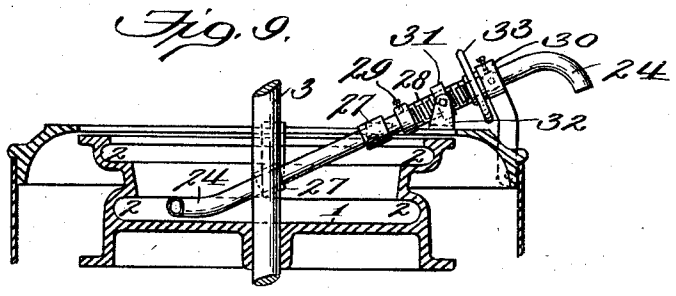
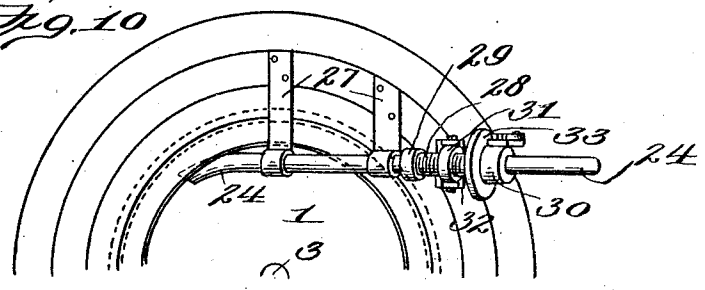


Fig. 10



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UNITED STATES PATENT OFFICE.

RICHARD TRUSTE CARTER, OF CARLTON, VICTORIA, AUSTRALIA.

CONCENTRATOR AND AMALGAMATOR.

1,006,433. Specification of Letters Patent. Patented Oct. 17, 1911.

Application filed October 27, 1910. Serial No. 589,360.

To all whom it may concern:

Be it known that I, RICHARD TRUSTE CARTER, a subject of the King of Great Britain, residing at No. 110 Victoria street, Carlton, in the State of Victoria and Commonwealth of Australia, have invented an Improved Concentrator and Amalgamator, of which the following is a specification.

This invention relates to improvements in ore concentrators and amalgamators of that type which embodies a vessel revoluble at a high rate of speed and providing for the centrifugal separation and gradation of the metal bearing particles.

The object of the invention is to improve the efficiency of the operation by providing novel means for preventing the packing or agglomeration of the separated material and by providing further novel means for securing the ready discharge of said material.

This improved concentrator and amalgamator consists essentially of a cylindrical bowl-shaped vessel having a circumferential pocket or pockets extending outwardly from its inner periphery. The said vessel is designed to be revolved at a very high rate of speed (not less than 1000 feet per minute) with the result that the material to be treated, which is fed thereto with water, and falls by gravity to the bottom of the bowl, is by the centrifugal action imparted to the cylindrical bowl-shaped vessel thrown outward into the said pocket, or into the lowermost pocket if there be more than one. Means are provided for supplying water direct to the material in said pocket so as to keep it in agitation and prevent packing and at the same time free it from any sand or light material which may be associated with it. This water may be supplied under pressure through pipes to the material in said pocket, or it may be fed through a vertical pipe in the center of the machine and delivered under a false bottom, which extends into said pocket, and is provided with holes in its outer periphery through which the water is forced to the material in the pocket by the centrifugal action imparted to the cylindrical bowl-shaped vessel. The sand and light material freed from the heavy particles in the pocket, together with the water, are carried up the sides of the bowl, in their passage passing over the surface of an amalgamated copper plate affixed to the sides of the bowl whereby fine gold which may have escaped from the pocket is caught, the waste material and water flowing over the top of the bowl. If the cylindrical bowl-shaped vessel is constructed with more than one pocket the heavier portion of the lighter particles of the material after passing over the amalgamated copper plate is thrown into the second pocket and retained therein, and if there be still any remaining it is caught by the next pocket. Mercury is placed in the pocket prior to commencing operations and if there be more than one pocket each may be supplied with mercury if thought necessary or advisable. Means are also provided for cleaning out the pocket, or if there be more than one, the lowermost pocket, either continuously or at intervals as may be desired. The material contained in the second or third pocket if the machine is constructed with these, is so small that it can be cleaned out by hand when work ceases for the day.

This invention will now be fully described aided by a reference to the accompanying sheets of drawings, in which:—

Figure 1 is a central vertical section of a concentrator and amalgamator constructed according to this invention, and having two pockets, which I have found in practice to be the most satisfactory. Fig. 2 is a plan of same. Fig. 3 is a vertical section of the cylindrical bowl-shaped vessel illustrated in Fig. 1, showing a modified arrangement for supplying water to the lowermost pocket for agitating the material therein. Figs. 4, 5, and 6 are detail sectional views showing modified arrangements of pockets. Fig. 7 is a sectional view of the cylindrical bowl-shaped vessel illustrated in Figs. 1 and 3, showing means of discharging at intervals the material from the lowermost pocket. Fig. 8 is a detail plan view of portion of the discharge regulating plate shown in Fig. 7, together with the levers for operating same. Fig. 9 is a vertical section of the cylindrical bowl-shaped vessel illustrated in Figs. 1 and 3 showing means for continuously discharging the material from the lowermost pocket. Fig. 10 is a part plan view of same.

Referring to Figs. 1 and 2 of the drawings 1 is a cylindrical bowl-shaped vessel having two circumferential pockets 2 extending outwardly from its inner periphery. Said pockets are arranged parallel and one above the other and are of equal or varying dimensions. Said vessel 1 is fitted to a

central vertical shaft 3, the upper end of which is furnished with a worm 5, which gears with and is operated by a worm wheel 6 secured to transverse shaft 7 supported in bearings secured to the machine frame. The vertical shaft 3 is supported at its bottom end by a ball-bearing foot step 8 secured to the framework. Said shaft is further supported by the bearings 9. The cylindrical bowl-shaped vessel 1 is, as previously stated, designed to revolve at a very high speed, not less than 1000 feet per minute.

10 is a stationary funnel-shaped feed hopper supported at the center of the bowl-shaped vessel 1 and extending downward to near the bottom thereof. The pocket 2 or the lowermost of the pockets, if there be more than one, is in the plane of the bottom of the vessel whereby the material to be treated, as it passes from the lower end of the feed hopper, flows immediately and without interruption to said pocket.

11 are water pipes arranged in or near the bottom of the bowl-shaped vessel 1 for delivering water under pressure from an outside source to the lowermost pocket 2. These pipes 11 radiate from about the center of the bottom of the bowl, and the water delivered by them is for the purpose of agitating the material in said pockets and so preventing the same becoming a solid mass in the pockets, and at the same time freeing the same from any sand or light material mixed with it. In place of said pipes 11 for delivering the water to the pocket, the receptacle 1 may be furnished with a false bottom 12 as shown in Fig. 3, and the water supplied from any convenient source to a central pipe or tube 13. In this case the water passes under the false bottom and is delivered by the centrifugal action imparted to the bowl-shaped vessel 1 to the lowermost pocket 2 through a series of holes 14 formed in said false bottom.

If preferred the water may be delivered to the pocket 2 or to the lowermost pocket if there be more than one, by means of one or more pipes 15, as shown in Figs. 4 and 5, each pipe being furnished with a nozzle 16 which can be placed in any desired position in order to direct the water to the pocket at the most effective angle for agitating the material.

One of the means devised for discharging the material from the lowermost pocket is illustrated in Figs. 7 and 8 and consists of a series of holes 22 in the side of the pocket. These holes are kept normally closed by a flanged metal band 17, this band being retained in position by springs 23. Said band is capable of being raised to uncover the holes 22 by means of the arms 18 and lever 19 secured to the shaft 20, a suitable friction roller 21 being fitted to the end of each arm 18 and designed to take under the flange of the band 17. On said band being raised the material in the lowermost pocket 2 can be discharged through said holes 22.

A means of continuously discharging the material from the lowermost pocket 2 is illustrated in Figs. 9 and 10 and consists of a pipe 24 the intake of which is at the bottom of the circular bowl or receptacle 1 and extends a short distance into the lowermost pocket 2. This pipe is supported by two brackets 27 attached to the framework of the machine. The pipe is provided with a loose sleeve 28 screw-threaded on the outside. The sleeve is situated between two collars 29 and 30 secured to the pipe 24. The sleeve passes through a stationary nut 31 carried by a bracket 32 attached to the machine frame. 33 is a hand wheel secured to the sleeve 28 by means of which said sleeve is operated for the purpose of adjusting the position of the intake of the pipe 24 in the lowermost pocket 2. By the centrifugal force imparted to the bowl-shaped vessel 1 the gold or other precious metals are forced through the pipe 24 and delivered into any suitable trough or the like. The centrifugal action given to the bowl-shaped vessel 1 and the very high speed at which it travels causes the water and waste material to pass up the inner wall of said bowl, and to catch any fine gold which may escape from the lowermost pocket 2, the said inner wall being fitted with an amalgamated copper plate 25 (see Figs. 1, 3, 5 and 7).

A suitable trough or gutter 26 is arranged around the upper part of the bowl or receptacle as shown to receive the overflow waste materials and water.

The mode of operation is as follows:— Mercury is first placed in the pockets 2 and motion given to the bowl-shaped vessel 1. The material to be treated is then fed in conjunction with water to the feed hopper 10 and falls by gravity to the bottom of the bowl-shaped vessel 1 and by the centrifugal action imparted thereto is forced or thrown into the lowermost pocket 2 and the heavy particles, which are retained therein, are kept in agitation by the water forced into said pocket thus freeing therefrom any sand or light material. This floats up the wall of water at the side of the vessel and overflows from the top into the trough or gutter 26, any fine gold being caught by the amalgamated copper plate 25. Any heavy particles which may escape from the bottom pocket will be caught by the next or succeeding pocket, when there is more than one pocket.

If the machine is required to treat concentrates of zinc, tin, antimony, lead or copper, I do not put mercury in the pockets 2, and in that case the machine is used as a concentrator only.

What I claim as my invention, and desire to secure by Letters Patent, is:—

1. A machine of the type set forth, comprising a cylindrical bowl-shaped ore-receiving vessel revoluble at a high rate of speed and having a peripheral pocket provided with a normally closed outer wall and opening into the inner face of said vessel and into which material is thrown by centrifugal force, the pocket being in the plane of the bottom of the vessel, a material feeding hopper arranged centrally of the vessel, a false bottom extending under the hopper and into the pocket beyond the overflow edge thereof, the material to be treated passing over the surface of the false bottom into the pocket and the false bottom being provided with openings adjacent the pocket and means to deliver water to the space under the false bottom.

2. A machine of the type set forth, comprising a cylindrical bowl-shaped ore-receiving vessel revoluble at a high rate of speed and having a peripheral pocket provided with a normally closed outer wall and opening into the inner face of said vessel and into which material is thrown by centrifugal force, a central feed hopper, the pocket being in the plane of the bottom of the vessel whereby the material to be treated, as it passes from the lower end of the feed hopper, flows immediately and without interruption to said pocket, and means extending substantially into said pocket for supplying water in the form of sprays or jets which are discharged immediately into the pocket.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

RICHARD TRUSTE CARTER.

Witnesses:

WALTER S. BAYSTON,

FRANK BAYSTON.