

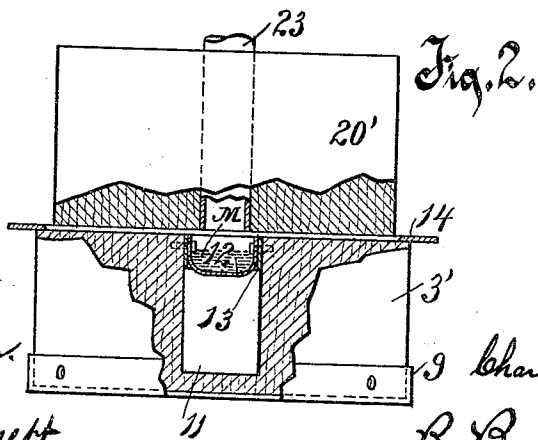
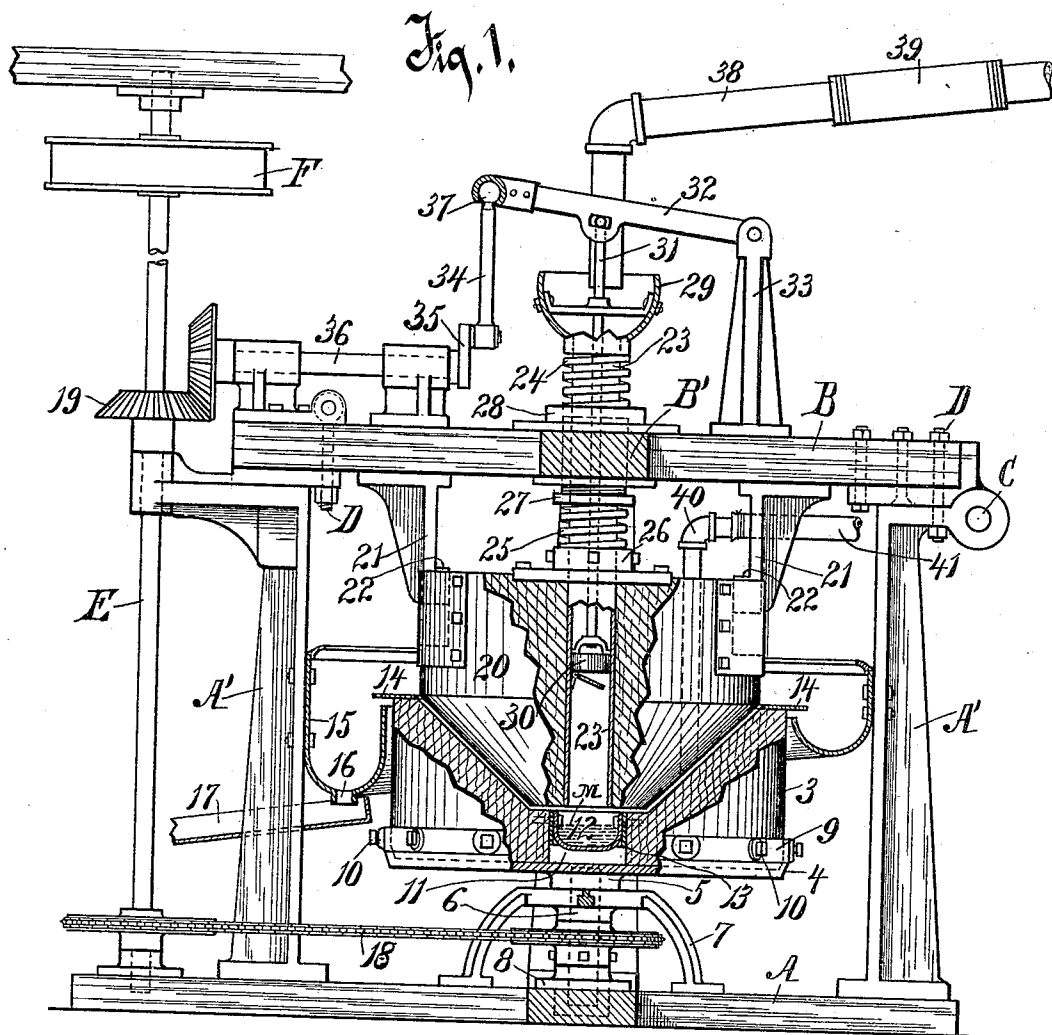
(No Model.)

C. E. SEYMOUR.

PROCESS OF CLEANING AND AMALGAMATING ORES.

No. 511,864.

Patented Jan. 2, 1894.



Witnesses.

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CHARLES E. SEYMOUR, OF LAKE GENEVA, WISCONSIN.

PROCESS OF CLEANING AND AMALGAMATING ORES.

SPECIFICATION forming part of Letters Patent No. 511,864, dated January 2, 1894.

Application filed January 31, 1893. Serial No. 460,419. (No specimens.)

To all whom it may concern:

Be it known that I, CHARLES E. SEYMOUR, of Lake Geneva, in the county of Walworth and State of Wisconsin, have invented a new and useful Improvement in Means for and Processes of Cleaning and Amalgamating Ores, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

10 My process and device relate to cleaning or scouring and polishing ores in a pulverized state, to increase the amalgamating affinity of the mineral particles, and includes the process and means for amalgamating some of the metallic particles in connection with the
15 cleaning operation. Some kinds of pulverizing mineral bearing ores do not in their crude state or when they are dull or coated, readily amalgamate with mercury, and this
20 is especially true of that class of gold ores commonly known as rusty ore. If this grade or class of ore is polished or cleaned so that the particles of mineral capable of amalgamation, are freed of enveloping or coating
25 foreign material so as to present a clean bright surface to the direct action of mercury, an amalgamation is readily accomplished.

My invention relates to a method of cleaning or polishing mineral ores and amalgamating some of the mineral therein, and therewith, to providing mechanism adapted to assist in the cleaning or polishing of the ores for the process of amalgamation either therewith or independently thereof.

35 In the drawings, Figure 1, is an elevation of the improved mechanism embraced in my invention, parts being broken away and other parts shown in section for convenience of illustration. Fig. 2, is an elevation of a modified form of the polishing blocks, parts being
40 broken away for showing interior construction.

In the drawings, A is a frame of suitable form for supporting the operative mechanism. The
45 frame is conveniently formed with four posts A' the one at the front of Fig. 1 being omitted for convenience of illustration. Cross beams B B' secured rigidly to each other at their medial junction, rest at their extremities on the four posts. The cross beam B is hinged
50 at its extremity C to one of the posts, and its

other extremity rests on the opposite post. These cross beams are also secured to the posts releasably by bolts D D.

A portion of the mechanism hereinafter described is supported directly on the sill and posts of the frame A, and other portions of the operative mechanism are suspended from and mounted on the cross beams B B'. By this construction the mechanism supported
60 on the cross beams B and B' may, when desired, be lifted away from the mechanism supported directly on the frame.

The material used for the polishing blocks in my machine may be of metal or less dense
65 material, but I advise and preferably use the ends of blocks of wood. In the machine illustrated a cylindrical block of wood or muller 3, is mounted on a disk 4, which disk is provided with a hub 5, and a rigid arbor indicated by dotted lines 6, in Fig. 1. The hub
70 5 rests on the support 7, and the arbor 6 has revoluble bearing in the support 7, and is stepped in the box 8, fixed on the sill of the frame. The disk 4 is provided with a peripheral
75 upwardly extending rim 9 in which the block 3 is fitted, and the block is secured therein by holding screws 10, through the rim turning into the block. The block 3 is hollowed out in its upper surface forming a
80 central chamber therein of inverted frusto-conical form, and a central aperture 11 extending from the frusto-conical chamber downwardly to the disk 4. A metal cup 12, having substantially the diameter of the aperture 11, is secured in the aperture conveniently by screws. The bottom of the cup is preferably at a little distance above the disk
85 4. A rubber gasket 13, interposed between the cup 12 and the surrounding block, makes the joint water tight. A flat ring 14 preferably of rubber secured permanently to the top of the block 3 about its chamber projects
90 laterally beyond the block and forms a rim adapted to carry material discharged centrifugally over the top of the block, into the annular encompassing trough 15. The trough
95 15 is bolted to the posts A' and is provided with a discharging orifice 16. A trough 17 is adapted to catch the material discharged from the trough 15 and conduct it therefrom. A
100 sprocket chain 18 running on a wheel fast on

the arbor 6 and on a wheel on the driving shaft E, is adapted to transmit motion from the driving shaft to the revoluble block 3. The driving shaft E is driven by a suitable belt (not shown) running on the pulley F fast on the driving shaft. That portion of the operative mechanism thus far described is supported directly on the frame A or its posts A'.

Above the block 3, and complementary to it, is located the non-revoluble block 20, also preferably of wood. This block 3 is movable vertically on the hangers 21 depending rigidly from the cross beam B. The hangers are provided with guides 22 which fit movably in ways therefor in bearing blocks secured permanently to the block 20. The lower end of the block 20 is frusto-conical in form. The conical wall of the block is complemented by the reversely conical wall of the chamber in the block 3 and ores or other material forced or inserted between these blocks is rubbed or polished by the revolution of the block 3 against the block 20. The block 20 is mounted rigidly on a hollow shaft 23, which extends upwardly therefrom passing centrally through the cross beams B and B' in which it is mounted, movable vertically, on the springs 24 and 25 respectively. The spring 25 is interposed between a hub 26 fixed on the block 20 and an adjusting screw threaded collar 27 turning into a journal box fixed in the cross beams B B'. By means of this adjusting collar and the spring 25, the extent of the pressure of the block 20 against the block 3, or interposed material, may be increased or diminished as desired. The spring 24 is interposed between the box 28 fixed in the cross beams and the base or hub of the hopper 29 which forms the upper extremity of the shaft 23. The hollow shaft 23 which extends to the bottom of the block 20 forms also a conduit or pump barrel for the delivery of material, especially pulp, to the polishing blocks. In those localities where the shaft 23 can be extended to a sufficient height, no other force will be required for delivering the pulp to the polishing blocks than the weight of the column of material in the shaft, but as this condition is rarely found, the shaft is converted into a force pump by means of the piston 30 having a downwardly opening valve, and an upwardly extending stem 31. The pump is conveniently operated by connecting the stem 31 to a lever arm 32 medially, the lever arm being pivoted at one extremity to an upright 33 fixed on the beam B, and at the other extremity being connected by a link 34 to the wrist of a crank 35 on the shaft 36 provided with a pinion gearing with the pinion 19 fixed on the driving shaft. The oscillating arm 32 is connected to the link 34 by a ball and socket or universal joint 37, and the shaft 36 is journaled in boxes therefor fixed on the cross beam B.

A pipe 38 for supplying pulp to the pump, is provided with a flexible section 39, so that its discharging end may be raised or turned to one side. A pipe 40 leading through the block 20, and discharging at the conical surface thereof, is adapted to deliver steam, or a gas, adapted to act on the material being polished between the blocks, either for the purpose of assisting in the cleaning of the material mechanically or chemically, as by the heat of the steam or the action of the gas. This pipe is also provided with a flexible section 41, which permits it to bend to accommodate the movement produced by the raising of the cross beams and the mechanism thereon suspended.

In the modified form of device shown in Fig. 2, there is a block 3', having a flat upper surface, but otherwise similar in construction and method of support to the block 3. Also there is a block 20' having a flat lower surface, complementary to the flat upper surface of the block 3', and in other respects of similar construction and supported in a similar manner as the block 20.

The method of using this machine in polishing and scouring amalgamating mineral bearing ores, is substantially as follows: A supply of mercury M is placed in the cup 12, and suitable ores with water, in the form of pulp, are delivered to the pump through the pipe 38, the pump being actuated in the manner described by the rotation of the driving shaft, to force the pulp into the space between the conical surfaces of the blocks 20 and 3. By the rapid rotation of the block 3 the particles of ore are rubbed and polished between the blocks, and at the same time and by the same motion the water, the pulverized material and the ores, are by centrifugal action carried over the top of the block 3 into the trough 15. So much of the cleaned or more purely mineral particles as comes in contact with the mercury in the cup, will be absorbed and amalgamated thereby. With some qualities of ores this cleaning process may be aided by forcing steam through the pipe 40 on to the material being polished, thereby softening or disintegrating soluble material adhering to the ores, and in other cases gases adapted to attack matter coating the ore, may be forced through this pipe on to the material between the blocks and thus aid the process of cleaning the ore.

The cup 12 may be emptied from time to time by raising the cross beams B and B' and thus lifting the block 20 away from the block 3 so that the cup is made readily accessible, and it may be removed from its seat in block 3, if desired for this purpose.

I purpose to use this machine with an amalgamating system, the scoured or polished material discharged from this machine being delivered from the trough 15 directly into an amalgamator, but should it be found desir-

able the ore discharged from a single machine of this kind, may be led by the trough 17 to a second machine similar to the one here shown, and the material from this second machine may in turn be conducted to a third machine, thus establishing a series of machines of the same character to accomplish the complete and perfect cleaning of the ores.

In carrying out the process that involves my invention, it is not necessary that the specific mechanism herein before described in all its details, should be used, although I have described mechanism that is preferably used for the purpose. However, it is not absolutely essential that a pump of the character herein described, should be used, for the purpose of delivering the pulp to and forcing it between the polishing blocks, as any other form of pump might be used instead, and even a column of the pulp of sufficient height would be a satisfactory means of accomplishing the same results. Also the scouring or polishing surfaces may be of other material than wood, though blocks constructed of wood, the ends or grain of which are made to abut and rub on each other, are considered better than any other material for this purpose.

It will not be frequent that the mineral bearing ores that have been scoured or polished by my machine and that are thrown off radially, should be run through another machine of the same form, but such ores may usually be treated by any amalgamating process or concentrated in any other manner, as by means of machines heretofore patented by me for such purpose.

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

1. The process of treating mineral ores, consisting in the forcing pulverized ores or pulp by means of other than gravity between rubbing surfaces and thus subjecting them to a polishing action, and at the same time discharging steam or gas between the rubbing surfaces and into contact with the ores being polished, substantially as set forth.

2. In an ore scouring or polishing machine, the combination of a revolving block or muller, a complementary non-rotating block, and means other than gravity for forcing pulp between the blocks whereby the particles are polished and forcibly ejected radially, substantially as described.

3. In an ore polishing machine, the combination of a superior frusto-conical non-revolving block, an inferior revolving muller having an upward enlarging frusto-conical chamber complementary to the conical surface of the non-revolving block, and means other than gravity for forcing pulp between the blocks from their centers outward radially and upwardly and discharging the larger portion of it therefrom beyond the circumference of the blocks, substantially as described.

4. In an ore scouring or polishing machine,

the combination of rubbing blocks constructed of wood having opposing rubbing or polishing faces formed by the abutting of the ends of grain of the wood, substantially as set forth.

5. In a polishing machine, the combination of polishing blocks one above the other the ends of which abut forming polishing surfaces, means for delivering ores under pressure to the polishing surfaces centrally, a flange projecting substantially horizontally from the upper end of the inferior revolving block, and an annular trough about the block adapted to catch the material discharged from the annular flange, substantially as described.

6. In an ore machine of the character described, the combination with two polishing blocks one above the other the ends of which abut forming centrally depressed polishing faces, of a cup secured to the inferior revoluble block in a central aperture therefor, for holding mercury for amalgamating purposes, substantially as set forth.

7. The combination in a machine of the character described, of an inferior revoluble block or muller, a superior complementary and non-revoluble block, an upwardly extending shaft or central stem suspended yieldingly loose in a fixed bearing, on which shaft the superior block is fixed and thereby partially supported, and fixed guides having ways in said superior block whereby vertical movement is permitted to said block, substantially as described.

8. The combination in a machine of the character described, of an inferior revoluble block or muller, a superior complementary end-abutting non-revoluble block, a hollow shaft fixed centrally in the superior block, which shaft opens at the lower end of the block and extends above the block, a downwardly forcing piston in the shaft, and means for actuating the piston, substantially as described.

9. In a machine of the character described, the combination with the piston of a pulp-forcing pump, of an oscillating lever, a link and a shaft geared to the driving shaft and having a crank to the wrist of which the link is connected, as and for the purpose set forth.

10. The combination in a machine of the character described having abutting polishing blocks, of a revoluble but vertically fixed inferior block, a superior non-revoluble block, a shaft fixed in the superior block which shaft has bearings and vertical movement in a relatively fixed support, springs interposed between collars on the shaft and a fixed support whereby the superior block is suspended yieldingly, and means for adjusting the tension of one of said springs, whereby the pressure of the superior block against the inferior block or interposed material, is made less or greater, substantially as described.

11. In an ore polishing machine the com-

10 bination of an inferior block or muller mounted
revolvably on the main frame, which block
is provided with an inverted frusto-conical
chamber and a central downwardly extend-
5 ing aperture, and an amalgam cup secured to
the block in said aperture, of a superior block
having a frusto-conical end complementary
to the frusto-conical chamber in the block, a
hinged and swinging beam on which the supe-
rior block and related mechanism are mount-
ed, the beam being so hinged as to permit the

lifting of the beam and thereby of the raising
of the superior block out of the frusto-coni-
cal chamber of the inferior block, as and for
the purposes set forth.

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

CHAS. E. SEYMOUR.

Witnesses:

CHAS. S. FRENCH,
CHS. S. ROSENBERG.

It is hereby certified that in Letters Patent No. 511,864, granted January 2, 1894, upon the application of Charles E. Seymour, of Lake Geneva, Wisconsin, for an improvement in "Processes of Cleaning and Amalgamating Ores," errors appear in the printed specification requiring correction, as follows: In line 40, page 3, the word "the" should be stricken out; and in line 41, same page, the word "of" should be stricken out; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 6th day of February, 1894.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.