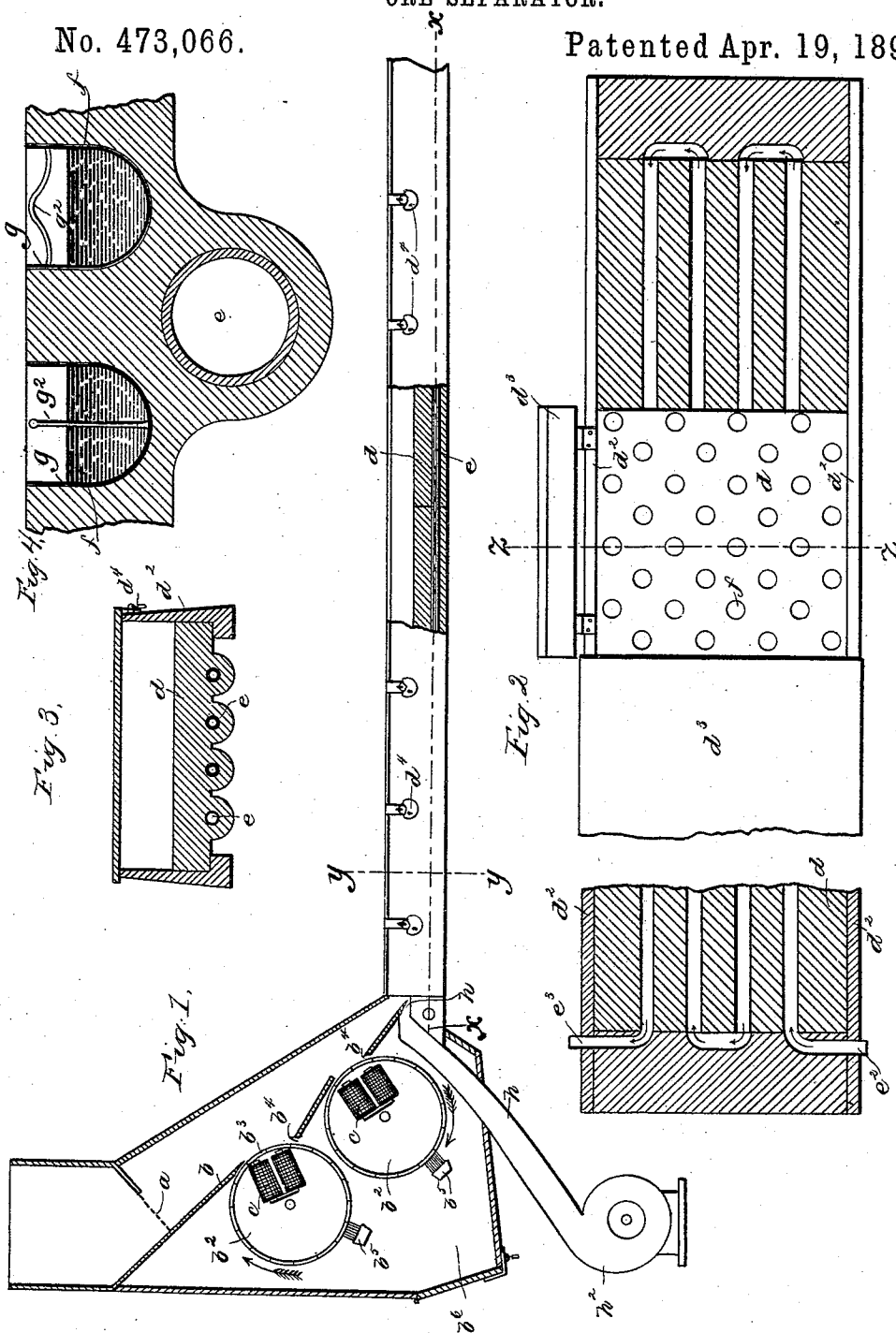


(No Model.)

S. G. ELLIOTT.
ORE SEPARATOR.

No. 473,066.

Patented Apr. 19, 1892.



Witnesses

Jas. J. Maloney.
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UNITED STATES PATENT OFFICE.

SIMON G. ELLIOTT, OF QUINCY, MASSACHUSETTS.

ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 473,066, dated April 19, 1892.

Application filed August 19, 1890. Serial No. 362,371. (No model.)

To all whom it may concern:

Be it known that I, SIMON G. ELLIOTT, of Quincy, county of Norfolk, State of Massachusetts, have invented an Improvement in Ore-Separators, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is embodied in an apparatus for separating gold from gold-bearing sands or ores, and relates especially to an amalgamator by which the sands are subjected to the action of mercury, which forms an amalgam with the gold contained in said sands.

When the apparatus is intended to be used with ores containing black sand, a magnetic separator is employed that acts upon the sands before entering the amalgamator and separates out the magnetic sands, so that only the remaining non-magnetic gold-bearing sands are carried into and acted upon by the amalgamator. The sands are preferably carried through the amalgamator and subjected to the action of mercury therein by the action of a blast of air, steam, or gaseous fluid as distinguished from a current of water, such as is commonly employed in amalgamators for treating gold, and in order to insure the action of the mercury upon the gold means are provided for retaining the floor or base of the amalgamator and mercury therein heated to a temperature above the normal atmospheric temperature, thereby enabling the mercury to act efficiently on certain classes of sand or ores which cannot be effectively amalgamated by the usual processes.

The amalgamator is made in the form of a long trough or closed passage, the floor of which is provided with longitudinal passages for steam, in order to maintain the same at the desired temperature, and is also provided with pockets or recesses to contain the mercury, which is preferably contained in removable cups in said pockets, so that when the mercury in the cups becomes charged the cups and contained amalgam can be removed and other cups containing mercury substituted, such interchange or substitution of the cups being made without interrupting the operation of the apparatus.

Figure 1 is a longitudinal section of an ore-separating apparatus embodying this invention, portions of the amalgamating-trough being shown in side elevation; Fig. 2, a plan view of the amalgamator with one of the covers open and portions of the base being shown in longitudinal section on line *xx*, Fig. 1, but on a larger scale; Fig. 3, a transverse section of the amalgamator on line *yy*, Fig. 1, but on a larger scale; and Fig. 4, a sectional detail on line *zz*, Fig. 2, but on a larger scale, to be referred to.

When the ore contains black sand, the dry sand is introduced in the apparatus through a screen *a* and is first submitted to the action of a magnetic separator comprising an inclined floor *b*, over which the sand flows by gravity, and drums or cylinders *b*², which are constantly revolved and are provided with longitudinal plates *b*³ of iron. A portion of the said periphery projects through and forms practically a portion of the inclined floor *b*, and the plates as they pass this point are magnetized by the action of electro-magnets *c*, so that the magnetic sand is attracted to the surface of the drum and is carried by it to a small space or opening *b*⁴ left between the periphery of the drum and the inclined floor, the non-magnetic sands being carried by their momentum over the opening. When required, two or more drums having a similar construction and arrangement are employed, as shown. After the magnetic sands have been passed through the opening the blades become demagnetized, so that the sands drop off by gravitation, their removal being completely effected by brushes or scrapers *b*⁵. The black sands are thus carried into a suitable receptacle *b*⁶ below the separator, from which they may be withdrawn through a suitable discharge passage or opening. The non-magnetic sands enter the amalgamator, shown as consisting of a long trough-like passage having a base *d*, which may be made of cast-iron, side walls *d*², and movable covers *d*³, which may be secured by locks *d*⁴ to prevent pilfering of the contents of the amalgamator.

The base *d* is provided with longitudinal passages *e*, connected at the ends of the amalgamator, as shown in Fig. 2, so as to make

practically a single continuous passage up and down the amalgamator, the ends of said passages being connected with inlet and outlet pipes e^2 e^3 , so that steam or other heating-fluid may be caused to flow through the passage and thus heat the base of the amalgamator. The upper surface of the base is provided with suitable pockets f for containing the mercury, and in order to facilitate the introduction of the mercury and removal of the amalgam the said pockets are provided with removable cups g , having handles or stems g^2 , (see Fig. 4,) by which they can be inserted in and lifted out of the pockets by forceps or other suitable tool.

The lifting-handles of the cups may be of any preferred construction, two different kinds being illustrated in Fig. 4, one consisting of a stem rising from the bottom of the cup and the other of a bridge-piece or bail extending from side to side of the cup near its top.

The cups g , charged with mercury, are placed in the pockets f , and the dry sand admitted at the inlet end of the amalgamator is caused to pass through the amalgamator by a blast of air or other gas introduced through a suitable blast-passage h , and in passing over the mercury in the cups g the gold is taken up thereby, the heat enabling the mercury to attack and amalgamate with the gold in certain classes of ores in which the gold is protected by a film of sulphur or similar material which withstands the action of mercury at ordinary atmospheric temperature.

As rapidly as the mercury in the cups becomes charged the said cups and their contents may be removed by raising the covers d^3 of the amalgamator, which are so arranged as to uncover only short sections of the amalgamator at a time, and by removing the cups one at a time and immediately substituting another cup filled with mercury for each cup removed the change may be made without any interruption to the operation of the amalgamator and practically without loss of time or material.

Independent removable mercury-receptacles such as described may be employed with amalgamators of other constructions and without the heating appliances, which are not required for certain classes of ores.

The blast for carrying the dry sand through the amalgamator may be produced by a blower, as indicated at h^2 , or by any suitable

blast mechanism for carrying the sand in dry condition through the amalgamator.

I claim—

1. An amalgamator comprising a long closed trough and means for introducing a blast at one end thereof, the floor of said trough being provided with circulating-passages for heating the same and the surface being provided with a number of independent pockets or recesses, and removable cups contained in said recesses, substantially as and for the purpose described.

2. An amalgamator comprising a long closed trough and means for introducing a blast at one end thereof, the floor of said trough being provided with a number of independent recesses, combined with removable mercury-cups contained in said recesses, said cups being provided with lifting-handles, by which they may be lifted out from said recesses, substantially as and for the purpose described.

3. The combination of the amalgamator, comprising a closed channel or trough having mercury-receptacles in its floor and means for producing a blast through said trough, with an inclined chute leading to the inner end of said trough, the inclined floor of said chute being provided with openings, and movable magnetized bars operating in said openings, whereby the magnetic sands are withdrawn from the chute through the openings in the floor thereof, while the non-magnetic sands are delivered into the amalgamating-trough, substantially as and for the purpose described.

4. The combination of the amalgamator, consisting of a closed channel provided with mercury-receptacles in the floor thereof and means for producing a blast through said channel, with an inlet-chute having an inclined floor provided with transverse openings, rotating drums composed of bars of magnetic material, the periphery of said drum rotating in the openings in the floor of the chute, and means to magnetize the said bars while adjacent to the said openings in their rotary movement, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIMON G. ELLIOTT.

Witnesses:

JOS. P. LIVERMORE,
M. E. HILL.