(No Model.) 2 Sheets—Sheet 1.

J. RADERMACHER.

BUDDLE.

No. 525,363. Patented Sept. 4, 1894.

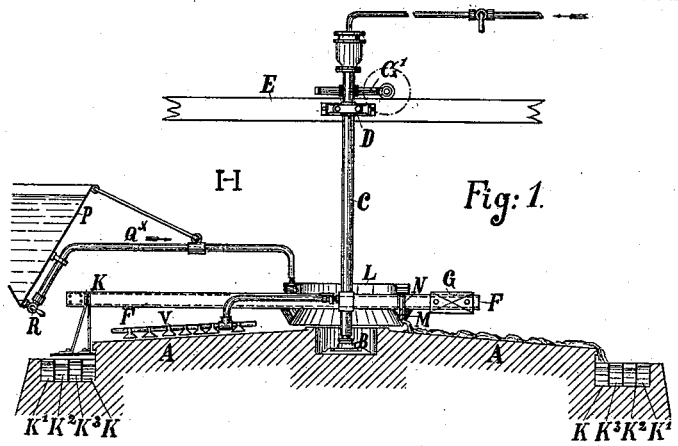


Fig: 1.

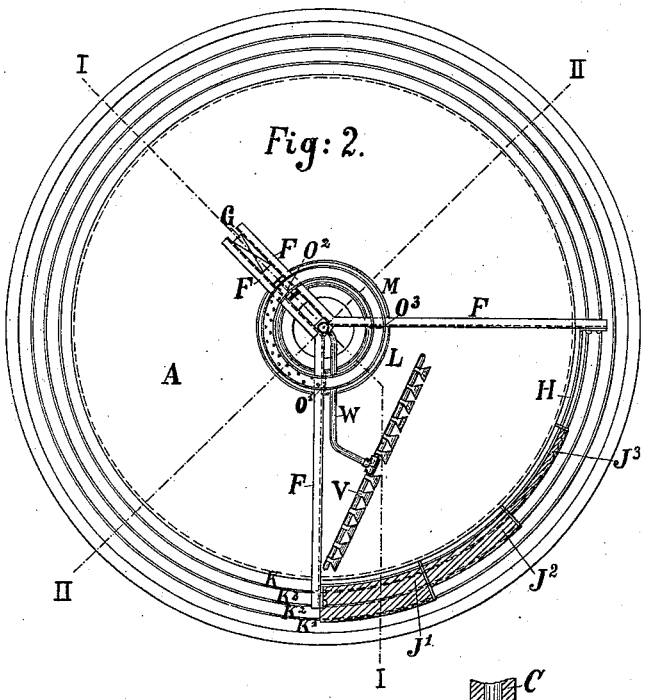


Fig: 2.

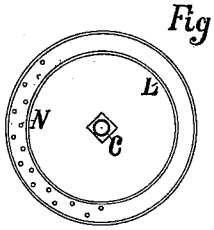


Fig: 3.

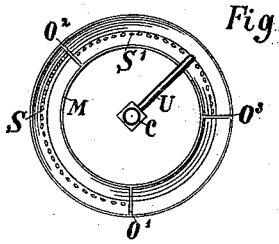


Fig: 4.

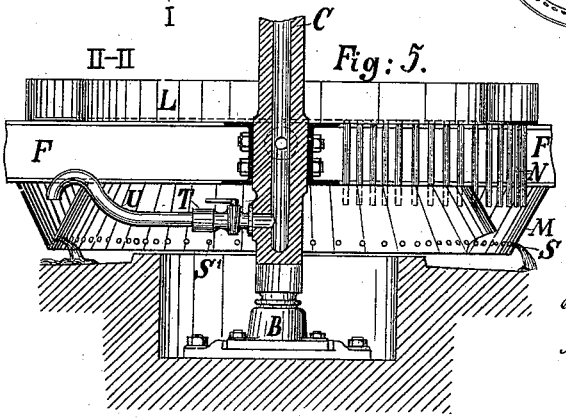


Fig: 5.

Witnesses.
L. Frey
O. Hanner

Inventor.
Joseph Radermacher
per
Karl A. Mayer
Attorney

(No Model.) 2 Sheets—Sheet 2.

J. RADERMACHER.

BUDDLE.

No. 525,363. Patented Sept. 4, 1894.

Fig: 6

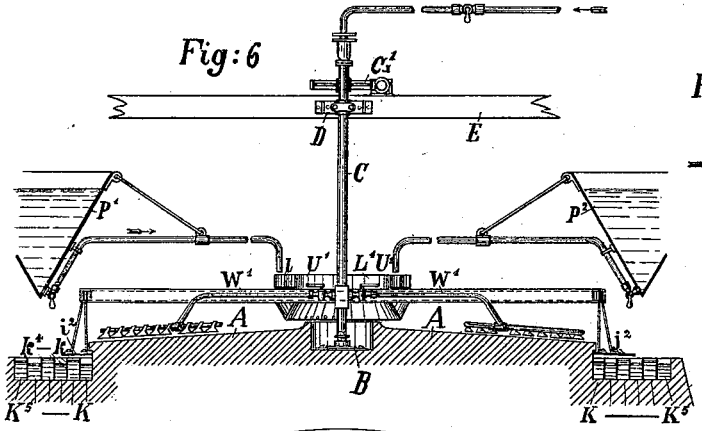


Fig: 8.

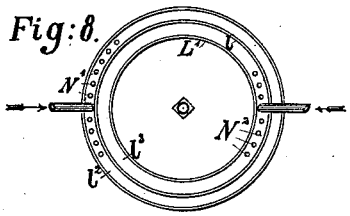


Fig: 9.

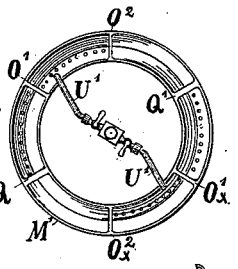
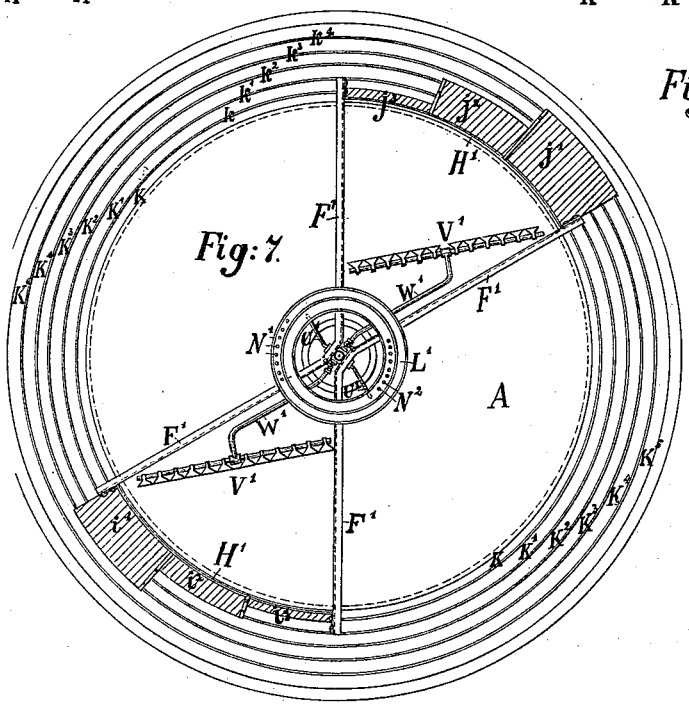


Fig: 7.



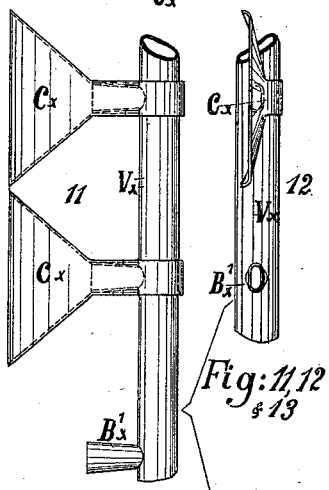
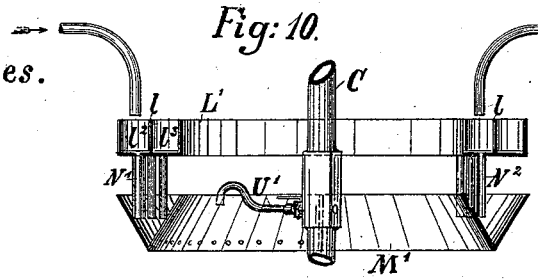


Fig: 11, 12 & 13

Fig: 10.



Witnesses.

L Frey

Hanner

Inventor.

Joseph Radermacher

per

Karl J. Mayer

attorney

UNITED STATES PATENT OFFICE.

JOSEPH RADERMACHER, OF KALK, GERMANY.

BUDDLE.

SPECIFICATION forming part of Letters Patent No. 525,363, dated September 4, 1894.

Application filed March 15, 1893. Serial No. 466,134. (No model.) Patented in Germany September 22, 1891, No. 62,811, and October 15, 1891, No. 65,086; in France October 19, 1891, No. 216,825 and No. 216,826, and in England November 6, 1893, No. 19,745.

To all whom it may concern:

Be it known that I, JOSEPH RADERMACHER, a subject of His Majesty the Emperor of Germany, residing at Kalk, near Cologne, in the Province of Rhenish Prussia, Germany, in the service of the Maschinenbauanstalt Humboldt, at Kalk, have invented a new and useful Improvement in Round Buddles, (for which I have obtained patents in the following countries: Germany, No. 62,811, bearing date September 22, 1891, and No. 65,086, bearing date October 15, 1891; France, No. 216,825 and No. 216,826, bearing date October 19, 1891, and England, No. 19,745, bearing date November 6, 1893), of which the following is a specification.

The machine invented by me and serving for washing and classifying ores according to their size and specific gravity, that is according to their richness in metallic substance distinguishes itself from other apparatus built for the same purpose, that in it all the main parts form together one compact self-contained machine, these parts being easily accessible in case of repairs being required, but its main difference from other machines of this class consists: first, in the different construction of the feeding and division trough, by means of which the material to be treated is divided evenly, before it comes into the division trough; second, by the use of a central feeding tube for the washing water forming at the same time the pillar on which the whole machine is supported or suspended; third, by the use of a special spray arrangement, making the clearing trough otherwise required in these machines unnecessary; this spray arrangement securing an absolutely good washing and classification; fourth, in an arrangement which makes it possible that at the same time ores of different quality may be treated at the same time. This latter condition may in some cases be desirable and then one machine can do the work of two separate machines and thus space, capital and working expenses may be saved, while the machine is equally well adapted for treating only one sort of materials.

The new machine is shown as single acting and double acting round buddle in the accompanying drawings, in which—

Figure 1 is a vertical cross section of the new machine along line I—I of Fig. 2. Fig. 2 is a plan of the machine, without the reservoir. Fig. 3 is a top view of the feed trough. Fig. 4 is a top view of the division trough with feed pipe. Fig. 5 is a vertical section of the feed trough and division trough mounted, along line II—II on an enlarged scale. Fig. 6 is a vertical cross section of the double acting machine. Fig. 7 is a plan of the same without the reservoirs. Fig. 8 shows the arrangement of the feed trough for this machine. Fig. 9 is the corresponding division trough. Fig. 10 is a section of the feed trough and division trough as mounted together and in an enlarged scale. Fig. 11 is a plan of the spray tube as used with this machine, on an enlarged scale. Fig. 12 is a front view of the same, on an enlarged scale. Fig. 13 is a side view, on an enlarged scale.

In the drawings similar parts are indicated by similar letters.

In both designs A is the slightly conical fixed bottom or buddle table of the machine upon which the washing and separation are done; in its center stands in a step B the vertical shaft C which turns round very slowly and which is held by a side bearing D on a girder E. The shaft receives its slowly revolving motion by a worm or worm wheel gearing C′×. On the shaft are mounted the girders F, F or F′, F′, on which the revolving working parts of the machine are fixed. For the sake of a better fixing of these girders the shaft is made square near its lower end in both cases.

I will now proceed to explain each manner of carrying out my invention separately, beginning with the single acting machine. The girders F in Fig. 2 are parallel to each other in one direction and here they carry between themselves a counterweight G; on the other side they go out radially from the shaft to the circumference of the table, standing at right angles to each other and having their ends connected together by a bent bar H. To this bar H are suspended the decanting plates

T′, T², T³ which project beyond the edges of their corresponding channels K′, K², K³, into which the plates conduct the good material, while from the edge of the table A of the machine the waste material is conducted into the innermost channel K. By this means I obtain four different sorts of materials, rich ore or concentrates, two sorts of intermediate products and waste. In the middle the arms F carry the feed trough L and the division trough M suspended thereon. The feed trough L (Figs. 3 and 5) consists of a ring shaped channel of rectangular section into which the water carrying, the finely crushed ore, pulp (trübe) is fed from a reservoir P by a pipe Q× and a cock R; from L it is led into the division trough by means of the small tubes N placed in part of the bottom of the feed trough.

The division trough consists of a circular channel of triangular section of equal average diameter as the feed trough; diaphragms O′, O², O³ divide it into three compartments. The part O′—O² is below that part of the feed trough L containing the tubes N and it receives the concentrates; quite near the bottom of this part there are little holes S in the outer side, as seen in Figs. 4 and 5, out of which the concentrates escape evenly distributed on the table surface of the round buddle. The part O²—O³ is reserved for pure water serving as washing water; it escapes out of the compartment on to the surface of the buddle through similarly arranged little holes S′ at the inner side (Figs. 4 and 5) near the bottom of the trough also evenly distributed. The part O³—O′ is free, but it must be so arranged that it comes to be situated between the part of the girders F F where they stand at right angles to each other.

The pure water is led into the washing compartment O²—O³ by means of a pipe U and a cock T through the shaft C itself, which for this purpose is made hollow. This shaft also conducts the water to the spray tube V by means of a pipe W which connects the two together and supports the spray tube. The latter is arranged in that part of the machine between the two arms F F standing at right angles to each other. This spray tube is of peculiar construction, so that it can serve at the same time as washing and as clearing tube. Its construction will be best seen from the detail Figs. 11, 12 and 13. It consists of the tube V× to which are fixed small branch tubes B′× which at their end are pressed flat; over these branches are fitted spray plates or baffle plates C× in an inclined position to the branches so that the water pouring out from the latter strikes against these spray-plates and is thus spread out in a broad stream, forming a continuous jet when leaving the plates, because they touch each other and thus the whole surface of the table is reached by the stream of the spray tube.

The ore after being washed by the streams from the holes S′ in the division trough is exposed to the action of the jet of the spray tube and thus it is conducted on to the decanting plates T′, T², T³ which lead it into the respective channels K′, K², K³ according to the quality and thence it is led away into clearing basins for further treatment.

The pulp pouring out of the little holes S at the outer side of the part O′ O² of the division trough on to the table, which as will be remembered, is very slightly conical, covering it wholly because the column C with all its appurtenances rotates very slowly. The light parts, that is those of poor mineral substances, will roll over the table quickly or rather they will be washed away rapidly by the washing water pouring out of the compartment O² O³ of the division trough and they will fall into the first channel K; the heavier and smallest parts will flow down slowly; by the rotation of the apparatus they will be reached gradually by the spray tube V which will support the washing off, so that when the outer end of the spray tube, that is the one nearest the circumference will pass over the material fed on the table and still left by the preceding washing operation the residue, which forms the heaviest and best concentrates will also be washed off and a clean table will always be left behind the spray tube. Now the decanting plates being smallest where they are farthest away from the spray tube and largest where this tube is nearest the circumference, it follows that the heaviest material, which is washed off latest, will be taken over the broadest decanting plates and carried into the outermost channel K′ and so on, the poorest material being taken up in the first channel without passing over a decanting plate. This material taking about three-quarters of the whole circumference, the other quarter being divided into equal parts for the plates j', j^2 and j^3.

I will now proceed to explain the variation of the machine shown by Figs. 5 to 10 for treating two sorts of material at the same time. The general arrangement and the manner of working of this modification are exactly the same, as with the single acting machine with the exception that the active and passive operating organs of the same are all arranged double. Thus the surface of the buddle table is to be thought of as being divided diametrically into two parts, (this division need not to be marked by any special device,) and accordingly instead of the channels K′, K², K³ of the former machine their number is increased. Diaphragms k, k', k^2, k^3 and k^4 marking the division between the channels K, K′, K², K³, K⁴ and K⁵ now arranged. In the feed trough L′ Fig. 8 the division must be a circular one, because the feeding of both sorts of ores must be a continuous one for each compartment from the reservoirs P′ and P²; a diaphragm l causes this circular division. From the two concentric troughs l^2 and

l^3 thus formed the little tubes N′ and N^2 conduct the oreschlich down into the respective compartments of the division trough M′. This division trough is divided into two main parts by diaphragms Q and Q′ placed in diametrically opposite positions, and each of the so obtained halves is subdivided in three compartments by diaphragms o' and o^2 and $o'\times$ and $o^2\times$ corresponding to the three compartments of the single acting machine. The compartments Q O′ and Q′ O′× receive the oreschlich by means of the little tubes N′ N^2 the two compartments O′ O^2 and O′× $O^2\times$ being intended for pure water and Q′ O^2 and Q $O^2\times$ being left free, because opposite to them the spray tubes V′, V′ are fixed to the pipes W′ and W′ between the girders F′, F′. These girders now project symmetrically to both sides of the center and the counterweight formerly used can be dispensed with.

The ends of the girders F′ F′ inclosing the sectors in which are placed the spray tubes, are in a similar manner connected to each other by bent bars H′, H′ and to them are suspended the decanting plates i', i^2, i^3 and j', j^2, j^3 respectively, reaching over the corresponding channels K′ and K^5 as shown in Fig. 7. From the compartments Q O′ and Q′ O′× pours out the oreschlich through the holes in the front side of the division trough; the water pouring out of the holes in the back side of the compartments O′ O^2 and O′× and $O^2\times$ washes the material and the material is finally clarified or decanted by means of the water from the spray tubes v', v', placed between the corresponding sectors, formed by the girders F′, F′ of the machine and thus the washing water carries the ore over the edges of the plates i', i^2, i^3 and j', j^2, j^3 into the corresponding channels K′—K^5 i' and j' in the example shown leading their material in the common channel K′, the waste being taken away first, direct into the first channel K. I thus obtain again various sorts of materials, concentrates, intermediate products and waste. It is evident, that the classification can be reduced or increased and I am not bound to only three or four sorts of goods, this depending merely on the number of divisions made, since in every other respect the machine acts like the single acting machine first described, the difference consisting merely in the arrangement of two reservoirs P′ and P^2 and increasing the number of spray tubes and collecting channels.

I am aware that round buddles have been known before and I do not claim such a machine broadly, but

What I claim is—

1. In a round buddle for washing and classifying ores a fixed buddle table a hollow vertical shaft in the center thereof, being set in motion by suitable gearing and having girders or arms fixed on it near its lower end; a circular feed trough having outlet tubes at the bottom and below the same a division trough being divided by radial diaphragms into three compartments, one for the pulp with holes at the outer side, the other for pure water with holes at the inner side near the bottom, the third to be kept empty, both troughs being supported by the said girders in combination with a reservoir and a pipe leading water into the water compartment from the hollow shaft, and with a combined spray tube, having outlet pipes and baffle plates or spray plates fixed thereon, the whole as set forth and for the purpose specified.

2. In a round buddle for washing and classifying ores a fixed buddling table A, a hollow vertical shaft C in the center of the same set in motion by suitable gearing C× and having a pair of girders or arms F′ F′ fixed thereon projecting at both sides from the center so as to divide the table in four sector like parts balancing each other a circular feed trough L′ divided by an annular diaphragm l into two concentric compartments l^2, l^3 having each outlet tubes N′ N^2 respectively fitted to their bottom, a division trough M′ being divided by two main diaphragms Q and Q′ into two compartments each of which is again subdivided by diaphragms O′, O^3 and O′×, $O^2\times$ into three compartments Q O′ and Q′ O′× with outlet holes at the outer side for the ore, O′ O^3 and O′× $O^2\times$ with outlet holes at the inner side for the water and O^2 Q′ and $O^2\times$ Q being left empty, in combination with spray tubes W′ V′ having outlet pipes B′×, B′× with flat ends and baffle plates C× C× fixed thereon, the whole as set forth and for the purpose specified.

JOSEPH RADERMACHER.

Witnesses:
FRITZ SCHROEDER,
SOPHIE NAGEL.