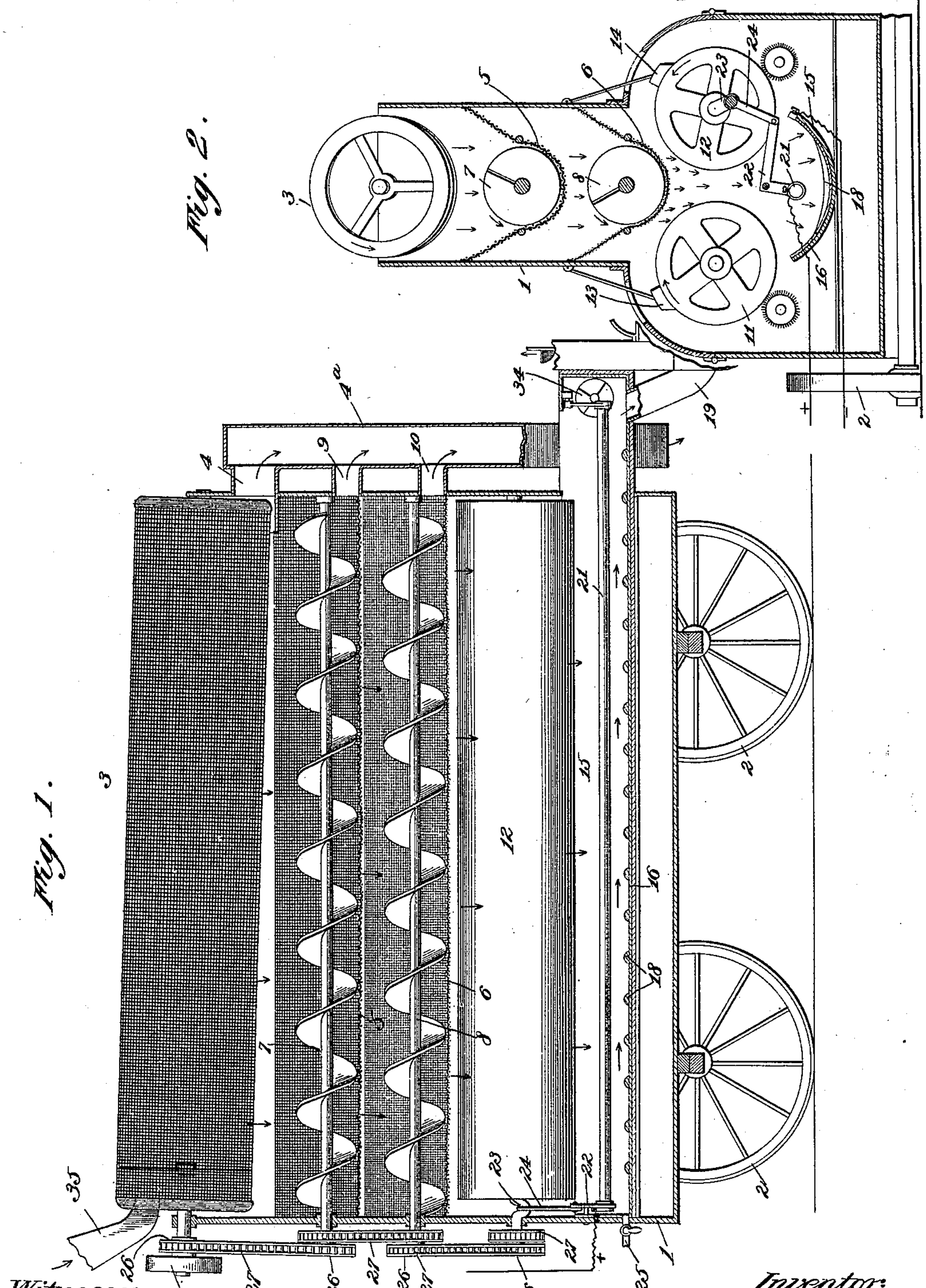
(No Model.)

2 Sheets—Sheet 1.

G. M. URIE.

AMALGAMATOR.

No. 546,749. Patented Sept. 24, 1895.



Witnesses.

Inventor:
George M. Urie.
per
Attorney

ANDREW B. GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

(No Model.) 2 Sheets—Sheet 2.

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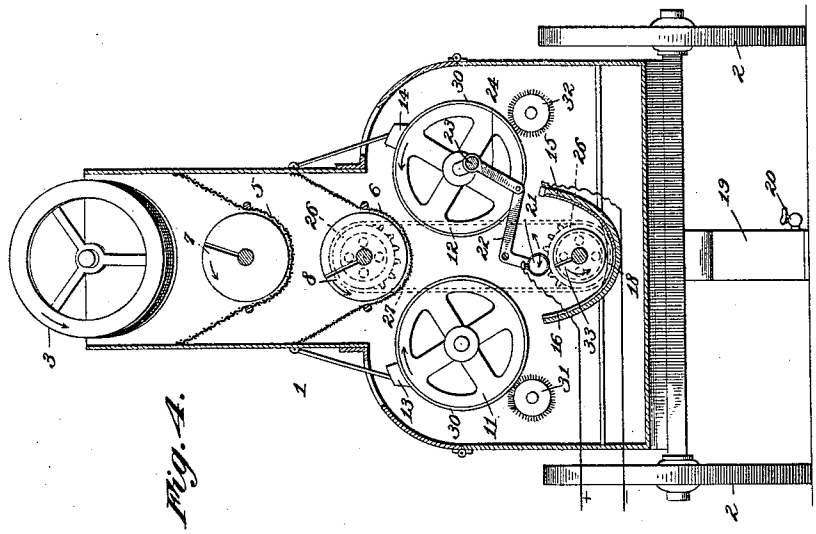

Fig. 4.

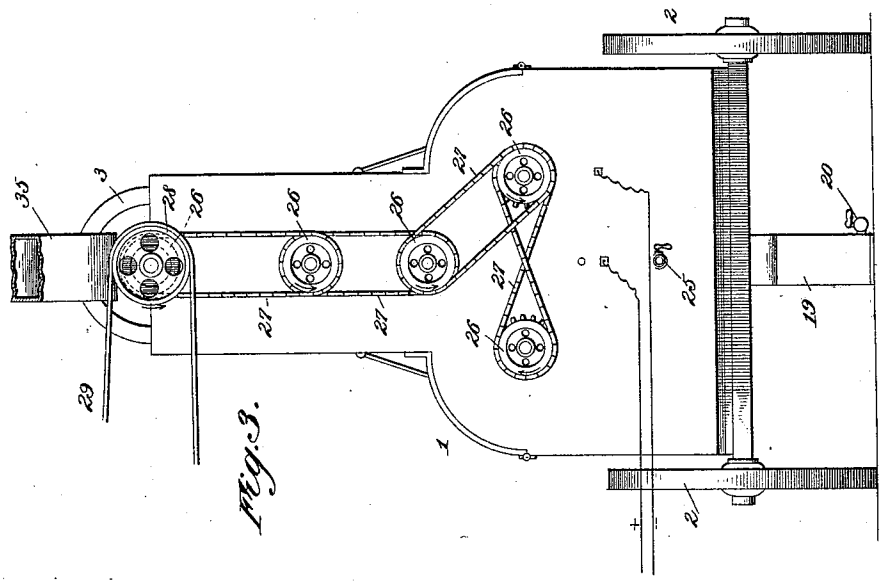

Fig. 3.

Attest.
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UNITED STATES PATENT OFFICE.

GEORGE M. URIE, OF SAN FRANCISCO, CALIFORNIA.

AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 546,749, dated September 24, 1895.

Application filed April 6, 1896. Serial No. 544,608. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. URIE, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Amalgamators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in amalgamators, and more particularly to that class in which electricity is employed to assist in the complete separation of the precious metals from auriferous earth and to save the comminuted particles to be encountered in placer mining. It is a well-known fact that in low-grade placer mining a certain percentage of the metal is in such a fine or flaky state that it will not sink, but floats upon the surface of the water and commingling with the refuse or sand passes through the finest reticulated obstruction and is lost. This percentage of escaping metal is so great that a saving of the same is of great value, especially in the instance of gold. My improved amalgamator not only separates the larger particles or nuggets from the earth or sand, but effects this most desirable object or end.

With these and other objects and advantages in view my invention consists in the novel construction and combination of parts herein shown and described, and more particularly pointed out in the hereto-appended claims.

Like numerals of reference designate like parts throughout the several views of the drawings, in which—

Figure 1 is a longitudinal sectional view; Fig. 2, an end elevation, partially in section; Fig. 3, an end elevation; Fig. 4, an end elevation of a modified form of amalgamator.

1 represents the framework or housing of my amalgamator or separator, which may be stationary or mounted on wheels 2 to facilitate its carriage from place to place. Journaled at the top of the frame and at an incline is the rotary screen or receiver 3, communicating at its lower end by means of a passage 4 with a chute 4^a, into which are directed all substances, as bowlders and the like, too large to pass through the mesh of said screen. Below the rotary screen 3 I provide the semicylindrical stationary screens 5 and 6, the mesh of the former being very much finer than that of the screen 3, while the mesh of screen 6 is finer still than that of screen 5. Within the same are placed the rotary spiral conveyers 7 and 8. These act upon the earth or sand, carrying out into the chute 4^a such portions as refuse to pass through the mesh. While in the present case I have illustrated only two such stationary screens, it is to be understood that in actual practice I may use any number of screens as circumstances may require, the same being graded in mesh from an ordinary size in the rotary sifter to a very fine mesh in the last stationary screen.

At the rear of the screens 5 and 6 and opening into the chute 4^a are the passages 9 and 10. Below the above-mentioned screens in the same horizontal plane and spaced one from the other are the parallel cylinders 11 and 12, constructed of iron and electromagnetized. These cylinders are designed to rotate in the direction of the arrows, and are provided upon the outside of the frame or housing with rubber scrapers 13 and 14, for a purpose hereinafter disclosed. These scrapers extend the full length of the cylinders, which are approximately of the same length as the screens 5 and 6.

Beneath the electromagnetic cylinders 11 and 12 is an amalgamating-trough 15, of a suitable length, provided with amalgam-plates 16 and mercury-riffles 18. Near the rear of the trough is located a waste-mercury well or basin 19, provided with a discharge-pipe 20, having a stop-cock. This well, besides the functions of a waste-mercury catcher, acts as a nugget-saver. In the center of this trough is suspended a carbon rod 21, the same being oscillated by means of the bell-crank lever 22, pivoted to the frame and operated through the medium of an arm 24, attached to the shaft of the cylinder 12 at the crank or bend 23 in said shaft. To this insulated carbon rod is connected the positive terminal of a dynamo, while the negative terminal is attached to the

amalgamated plates, whereby the attractive quality of the amalgamated surface is greatly increased, in which the carbon is the positive and the amalgamed plates the negative pole. Fresh mercury is admitted through the supply-pipe 25, having a stop-cock.

The rotary screen, rotary conveyers, and electromagnetic cylinders are provided with sprockets 26, driven by chains 27, and have motion imparted to them through the medium of a pulley 28 upon the shaft of the rotary screen, and driven by a belt 29.

In Fig. 4 I have illustrated a modified form of amalgamator adapted for use in placer mining in dry or rainless regions, where mining must of necessity be carried on without the use of water.

In this construction of amalgamator I use the same mechanism as in the first form, with the following additions: I surround the cylinders 11 and 12 with copper plates 30, amalgamating the same, the mercury being continually renewed, and below the said cylinders I place revolving brushes 31 and 32, designed to keep the cylinders free from dust. In the amalgamating-trough 15 I journal a spiral conveyer 33, such as is used in the stationary screens, and by it all the fine material is conveyed over the amalgamated plates, mercury-riffles, and waste mercury into the well and finally out of the trough. Dust from the rear or discharge may be eliminated by an exhaust-fan 34.

This completes the construction of my improved amalgamator and separator, and its operation is as follows: The material and water enters the rotary screen or receiver from a delivery-chute 35, stationed near its upper end, and such portion of the auriferous earth as passes through the same falls successively on the stationary screens 5 and 6, being graded in the course of the descent. The tailings from the screens 3, 5, and 6 are conveyed by the spiral conveyers to the delivery-chute 4ª. The earth or sands now in a comminuted condition fall upon the electromagnetic cylinders, which attract any iron, cobalt, nickel, &c., which may be common to the earth. These metals which adhere to the surface of the cylinders tend to deteriorate the delicate amalgams and are eliminated by the rubber scrapers 13 and 14, attached to the frame 1. The refined material now passes into the amalgamed trough 15 and is floated down its length. During the pas sage of the material down the trough, the action of the current of electricity, whose terminals, as hereinbefore stated, are the insulated carbon rod and the amalgamated plates, is to separate from the mass and attract to the amalgamated plates or negative terminal that percentage of metal or fine gold which is floating off and which to this time has defied the saving action of the finest-meshed screens. By this electric action the amalgam is also kept free from deterioration and in condition to do the best work. Such small nuggets as are in the floating mass are caught in the mercury-well, which also acts as a mercury-saver by forming a catch-basin for the same.

In the modification the auriferous earth, after leaving the refining-screens, falls upon the cylinders, which, as stated, are surrounded with copper plates and amalgamated with mercury. The precious metal, such as gold, is by this contact amalgamated, and to remove the same the rubber scrapers are applied as needed and mercury supplied at will. From here the earth or sands drop into the amalgamating-trough, fitted with the spiral conveyer 33, passing over the amalgamed plates, mercury-riffles, and into the waste-mercury well. The well is constructed as an elevator-boot, fitted with wire elevator-buckets, in the rotary motion of which the nugget-sands are revolved through the mercury, and as the débris-sands are elevated out the mercury-amalgam drops through the wire meshes of the buckets back into the mercury-well, thus saving the said mercury.

I do not wish to be understood to limit myself to the precise details of construction herein shown and described, but reserve to myself the right to alter the same without departing from the spirit of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an amalgamator, the combination with the receiving, revolving screen, the stationary screens of finer mesh, to receive the screenings from said revolving screen, and the rotary conveyers, of the revolving magnetic cylinders, located below the same, the amalgamating pan or trough provided with riffle plates and amalgamated plates, the oscillating electrode suspended above said trough, and the conductors connecting said trough and electrode with the negative and positive poles of a generator, substantially as described.

2. In an amalgamator, the combination with the revolving, receiving screen, the stationary screens located below the same, and the rotary conveyers, of the magnetic revolving cylinders, located beneath said screens, the amalgamating pan or trough provided with riffle plates and amalgamated plates, the oscillating electrode suspended above said trough, the conductors connecting the said trough and electrode with the negative and positive poles of a generator, and the non magnetic scrapers, substantially as described.

3. In an amalgamator, the combination with the revolving receiving screen, the vertical chute at one end thereof, the open screens and the revolving conveyers, of the revolving magnetic cylinders located below said screens, the amalgamating pan or trough, provided with riffle plates and amalgamated plates, the oscillating electrode, the bell cranks in which it

is journaled, the arm on the shaft of one of said magnetic cylinders with which it is connected, the conductors connected with said electrode and trough and with the positive and negative poles, respectively, of a generator and the non magnetic brushes, substantially as described.

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

GEORGE M. URIE.

Witnesses:
W. C. REID,
V. H. NUCKOLS.