(No Model.)

F. B. MORSE.

ORE CONCENTRATOR.

No. 386,552. Patented July 24, 1888.

Fig. 1.

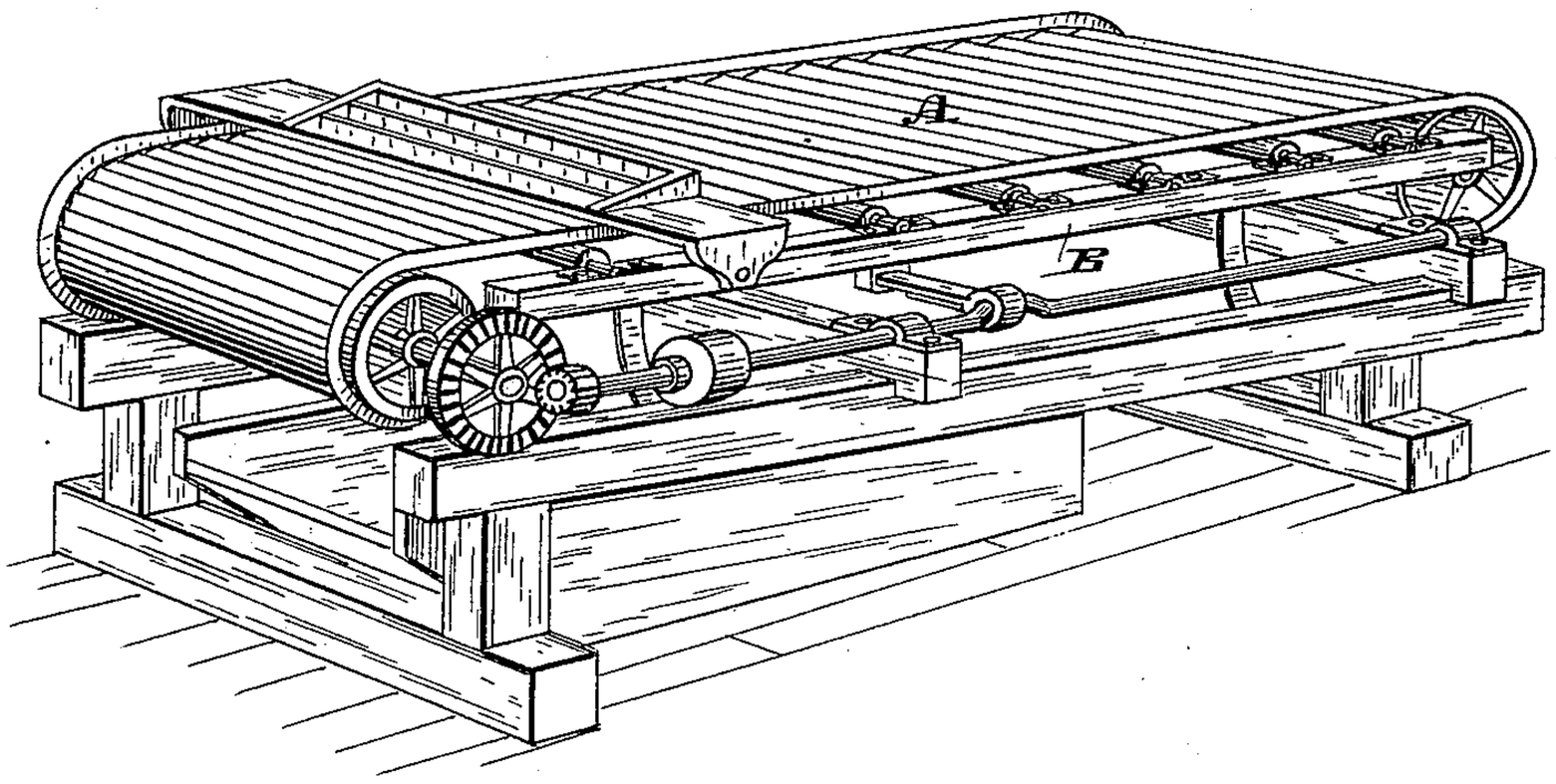


Fig. 2.

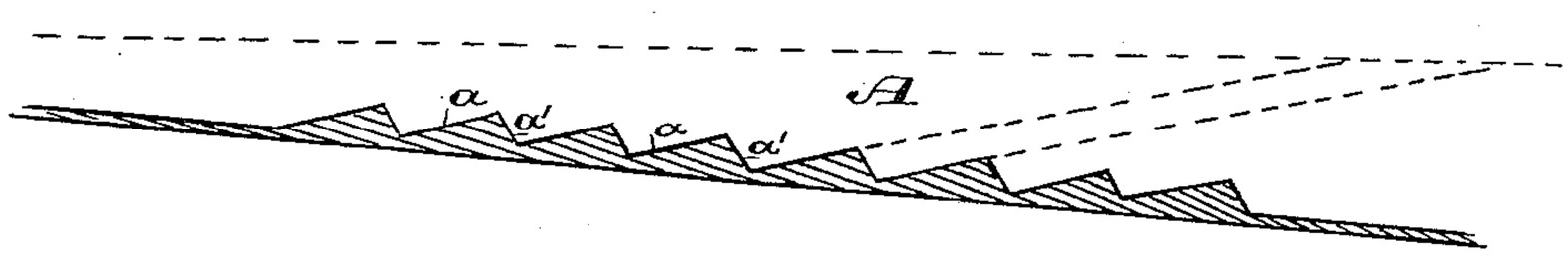
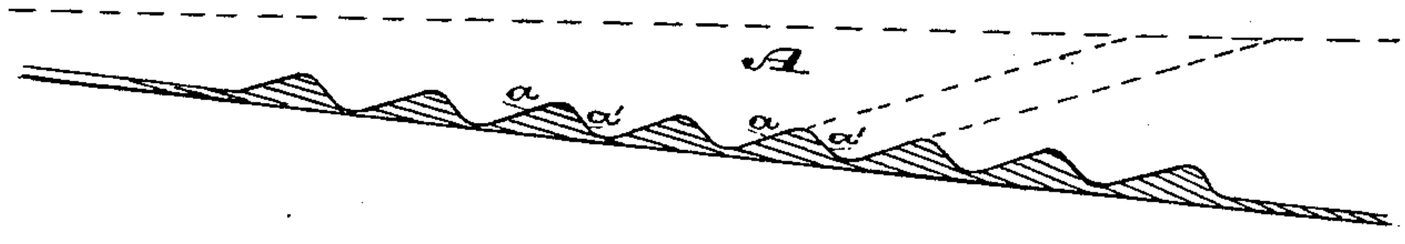


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANK B. MORSE, OF MURPHY'S, CALIFORNIA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 386,552, dated July 24, 1888.

Application filed March 5, 1887. Serial No. 229,865. (No model.)

To all whom it may concern:

Be it known that I, FRANK B. MORSE, of Murphy's, in the county of Calaveras and State of California, have invented an Improvement in Ore-Concentrators; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to that class of ore-concentrators in which an endless traveling belt is employed and to which a positive shaking motion is imparted.

My invention consists in a concentrator the endless traveling belt of which is formed or provided with an operating-surface of the peculiar character hereinafter fully described, and set forth in the claims.

Referring to the accompanying drawings, Figure 1 is a perspective view of the ore-concentrator, showing my belt. Fig. 2 is a longitudinal section of the belt, showing the peculiar character and form of its surface. Fig. 3 is a modification of the same, and shows the short vanning-surfaces connected by curved surfaces.

My invention is applicable to any of the endless-belt concentrators. These machines differ from one another in details of construction relating to the frame-work and the mechanisms for imparting to the belt its several motions; but they all resemble one another in the employment of a common feature—namely, the endless traveling belt to which a positive shake is imparted. These belts have been made of canvas, especially the earlier ones, but they are now usually made of rubber. Their sides have guard-flanges and their surfaces are smooth. They are set at a slight inclination, and have imparted to them what is known as an "uphill" travel, at the same time receiving a supplementary motion, which is known as a "shake," this latter being either sidewise, endwise, a rotary movement, or an eccentric movement resulting from the combination of simple movements.

In the accompanying drawings I have shown a machine of this class which is well known, and which will require no further description than to say that the endless belt is supported at an inclination upon a frame, B, and has a shake imparted to it, said belt having an uphill travel and passing down underneath through a washing-tank, whereby the sulphurets which cling to its surface are deposited, the ore being fed on the surface of the belt together with a stream of water.

The general operation is that the stream of water flowing down the inclined belt carries the lighter or waste particles of the pulp with it to the lower end, while the heavier particles or sulphurets cling to the surface of the belt and proceed upwardly with its travel against the flow of water, pass around the upper end, and are deposited in the tank below. Now, instead of using the ordinary belt with a flat or smooth surface, I employ an endless belt, A, the surface of which is formed as I shall now describe.

By referring to Fig. 2 it will be seen that the surface of the belt consists of a continuous series of short vanning-surfaces, *a*, rising at a considerable angle to the horizon and to the general grade of the belt. These elevated vanning-surfaces are connected by a series of steep inclined surfaces, *a'*. This construction changes the vanning-surface of the belt from a downwardly-sloping surface, as in a smooth belt, to a partially upwardly-sloping surface.

The operation of this belt is as follows: The water and pulp flow down the depressed surfaces *a'* and are forced up and over the elevated surfaces *a*, and on these latter surfaces the vanning or separation of the lighter and heavier particles takes place. On a plane-surfaced belt the separation depends largely upon the adhesion of the heavier particles to the belt; but by having these vanning-surfaces *a* elevated, as shown, there is, in addition to the adhesion of the heavier particles, a separation due to the difference of specific gravity of the particles in a current of water. The current of water flowing up the inclined elevated surfaces *a* will take with it the sand or lighter particles, while the sulphurets or heavier particles will move downward on these surfaces through this current of water and lodge in the angles between *a* and *a'*. In this way the vanning-surface of the belt becomes a positive one, dependent chiefly upon the specific gravity of the particles flowing over it, and not merely a nominal one, as in the case where such surface is sloping, as in a smooth belt. This elevation of the vanning-surface greatly facilitates the action of separating, vanning, or concentrating, and does the work on a much shorter belt.

The vanning-surfaces *a* must necessarily be comparatively short in order to insure the upward flow of the water on them. The length of such surfaces and their grade are determined by the size of the average particles of pulp which pass over them. The force of the current of water over them and the inclination of the surfaces can be regulated at the same time by raising or lowering the belt. A much shorter belt of this description will do better and cleaner work than an ordinary plane-surfaced belt. It will work with a thin stream of pulp, instead of requiring a heavy load. A larger stream of water can be used, and any variation in the amount of pulp may be permitted—a thing which would be fatal in case of a common smooth belt. Though I have in Fig. 2 shown the surfaces *a* and *a'* forming a sharp angle by their intersection, I prefer to connect them as shown in Fig. 3, in which the surfaces *a'* are curved. In this form the change of direction of the current of water from the vanning to the connecting surfaces and the reverse is made more smoothly and effectively for the result desired.

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

1. In a concentrator, an endless traveling belt mounted at an inclination and having its working-surface composed of the series of short transverse upwardly-inclined vanning-surfaces *a*, and the downwardly-inclined surfaces *a'* connecting them, substantially as described.

2. In an ore-concentrator, the combination of a supporting-frame, an endless traveling belt mounted at an inclination therein and having its working-surface composed of the series of short transverse vanning-surfaces *a*, elevated or inclined from the horizontal, and the downwardly-inclined surfaces *a'* connecting them, and means, substantially as described, for vibrating said belt.

In witness whereof I have hereunto set my hand.

FRANK B. MORSE.

Witnesses:
J. W. WILLARD,
H. C. TYLER.