No. 786,946. PATENTED APR. 11, 1905.

E. S. BENNETT.

MEANS FOR RECOVERING MAGNETIC IRON FROM ORE SEPARATING TANKS.

APPLICATION FILED OCT. 17, 1903.

fig. 1.

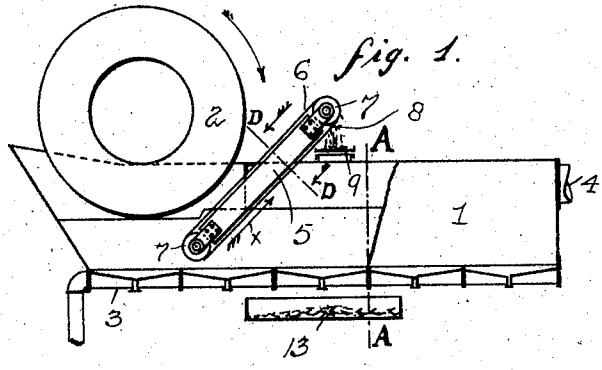


fig. 2.

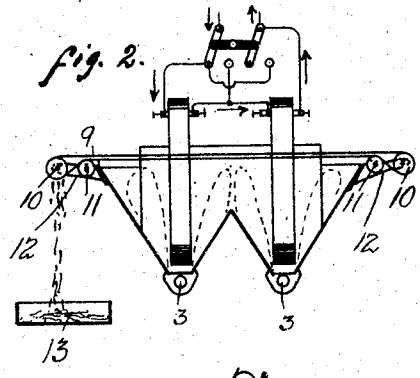


fig. 3.

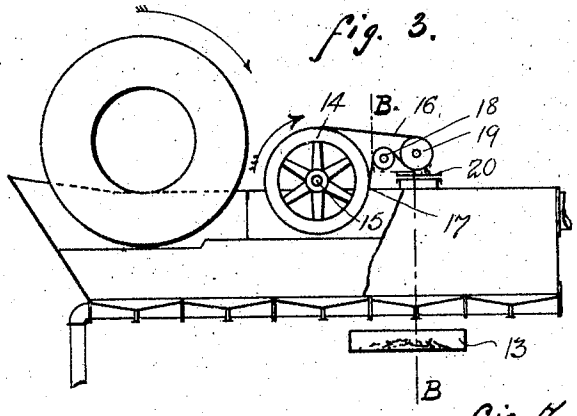


fig. 4.

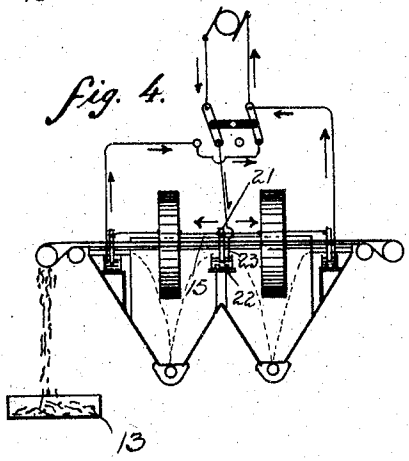


fig. 7.

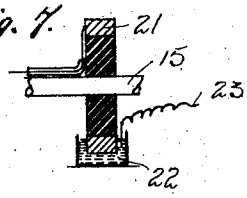


fig. 5.

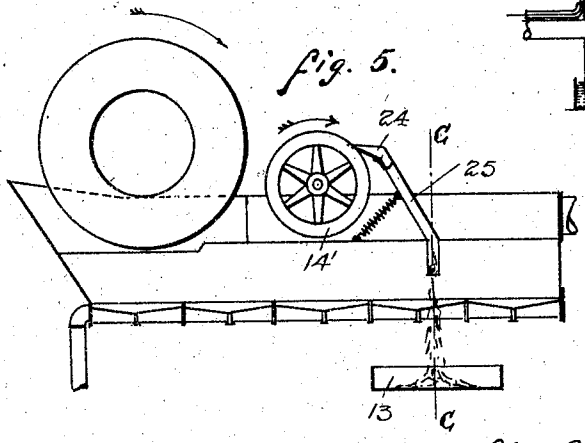


fig. 6.

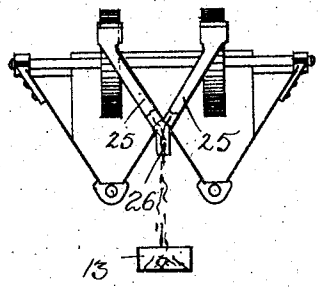
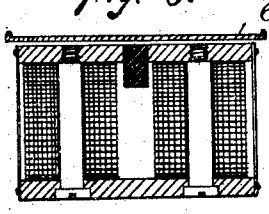


fig. 8.



Witnesses:
J. R. Scott
S. Whaddon

Inventor:
Erastus S. Bennett
by Ellis Spear & Company
Attys.

PHOTO-LITHOGRAPHED BY SACKETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

No. 786,946. Patented April 11, 1905.

UNITED STATES PATENT OFFICE.

ERASTUS S. BENNETT, OF NEW YORK, N. Y.

MEANS FOR RECOVERING MAGNETIC IRON FROM ORE-SEPARATING TANKS.

SPECIFICATION forming part of Letters Patent No. 786,946, dated April 11, 1905.

Application filed October 17, 1903. Serial No. 177,455.

To all whom it may concern:

Be it known that I, ERASTUS S. BENNETT, a citizen of the United States, residing at New York city, New York, have invented certain new and useful Improvements in Means for Recovering Magnetic Iron from Ore-Separating Tanks, of which the following is a specification.

My invention relates to means for removing magnetic iron from placer-sand while the same is being subjected to the action of a gold-saving apparatus, such as an amalgamating-tank or a gravitating-tank of the form, for instance, as shown in an application for Letters Patent of the United States filed by me, Serial No. 177,798, dated October 20, 1903.

All placer-sand has more or less magnetic iron therein, and I aim to subject the placer material while passing through the separating-tank to the action of magnets, so as to extract from the said material the magnetic iron.

The primary object of my invention is to save gold, including the infinitely-fine particles which are found adhering to the exterior of the grains of iron-sand. I do this by subjecting the iron-sand to a scouring action of jets under high pressure, which separates from the said iron-sand the microscopic particles of gold, and the iron-sand particles denuded of the gold are immediately removed from the tank, so as not to interfere with the subsequent recovery of these free gold particles by preventing their gravitation into the pockets provided for their recovery.

The invention consists in the features and the combination and arrangement of parts hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a gold-saving apparatus with my invention applied thereto. Fig. 2 is a transverse sectional view of Fig. 1 on line A A thereof. Fig. 3 is a side view, partly broken away, showing a modified form of the invention. Fig. 4 is a transverse sectional view of Fig. 3 on the line B B. Fig. 5 is a longitudinal sectional view of a separating-tank with a further-modified form of my invention applied thereto. Fig. 6 is a transverse sectional view of Fig. 5 on the line C C thereof. Fig. 7 is a detail view showing circuit connections, and Fig. 8 is a detail sectional view showing the arrangement of magnets and the carrying-belt for the magnetic iron.

My invention is particularly designed for use in connection with a separating-tank of the shape of the letter **V** in cross-section or multiples thereof—such, for instance, as is disclosed in Letters Patent of the United States granted to me March 13, 1894, No. 516,624—though it will be understood that I do not wish to limit myself to this particular cross-sectional form of separating-tank.

Referring to Fig. 1, the tank is indicated at 1, having at one end a rotary grate or separator 2 associated therewith, and in the bottom of the tank a water-distributing pipe 3 is arranged, one for each valley or **V**-shaped formation. The material is introduced through the separator 2 and is subjected to the action of the water which is projected up from the distributing-pipes in the form of jets, as indicated in dotted lines in Fig. 2. The jet-nozzles of the distributing-pipes are so arranged as to throw two series of jets upwardly in each of the valleys, these jets rising from the center of the valley and flowing over to the sides to produce currents passing down along the said sides, so that the ore may be recovered by either gravitating onto suitable ledges on the sides of the valley or will amalgamate with mercury arranged in pockets and on aprons between the pockets supported on the sides of the tank. The jet-nozzles all incline toward the tailings end of the tank, so that there will be produced in each valley two spiral currents of the water, carrying the material up and down the sides of the valley and moving it gradually toward the tailings end, where the tailings and overflow-water discharge through the opening 4.

The invention is particularly designed to recover the minute particles of gold adhering to the iron-sand contained in placer material and to then immediately remove the said iron-sand, so that the same will not prevent the free gold particles from gravitating into the mercury-pockets provided for the recovery of the gold. The separation of the small particles

of gold from the iron-sand is effected by subjecting the iron-sand to the scouring action of the jets, which being under considerable pressure will remove the gold particles from the iron-sand. After this the free gold particles must be recovered by gravitation or amalgamation or by gravitating into mercury-pockets, and were this denuded iron-sand left in the tank it would materially prevent the gravitation of the light and flaky gold into the mercury-pockets by resting on the surface of the mercury and shedding off these lighter particles of gold. I therefore provide means for immediately removing the denuded iron-sand as soon as the gold particles have been removed therefrom, so that the subsequent steps in the process may be carried out without being interfered with by this iron-sand. For this purpose I provide means between the inlet and tailings end of the tank for removing the iron-sand, so that as soon as scoured the iron-sand will be removed, and no opportunity will be afforded for its deposit at points where it would prevent the recovery of the free gold.

In order to remove the magnetic iron contained in the placer material immediately after it has been scoured by the jets, I arrange magnets in the tanks, and in one embodiment of my invention a series of electromagnets 5 is arranged in each of the valleys centrally thereof, as shown in Fig. 2, the said series of magnets inclining upwardly and rearwardly from the lower end of the series, as shown in Fig. 1. The series of magnets are supported in any suitable manner, and encircling the series there is a carrying-belt 6, preferably of rubber, which passes over pulleys 7 at the ends of the series journaled in brackets 8, extending from the support which carries the magnets. The upper end of the belt projects somewhat above the upper edge of the tank, and in the space below there is arranged a transverse belt 9, passing over pulleys 10 and guide-pulleys 11, supported in brackets 12 from the sides of the tank.

Fig. 2 shows the circuit connections leading to the two series of magnets in the valleys of the W-formed tank, and Fig. 1 indicates by the arrow *x* the direction of movement of the recovering-belt. In operation the magnets attract magnetic iron and hold it against the belts, so that the said iron will be carried up out of the tank and over the transverse belt, at which point the magnetic iron will be free from the influence of the magnets and will fall onto the transverse belt, to be carried laterally of the machines to be deposited in a receptacle 13, as shown in Fig. 2. It will be understood, of course, that the magnets are arranged with their pole-pieces directed toward the traveling belt in Fig. 1, and in Fig. 8 I show a detail of the magnets in their relation to the carrying-belt 6.

Referring to Fig. 3, I show another form of my invention, in which instead of having stationary magnets and a belt traveling about the same I mount the series of magnets on the periphery of a wheel 14, carried by a shaft 15, so that its lower periphery will extend down into the tank. Around this magnetic wheel a belt 16 passes, which leaves the periphery of the magnetic wheel at 17 and passes over guide-rollers 18 19, the latter of which overlies a belt 20, moving transversely of the machine and supported and operated, like the transverse belt above described, to deposit the material falling thereon into the receptacle 13. The effect of this arrangement is substantially the same as that taking place in connection with the form above described, the magnets drawing the material against the belt and the said belt after passing away from the face of the magnet discharging the magnetic iron carried by it onto the transverse belt. I do not wish to limit myself to a transverse belt, as the belt shown in Fig. 3 may be extended to the rear to discharge over the tailings end of the tank.

In Fig. 4 I show the circuit connections for the magnetic wheel, from which it will be seen that I arrange on the shaft 15 contact-rings 21, insulated from the shaft and dipping into mercury-troughs 22, to which the line-wire 23 extends.

Instead of using the belt I may, as in Fig. 5, take the magnetic iron directly from the poles of the magnets, and as illustrating this embodiment of my invention I show in this figure a magnetic wheel 14′ made up of a series of permanent or electro magnets carried by the periphery of the wheel and having their poles radially disposed, the said wheel rotating in the direction of the arrow and carrying magnetic iron to a scraper-plate 24, resting against the periphery of the wheel, which takes magnetic iron therefrom and directs the same to a trough 25, leading to a pan or receptacle 13. I show a magnetic wheel in each of the valleys of the tank, and the two troughs 25, as shown in Fig. 6, may unite at the apex of the inner inclined walls of the tank and have a common discharge 26 to the pan 13.

In all the forms shown it will be seen that the magnetic device is arranged centrally of the valley and the laterally-inclined jets of water are not interfered with, but these pass up on each side of the said magnetic device; but they serve also to raise the magnetic iron into the range of the magnetic influence of the poles of the magnet.

I claim as my invention—

1. In combination, with a separating-tank, means for producing a continuous jet or jets for scouring the material in the tank, and a magnetic device for removing from the tank the iron-sand from which the gold has been scoured, substantially as described.

2. In combination with a separating-tank, means for producing a jet or jets for scouring

the material in the tank, and a magnetic device for removing from the tank the iron-sand from which the gold has been scoured, said device being located intermediate the inlet and tailings end of the tank and said tank having means for recovering the gold freed from the iron-sand, substantially as described.

3. In combination with a tank of V shape in cross-section, means for producing a jet or jets therein, directed laterally and rearwardly toward the tailings end of the tank, and a magnetic device for removing from the tank the iron-sand from which the gold has been scoured by the jets.

4. In combination with a tank having upwardly and outwardly inclined sides, jet-nozzles at the lower part of the said tank for producing continuous jets, and a magnetic device above the said jet-nozzles for removing the iron-sand from which the gold has been scoured, substantially as described.

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

ERASTUS S. BENNETT.

Witnesses:
MYRON L. JUSTIN,
J. K. SCOTT.