

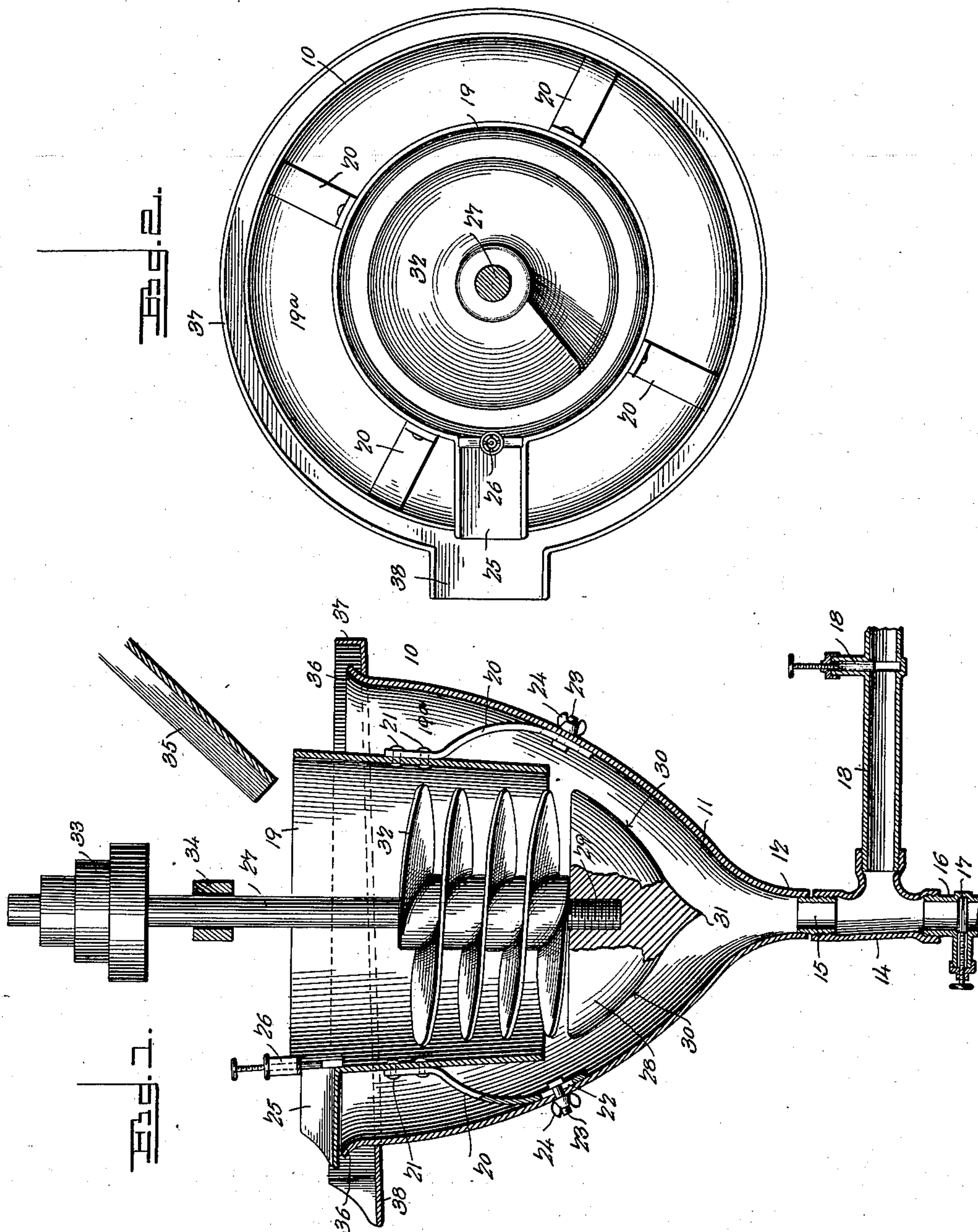
No. 655,125.

Patented July 31, 1900.

J. B. STALCUP.  
CORUNDUM SEPARATOR.

(Application filed July 24, 1899.)

(No Model.)



Witnesses

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# UNITED STATES PATENT OFFICE.

JESSE B. STALCUP, OF WAYNESVILLE, NORTH CAROLINA.

## CORUNDUM-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 655,125, dated July 31, 1900.

Application filed July 24, 1899. Serial No. 724,967. (No model.)

*To all whom it may concern:*

Be it known that I, JESSE B. STALCUP, a citizen of the United States, residing at Waynesville, in the county of Haywood and State of North Carolina, have invented a new and useful Corundum-Separator, of which the following is a specification.

My invention relates to machines for washing and separating corundum ore from quartz and heavy as well as lighter foreign matter; and one object in view is to provide an improved construction adapted to effect the separation of the desirable ore from the foreign matter by hydraulic pressure in connection with mechanical agitation of the mass contained in the machine, so that the heavy and light foreign matter will be discharged automatically, while the desirable corundum and ore will be retained for discharge at will from the apparatus.

A further object of the invention is to provide novel means for regulating the hydraulic pressure within the bowl or receptacle and to vary the speed of the agitation-producing mechanism to render the machine applicable to the treatment of different sizes or grades of crushed material.

With these ends in view the invention consists in the novel combination of devices and in the construction, arrangement, and adaptation of parts, as will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated a preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical sectional elevation of a corundum-separator constructed in accordance with the principles of my invention. Fig. 2 is a plan view of the machine with the feed-spout omitted.

The same numerals are used to indicate like and corresponding parts in both figures of the drawings.

10 designates a non-revoluble receptacle which is arranged in a vertical position and is held securely in place by any suitable means; but I have not considered it necessary to illustrate the supporting-framework, because the same may be of any construction readily supplied by a skilled mechanic. This

receptacle is circular in cross-section at all points in its height; but the receptacle is tapered from its broad open upper end to provide the contracted lower part 11. This contracted part of the bowl-shaped receptacle terminates in a neck 12 of small diameter, said neck serving for the ingress of the water under pressure to the apparatus and as the egress or discharge port for the desirable corundum ore. The water-pressure pipe 13 is represented as arranged in a horizontal position below the plane of the upright bowl, and a T-coupling 14 is employed to unite the water-pressure pipe 15 and the ore-discharge pipe 16 to the contracted neck 12. One branch of this T-coupling 14 is united to the bowl-neck 12 by a union-sleeve 15, the latter having threaded engagement with said coupling and the neck. The water-pressure pipe 13 has threaded engagement with a horizontal branch of the coupling. The ore-discharge pipe 16 has threaded engagement with another vertical branch of the coupling, said pipe 16 being in vertical alinement with the union-sleeve 15 and the neck 12 of the bowl, whereby the axis of the pipe 16 is in the same vertical plane as the axis of the bowl for the purpose of permitting the heavy particles of corundum ore to gravitate through the neck 12 and the coupling, and thereby accumulating in the discharge-pipe above the gate-valve 17 therein. The water-pressure pipe 13 is provided with a gate-valve 18 at a point on one side of the coupling 14, said gate-valve adapted to be opened more or less for admitting the water in regulated volumes to the bowl 10 and to regulate the pressure of water therein.

19 designates a hopper which depends into and is supported within the bowl 10, said hopper arranged for its axis to be coincident with the vertical axis of the bowl. The hopper is preferably, although not essentially, conical in form, and it is arranged within the bowl to provide an intervening space 19<sup>a</sup> between the bowl and the hopper. The lower end of this hopper terminates above the converging wall of the bowl at the contracted portion 11 thereof to form a free entrance for the water between the bowl and the lower extremity of the hopper. One of the important features of my invention consists in making a hopper



adjustable vertically within the bowl for the purpose of varying the space between the lower end of the hopper and the wall of the bowl, thereby regulating the volume of water which may flow upwardly from the pipe 13 and the neck 12 into the channel 19<sup>a</sup> between the hopper and the bowl. Any suitable means may be adopted for adjustably supporting this hopper within the bowl; but I prefer to adopt the series of supporting-arms 20 to form the adjustable connection between the hopper and the bowl. A series of four of these supporting-arms is shown by Fig. 2 as arranged equidistant in the annular channel 19<sup>a</sup>, each arm being curved or bent to extend across said channel. The upper ends of the arms are fastened securely in a suitable way, as at 21, to the hopper; but the lower ends of the arms are bent to bear against the lower end of the bowl, said bent ends of the arms having the longitudinal slots 22, adapted for the reception of the fastening-bolts 23. These bolts pass through the slotted ends of the arms and the bowl, so as to have their outer ends receive the nuts 24, that bind against the bowl and clamp the arms 20 firmly thereto. The slots in the supporting-arms 20 provide for the desired vertical adjustment of the hopper, so as to raise or lower the same within the bowl. The elevation of the hopper with the supporting-arms enlarges the space between the hopper and the bowl to provide for a relatively-free circulation of the water under pressure through the bowl and the channel 19<sup>a</sup>; but by lowering the hopper for its lower extremity to lie quite close to the inner surface of the bowl the space between the lower edge of the hopper and the bowl is reduced or contracted, thus restricting in a measure the circulation or flow of water, whereby the hopper may be adjusted to regulate the pressure of the water which flows through the channel 19<sup>a</sup> and the hopper. The upper end of the hopper protrudes above the broad open mouth of the bowl, said hopper having a laterally-extending discharge-spout 25, in which is located a regulating-valve 26, the latter being preferably of the type known to the art as a "gate-valve."

A vertical shaft 27 is arranged centrally within the hopper, said shaft being supported in any suitable manner—as, for instance, by a bearing 34. This shaft carries a bur or deflector 28, which is united or coupled to said shaft, preferably by a screw-threaded joint 29, thus making the bur fast with the shaft to rotate therewith. The bur has a flat upper face, but the lower face thereof is curved or converged, as at 30, so as to terminate in a point 31. This bur is substantially conical, and it is disposed within the contracted lower portion 11 of the bowl, so as to lie below the lower extremity of the hopper and for its pointed extremity 31 to face the inlet-neck 12. The point 31 of the bur or deflector lies in the plane of the

vertical axis of the bowl and the neck 12 thereof, and the curved surface 30 of this bur is thus presented to the inflowing rising column of water for the purpose of changing the course thereof and making the water-current flow uniformly toward the channel 19<sup>a</sup>, between the hopper and the bowl. The greatest diameter of the bur is less than the smaller diameter of the conical hopper at the lower extremity thereof, and by arranging the shaft to support the bur in a position below the hopper an ample space is provided between the bur and the foot of the hopper for the free passage of the ore in a downward direction and for the circulation in an upward direction of some of the water through the hopper. One of the essential features of my hydraulic ore-separator resides in the bur, which has its lower and approximately-conical surface facing toward the water-inlet at the contracted lower end of the bowl, such bur being arranged with relation to the hopper so as to leave the unobstructed space for the free flow from the hopper of the heavier particles of ore refuse and permitting the flow of water in an upward direction into the hopper, and said bur being also revoluble within the bowl substantially below the hopper. The rotation of this bur imparts a whirling motion to the ascending current of water and to the heavier particles of ore refuse which rise with the water through the annular channel or space 19<sup>a</sup>, so that the ore is prevented from adhering to the inner surface of the bowl, thus insuring its free discharge over the upper edge of the bowl. The bur also serves the important purpose of uniformly deflecting the ascending hydraulic pressure admitted by the centrally-disposed inlet toward and into the annular channel 19<sup>a</sup>, and thus the deflector establishes uniformity of hydraulic pressure in said annular channel as well as imparting the whirling motion to the water-pressure, as hereinbefore described. The shaft 27 carries a spiral conveyer or screw 32, which is made fast with said shaft at a point above the bur 28. Said spiral conveyer extends for a part of the length of the shaft, so as to operate in the hopper, the diameter of the conveyer being equal substantially to the greatest diameter of the bur. A cone-pulley 33 is made fast with a part of the shaft 27 above the bowl, said pulley adapted to have a driving-belt fitted on either of the steps thereof for giving variable speed to the shaft, the bur, and the conveyer, according to the grade or nature of the ore which is to be treated in the machine. The ore in a crushed condition may be supplied to the hopper 19 in any suitable way. As one means for feeding the ore to the machine I have shown a feed-spout 35 by Fig. 1; but it is evident that equivalent means may be substituted for this spout.

The stationary bowl or receptacle 10 has the edge around its open mouth curved out-



wardly to form the lip 36, which facilitates the discharge of the heavy particles of foreign matter from the apparatus. Below the curved lip is arranged a collector-tray 37, which circumscribes the bowl or receptacle and is secured in a suitable way thereto, so as to be supported on said bowl. This collector-tray occupies a stationary position and extends above the curved lip of the bowl for the purpose of receiving the foreign matter therefrom, said tray having a discharge-spout 38. (See Fig. 2.) The tray is inclined transversely across the bowl from the closed side thereof toward the spout, so as to facilitate the discharge of the foreign matter. The hopper 19 extends above the plane of the tray for its spout 35 to extend over the bowl and discharge into the spout 38 of the tray.

The operation is as follows: The ore in a crushed condition is supplied to the hopper by the spout 35, and the valve 18 is opened to permit the fluid under pressure to pass through the pipe 13, the coupling, and the neck into the bowl. The belt which drives the shaft 27 is adjusted on one of the steps of the cone-pulley to drive the bur and spiral conveyer at a proper speed, and the valve 18 is adjusted to admit water under the desired pressure, according to the nature of the ore to be treated. The water is deflected by the bur, so as to traverse the channel 19<sup>a</sup> and the hopper 19 in an upward direction. The water is kept in a state of agitation by the rotation of the bur and the spiral. These elements also serve a peculiar purpose in my apparatus—that is to say, the bur and spiral keep the water from “blubbering,” they promote the upward travel of the hydraulic current, and they also insure a uniform pressure throughout the separator. The lower strata of ore being of greater specific gravity is retained in the lower part of the bowl by regulating the hydraulic pressure. The mica and other light foreign matter are confined within the hopper 19 and are carried upward therethrough by the ascending current of water, so as to be discharged below the gate-valve 26, through the spout 25, and thence into the spout 38 of the tray. The quartz and heavier foreign matter rises with the current of water through the channel 19<sup>a</sup> and thence travels over the lip 36 into the tray 37 for discharge through the spout 38 thereof. The clean ore being of the highest specific gravity accumulates in the neck 12, the coupling, and the pipe 16; but the valve 17 may be opened for discharging the desirable ore through the pipe 16. The hopper 19 may be raised or lowered within the bowl to vary the space between its lower end and the contracted portion 11 of the bowl, said hopper thus serving to assist in regulating the water-pressure in the upper part of the separator. The hydraulic pressure may be varied by adjustment of the hopper and by opening the gate-valve 18 more or less, and at the same time the pulley 33 may be

driven at the desired speed, according to the size or nature of the crushed ore, whereby the entire apparatus is adapted to be adjusted for treating ore of different sizes or grades.

Having thus described the invention, what I claim is—

1. In an ore-separator, the combination of a bowl having a water-inlet at its lower end, an open-ended hopper arranged within the bowl to form an intermediate water-passage, a conveyer revoluble within said hopper, and a deflector revoluble with said conveyer, and having a conical under surface which faces said water-inlet the greatest diameter of the deflector being less than that of the hopper and said deflector arranged contiguous to and below the open end of said hopper to form an unobstructed narrow space therebetween, substantially as described.

2. In an ore-separator, the combination of a bowl having a water-inlet at its bottom, an open-ended hopper extending into said bowl and forming an immediate water-channel therewith, a spiral conveyer revoluble within said hopper, and an inverted conical deflector situated below the hopper, facing the water-inlet to the bowl and revoluble with said conveyer, the greatest diameter of the deflector being less than the internal diameter of the hopper, substantially as described.

3. In an ore-separator, the combination of a tapering bowl having a water-inlet at its lower contracted extremity, an open-ended hopper within said bowl and forming therewith an intermediate channel, a tapering imperforate deflector revolubly mounted contiguous to the open end of the hopper to leave an unobstructed narrow space therebetween and presenting an upwardly and outwardly flaring surface to the water-inlet of the bowl, and a conveyer within said hopper and above the deflector, substantially as described.

4. In an ore-separator, the combination of a bowl, having a water-inlet at the lower end, a bottomless, substantially-cylindrical hopper disposed in the bowl and vertically adjustable therein, for the purpose set forth, the revoluble agitator spiral or worm, centrally disposed in the bottomless hopper, and an inverted conical deflector at the lower end of said agitator or worm, below the bottomless hopper, revoluble with said agitator or worm, and of less diameter than the hopper, all arranged and adapted to operate, substantially as described.

5. In an ore-separator, the combination of a bowl having a water-inlet at its lower end, a hopper extending into said bowl, a discharge-spout extending laterally from the hopper and over the edge of the bowl, a valve supported in said spout and adjustable across the opening between the hopper-chamber and the spout, an agitator mechanism within the hopper, and a collector-tray below the upper edge of the bowl, substantially as described.

6. In an ore-separator, the combination of a



bowl, a water-inlet thereto, a collector-tray  
inclined to the axis of the bowl and situated  
contiguous thereto, said tray having a dis-  
charge-spout, a hopper provided with a dis-  
5 charge-spout which overhangs the spout of  
the tray, a valve in the spout of said hopper,  
and an agitator operable within the hopper,  
substantially as described.

In testimony that I claim the foregoing as  
my own I have hereto affixed my signature in 10  
the presence of two witnesses.

JESSE B. STALCUP.

Witnesses:

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ARCHER W. SEAVER.