No. 786,322. PATENTED APR. 4, 1905.

W. F. STEIN.

ORE SEPARATOR AND CONCENTRATOR.

APPLICATION FILED MAY 31, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

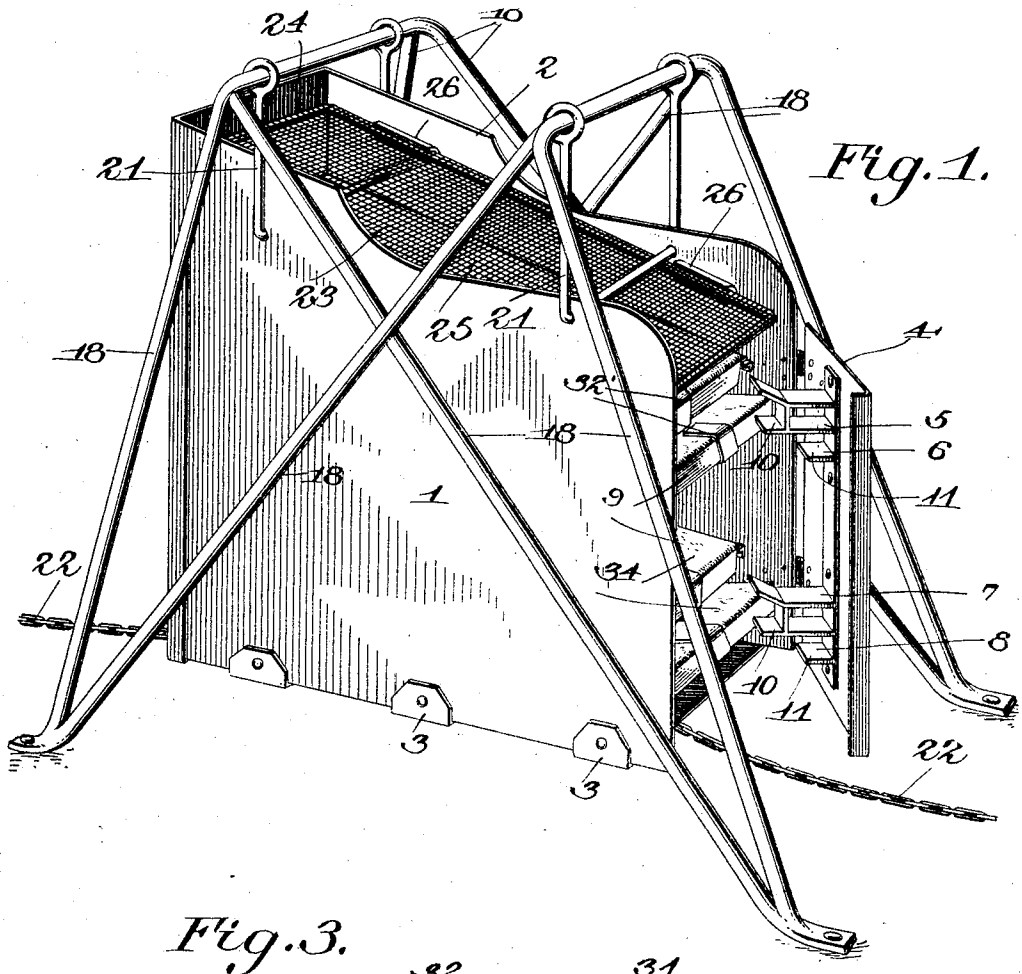
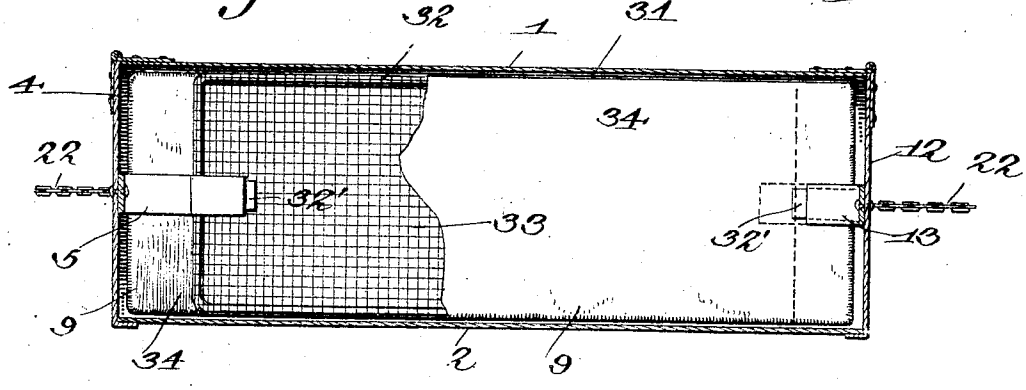


Fig. 3.



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2 SHEETS—SHEET 2.

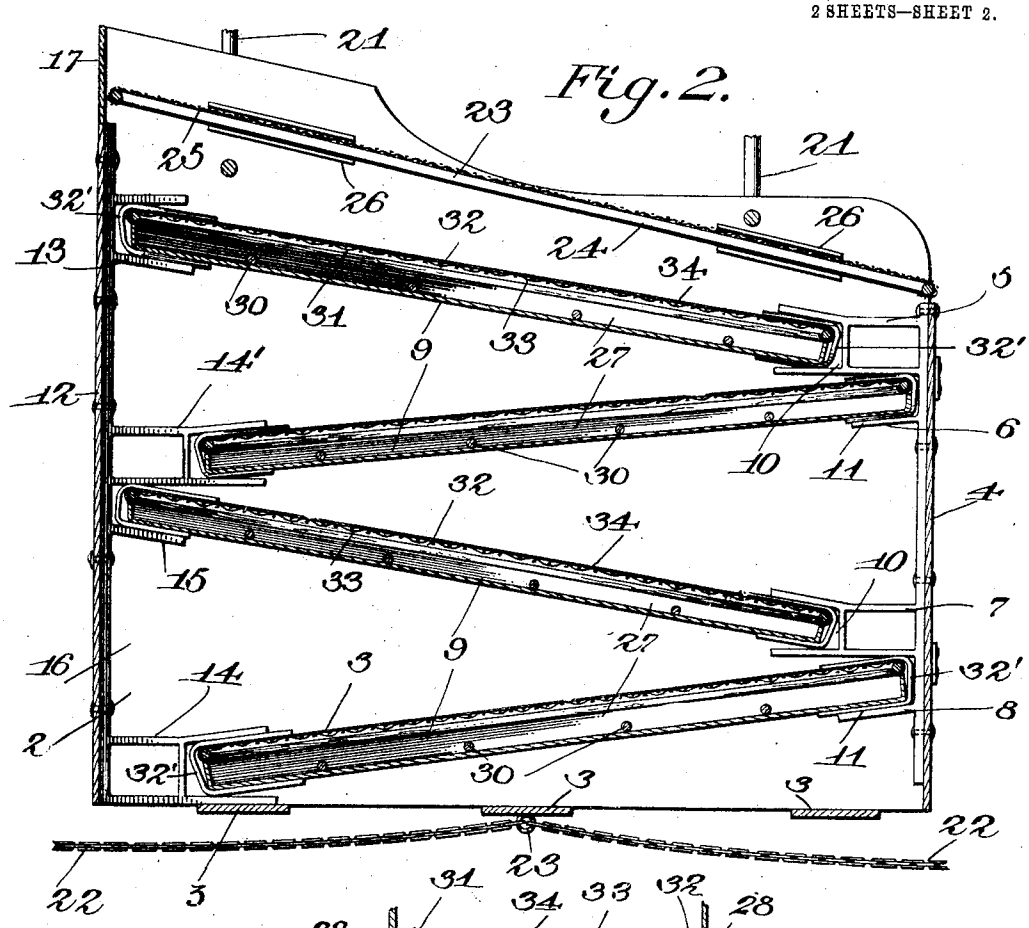


Fig. 2.

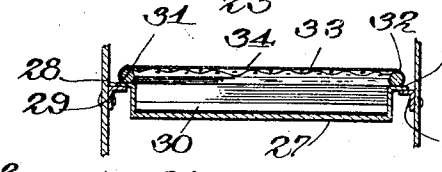


Fig. 5.

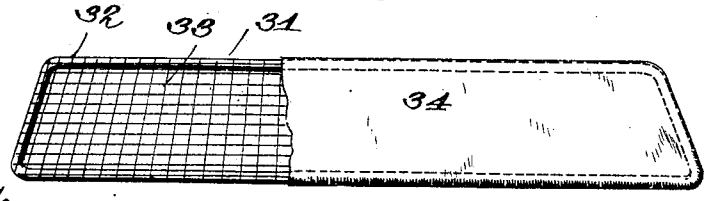


Fig. 4.



Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM FRANK STEIN, OF FORT COLLINS, COLORADO.

ORE SEPARATOR AND CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 786,322, dated April 4, 1905.

Application filed May 31, 1904. Serial No. 210,551.

To all whom it may concern:

Be it known that I, WILLIAM FRANK STEIN, a citizen of the United States, residing at Fort Collins, in the county of Larimer and State of Colorado, have invented a new and useful Ore Separator and Concentrator, of which the following is a specification.

This invention relates to ore separators and concentrators.

The objects of the invention are in a certain and rapid manner to effect separation of gold or other precious metals from the earth or gangue with which they are combined; to catch and retain the finer particles of the precious metal or in the case of gold the flour or float gold; to secure proper separation from the earth to be treated of all large lumps that cannot be properly operated upon and also stones and other rubbish that would tend to injure the machine, and finally to improve, simplify, and increase the efficiency of machines of the class specified.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of an ore separator and concentrator, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate corresponding parts, there is illustrated one form of embodiment of the invention capable of carrying the same into practical operation, it being understood that the elements therein exhibited may be varied or changed as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof.

In the drawings, Figure 1 is a view in perspective of the apparatus viewed from the front with one of the doors open. Fig. 2 is a longitudinal sectional view. Fig. 3 is a horizontal sectional view. Fig. 4 is a perspective view of one of the concentrating-pans with the parts separated and partly in section. Fig. 5 is a view in transverse section through one of the concentrating-pans. Fig. 6 is a detail view, on a large scale, showing the coöperative relation between the screens of the separator-pan and the strainer or cover coöperating therewith.

The shell or casing of the machine comprises two sides 1 and 2, which are connected and held spaced apart by straps or cleats 3, secured to the bottom edges of the sides, the space between the straps or cleats affording ready escape of material thrown from the concentrating mechanism. The front is provided with a door which extends from the lower practically to the upper side of the casing and is furnished on its inner side with a series of irregularly-disposed projections 5, 6, 7, and 8, said projections constituting spacers for holding the concentrating-pans 9 in staggered relation to each other, thus to permit the gangue or slime that escapes from one pan to drop upon the other. As shown, the spacers 5 and 7 have the rear walls of their pan-receiving crotches 10 projecting some distance beyond the inner side of the door, while the crotches 11 of the spacers 6 and 8 have their rear walls disposed adjacent to the door. The rear door 12 is provided with similar spacers, which are disposed reversely to those on the door 4—that is to say, the rear wall of the crotch of the upper spacer 13 is disposed adjacent to the door, while the rear wall of the crotch of the lower spacer 14 is disposed some distance from the door, the remaining spacers 14′ and 15 being reversely disposed to the spacers 6 and 7 of the door 4. By the provision of two doors the concentrating-pans may readily be removed, and access to the interior of the casing may at all times be had without necessity of removing the pans. The rear portion 16 of the casing is connected by a cross-piece 17, the under edge of which serves as a lintel for the rear door 12, as shown in Fig. 2. The casing is suspended for rocking movement upon a framework comprising four inwardly-inclined uprights 18 on each side, which serve as supports for the upper ends of a pair of bails 21, the said bails being secured in any suitable manner to the sides of the cas-

ing, as by being passed through openings therein, as clearly shown. Swinging motion may be imparted to the casing in any preferred manner, and in this instance two chains 22 are shown, the inner end of each of which is secured in an eye 23, carried by the center strap. By pulling upon either of these chains the desired reciprocatory movement will be imparted to the casing.

The separating or concentrating mechanism embodies a grizzly 23 and a plurality of concentrating-pans 9, above referred to. The grizzly comprises a rectangular frame 24, to which is secured a screen 25, preferably of wire having about one-quarter of an inch mesh, as this size mesh permits the finely-divided earth to pass to the concentrating-pans, but effectually divides out large lumps of earth, stones, or other rubbish, which if allowed to pass to the concentrating-pans might injure the same. The grizzly is held in an inclined position over the concentrating-pans by guides 26.

Each of the concentrating-pans, to which reference has been made and which constitute one of the essential features of the present invention, embodies a pan 27, having lateral flanges 28, said flanges being designed to engage with pairs of guides 29, secured to the inner sides of the casing. In this instance four concentrating-pans are shown, and the four sets of guides are arranged on opposite inclines, thus causing the material to traverse a zigzag path while being treated. In order to retain any fine gold or other precious metal separated from the gangue, the bottom of each pan is provided with a series of riffles 30.

Combined with each concentrating-pan is a screen 31, embodying a frame 32, with which is combined wire-netting 33 and a covering of burlap or other suitable flexible material 34. The netting 33 has its meshes by preference about two inches square, and the burlap is loosely combined with the frame 32 in order to allow it to sag between the meshes of the netting, as shown in Fig. 6, and thus form pockets which will catch and retain any separated precious metal and prevent it from passing to the next succeeding pan. In order to keep the screen 31 combined with the concentrating-pan, a suitable cleat or clamp 32′ may be employed, which will be sprung around the frame of the screen and under the bottom of the pan and at one or both ends, as may be found necessary or desirable.

In the operation of the device the pans are disposed in the manner shown in Fig. 2, the spacers on the doors serving to hold them in the position shown, so that each pan overlaps the adjacent pan at one end. The material is fed to the separating-screen 25, where the finer material is separated from the coarse gravels and the rocks and the like. Water is supplied in the usual manner to the apparatus, as will be understood. As the casing is vibrated through the medium of the chains 22 the material on the burlap is agitated and the finer particles are caused to sift through the burlap and into the pans, while the coarser particles sink into pockets formed by the burlap projecting through the meshes of the netting 33. After the operation has been carried on the proper time the doors are opened and the concentrating-pans are removed, freed of their contents, and again replaced for further use.

The machine of this invention, while exceedingly simple of construction, will be found of the highest efficiency and durability in use and will in a positive and economical manner effect separation of precious metals from their earths. Moreover, the machine herein described is designed and adapted especially for dry separation or concentration, so that it can be used in operating on placer material in localities where water is available only with difficulty or cannot be obtained, and while the apparatus is especially designed to make it possible and at the same time profitable to handle material without the use of water and at the same time effect the necessary concentration it will be understood that its usefulness is not necessarily limited to work in connection with placer material.

Having thus described the invention, what is claimed is—

1. In a machine of the class described a casing, concentrating-pans arranged therein in oppositely-inclined order, and doors carrying spacing elements projecting at different distances therefrom to hold the pans properly positioned with relation to each other.

2. In a machine of the class described, a concentrating element comprising a pan provided with riffles, and a frame detachably connected therewith and comprising a netting and a covering of flexible fabric therefor overlying the riffles and adapted to sink between the meshes of the netting to present ore-collecting pockets.

3. In a machine of the class described, a casing provided on its sides with oppositely-inclined guides, in combination with concentrating-pans having flanges to engage the guides, and doors having spacers projecting at different distances therefrom to hold the ends of the pans in staggered order with relation to each other.

4. In a machine of the class described, a framework, a casing suspended therefrom for swinging movement and having its top and bottom open and its inner sides provided with oppositely-inclined guides, concentrating-pans having flanges engaging the guides, doors arranged at the ends of the casing

and provided with spacers projecting inward at different distances therefrom to hold the ends of the pans in staggered order with relation to each other, a detachable grizzly arranged above the upper pan, and means for vibrating the casing.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM FRANK STEIN.

Witnesses:
NEWTON W. CROSE,
HARRY E. KNOWLTON.