To all whom it may concern:

Be it known that I, AUGUST MAASSEN, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Centrifugal Metal-Extractors, of which the following is a specification.

In economically extracting the metallic values from ores by the leaching process, it is necessary to crush the ore in order that the solvent used may readily come into contact with the metal. The crushed ore is then immersed in the leaching solution and allowed to stand in tanks holding the leaching solution until the metal in the ore has been dissolved and is held in suspension in the leaching solution. It is then necessary that the leaching solution carrying the values formerly in the ore be drawn off or separated in some way from the gangue. Usually this is done by gravity, by allowing the solution to drain or fall from the bottom of the leaching tank, and the gangue is then removed from the tank, by shoveling it out of the tanks or by having the tanks so constructed that they may be overturned and dumped, or by having the bottom constructed so that it may be removed and the gangue allowed to fall into cars or other receptacles for dumping. Some considerable time is needed to allow the solution to drain out, and at best quite a lot of the enriched solution carrying its metallic values is left in and will not drain out of the gangue, thus causing a loss of the metallic values, and of the solution and of time.

The object of my invention is to separate the enriched solution from the gangue in less time, with less expense and more completely than has heretofore been done. These objects I accomplish with the machine illustrated in the accompanying drawings in which similar letters of reference indicate like parts throughout the several figures.

Figure 1 is a vertical elevation of the machine, parts cut away, and parts in section. Fig. 2 is a plan view on line a a of Fig. 1, parts cut away. Fig. 3 is a plan view of the distributing disk and the means of fastening the inner casing to the cone shaped hub.

I have previously been granted a patent on a centrifugal sugar separator No. 934,000, and have observed, and by experiment have shown that the principles of that machine may be used in the economical extraction of the mineral values from crushed ore. The manner of feeding the ore into the machine and of causing it to contact with the interior of the separator is materially different from that of syrup. It is also necessary, in order that all of the metallic values may be extracted from the gangue that additional and fresh water be allowed to strike the gangue in its descent and as that water would carry metallic values it must be saved and kept separate from the richer solution first extracted.

My machine consists of an outer casing 1, preferably cylindrical in form and having a partially closed top and bottom. Through the opening in the top is inserted the pipe 2, through which the material to be treated is conveyed into the machine. Inserted through the side of the casing 1 and near the bottom thereof is the wash pipe 27. Secured to the bottom 20 of the said casing 1 is the discharge chutes 22, and to the sides, the stay or fastening brackets 3 by which the machine is rigidly secured in position. Within said outer casing 1 is fastened two centrally open annular diaphragms 4 and 5, each having its inner edge upwardly flanged, and in the side of the said casing 1 adjacent the upper side of each of said diaphragms is provided discharge pipes 6 and 7. The purpose of the flanged edges of the said diaphragms and of the said discharge pipes 6 and 7 being that any fluid falling on the diaphragms will flow therefrom through the said discharge pipes to precipitating tanks, where the metallic values in the solution will be recovered. To the bottom 20 of the said casing 1 is fastened the bearing stay-brackets 8, through which the bearing rods 9 are passed. Said rods 9 have one end fastened to the bearing 10, and on the other end of each of which is carried nuts for adjustment. Within the said bearing 10 is operated the vertical shaft 11 having a foot or bottom bearing 12. The upper portion of said shaft 11 is formed conical in shape, and has secured thereon the hub 13. The top portion of said hub 13 is flared or flanged outwardly to form the centrifugal gal or distributing table 14 on which the material first falls when entering the machine. To the centrifugal table 14, by means of the braces 15, is rigidly secured a perforated frusto-conically shaped inner casing 16 con-105 centric with said table. On the other side of said inner casing 16 is fastened two an-
nular drain boards 17 and 18 so placed that the outer edge of the drain board 17 will extend over the flanged edge of said diaphragm 4 and the outer edge of the drain board 18 will extend over the flanged edge of said diaphragm 5. Adjacent the inner side of said frusto-conically shaped casing 16 is fastened the coarse meshed screen 19 similar in shape but enough smaller in size to fit closely with-in said casing 16. Adjacent the inner side of the said screen 19 is secured a filter screen 21 made of burlap or cloth. On the side of the said wash pipe 27 adjacent the said filter screen 21 is provided openings to direct the wash water against the said screen 21. The water being under head sufficient to cause the falling gangue, through which the water passes, to again contact with said filter screen 21.

The operation of my machine is as follows:—Power being applied to the shaft 11 by a belt operated upon a pulley 25 on said shaft, the said inner casing 16 and the parts secured thereto are made to revolve very rapidly. The contents of the leaching tank—the leaching solution and the leached ore or gangue—is then allowed to flow through the pipe 2 into the machine and fall upon the table 14. The centrifugal force of this table throws the gangue and solution against the rapidly revolving inner casing with its screen lining composed of the cloth screen 21 and coarse meshed wire screen 19. The solution carrying the metallic values is thrown out through the openings in said casing 16 and falls onto the drain board 17 and diaphragm 4, while the gangue is held against the said cloth screen 21 with a tendency to fall or seek a lower plane. While said gangue is falling or sliding down the said cloth screen 21, wash water is introduced through the pipe 27, under a head or force sufficient, to cause any falling particles of gangue to again contact with the said cloth screen 21 and the water washes out any portion of the leaching solution remaining in the gangue. The gangue then falls and is guided by the chutes 22 into cars or other receptacle whereby it may be removed. The wash water with the residue of the leaching solution is thrown out through the said cloth screen 21, the coarse mesh screen 19 and the openings in the casing 16 onto the lower drain board 18 and the lower diaphragm 5, and is drawn off through the pipe 7.

Having thus described my invention I desire to secure by Letters Patent and claim:—

1. The combination of a power driven vertical shaft, a conically shaped hub thereon having the upper portion outwardly flanged forming a distributing table, a perforated frusto-conically shaped casing spaced from and carried by said hub, two annular drain boards secured on the outer side of said casing, an outer casing having a partially closed top and bottom, a centrally located pipe with the opening thereof above said hub, two open annular diaphragms secured to the inner wall of said outer casing having their inner edges upwardly flanged and located respectively subjacent said drain boards, and discharge pipes in the wall of said outer casing immediately above said diaphragms as and for the purposes described.

2. In a centrifugal metal extractor the combination of a power driven vertical shaft, a hub secured on the upper portion thereof, an outwardly extended flange on the upper end of said hub adapted to form a distributing table, a perforated frusto-conically shaped casing concentrically spaced from and carried by said table, filtering means secured to the inner wall of said casing, two annular drain boards secured on the outer wall of said casing, an outer casing having chutes in the bottom thereof, a pipe with the opening therethrough adapted to discharge on said table, two open annular diaphragms secured to the inner wall of said outer casing and located respectively subjacent said drain boards and having their inner edges upwardly flanged, discharge pipes in the wall of said outer casing located immediately above the said diaphragms, and a water pipe adapted to discharge water against the said filtering means.

3. In a centrifugal metal extractor the combination of a power driven vertical shaft, a hub secured on the upper portion of said shaft, an outwardly extended flange on the upper end of said hub adapted to receive the material to be treated, a perforated frusto-conically shaped casing concentrically spaced from and secured on said hub, filtering means secured to the inner wall of said casing, said means consisting of a coarse meshed wire screen and a cloth screen both of which are frusto-conically shaped and adapted to fit closely within said casing, two annular drain boards secured on the outer wall of said casing, an outer casing, a pipe through the top of said outer casing adapted to discharge the material to be treated on the upper end of said hub, two annular diaphragms secured within said outer casing and located subjacent said drain boards one below each of said boards, an upturned flange on the inner edge of each of said diaphragms, discharge pipes in the wall of said outer casing adapted to drain said diaphragms, and a wash pipe within the lower end of said first mentioned casing adapted to conduct water against the cloth screen as and for the purposes described.

4. The combination of a power driven vertical shaft, a hub on the upper end thereof having an outwardly extended flange
thereon adapted to receive a liquid solution containing crushed ore, a cone shaped casing concentrically spaced from said hub and carried on said flange of said hub and having perforations in the wall, a cone shaped coarse meshed screen secured within said casing and adjacent the inner wall thereof, a cone shaped cloth screen adjacent to secured within said first mentioned screen, a conveying pipe inserted through an opening in the top of said casing and screens and adapted to discharge a liquid solution carrying crushed rock over the upper end of said hub, an outer casing, annular diaphragms within said outer casing having their inner edges flanged upwardly, and drain boards secured on the wall of said inner casing adapted to discharge on said diaphragms.

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

AUGUST MAASSEN.

Witnesses:
Ben L. Corum,
Charles Fallentine.