

J. H. PADDOCK.
Ore-Separator.

No. 218,896.

Patented Aug. 26, 1879.

Fig. 1.

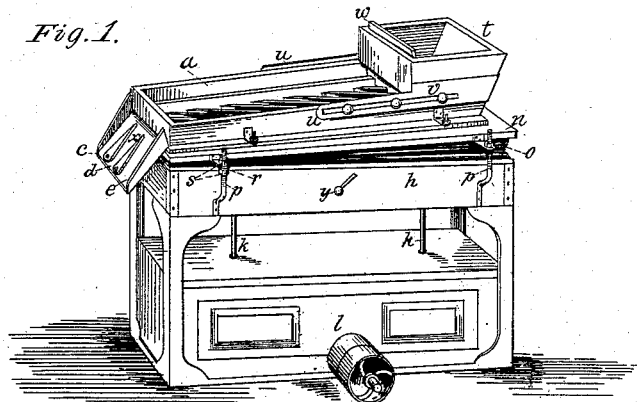


Fig. 2.

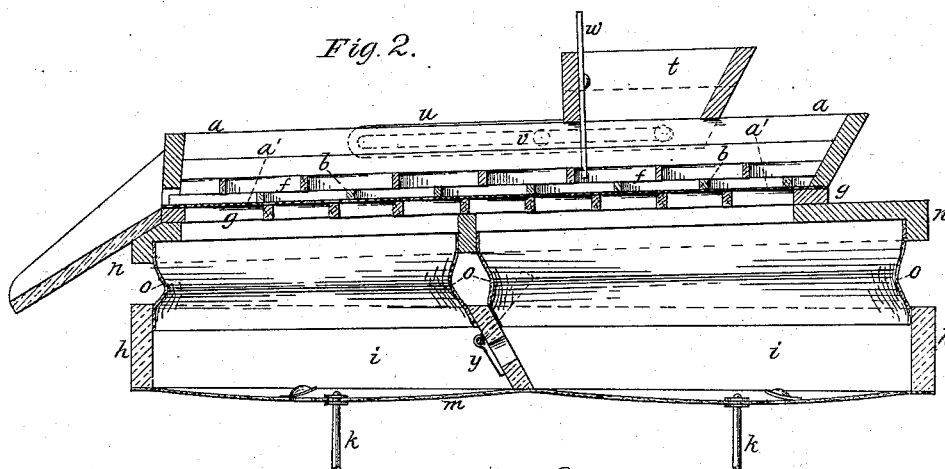
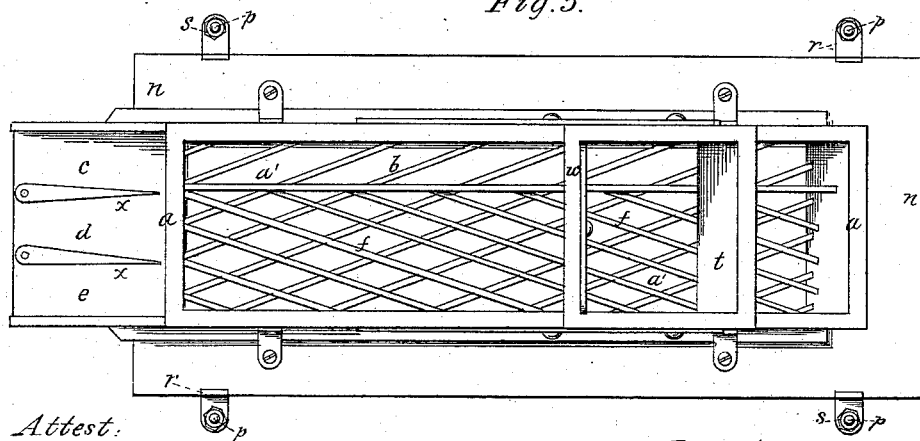


Fig. 3.



Attest:

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UNITED STATES PATENT OFFICE.

JOHN H. PADDOCK, OF ST. JOHNSBURY, VERMONT.

IMPROVEMENT IN ORE-SEPARATORS.

Specification forming part of Letters Patent No. **218,896**, dated August 26, 1879; application filed February 28, 1879.

To all whom it may concern:

Be it known that I, JOHN H. PADDOCK, of St. Johnsbury, Caledonia county, State of Vermont, have invented certain new and useful Improvements in Ore-Separators, of which the following is a specification.

In the drawings annexed, Figure 1 is a perspective view of my improved machine. Fig. 2 is a longitudinal section of the upper part, and Fig. 3 a plan thereof.

My invention is an improvement on that class of machines such as patented to Thos. J. Chubb August 20, 1857, the title to the extended term of which, and to the Reissue No. 5,033, granted thereon, being now vested in myself. In this class of machines the pulverized ore is fed over an inclined and grated bed, through which pulsations of air are forced, which cause the ore to separate in layers arranged according to their specific gravities, the heavy or more metallic particles gravitating to the bottom and running to the most inclined side, where they are delivered, while the lighter particles rise to the top and are delivered from the higher side.

My improvements aim to render the action of these machines more sure and effective, and adapted to various kinds of ore, by enabling such adjustments of the bed or table to be obtained; also the position of the feeding-hopper and the inflowing stream of ore to be so controlled, as will enable the point of separation to be so regulated as to occur at or near the point of delivery; and also in such a construction of the air-chamber or bellows as will allow of its air-holding capacity being increased or diminished at will, or allow of the ore-bed, forming its top, being set at varying distances from its air-forcing part, whereby the effect of the blast may be varied, thus causing the machine to act with certainty and without waste on different ores.

The general construction of the machine, as shown in the drawings, with the exception of those features which constitute the present invention, is substantially the same as shown in the aforesaid patent to Chubb, and also in the latter patents granted to the said Chubb, September 1 and October 13, 1857.

a is the table or bed of the machine, formed

in the usual way, and set at a slight incline both sidewise and lengthwise. The dry pulverized ore is fed into the hopper at one end, and, after traversing the bed, is delivered from the opposite end in a separated condition through the three deliveries *c d e*, as shown, the metallic or heavy particles being delivered at the lower corner, the more earthy particles, or tailings, being discharged at the higher corner, while the middlings issue from the center, the different streams being properly divided and directed by the pivoted sluices or partitions *x x* in the manner usual in these machines.

The bed of the table is formed of strong cloth, *a'*, through which the pulsations of air are forced, and on this a number of gratings or diagonal bars, *b f*, are fixed, the lower bars, *b*, running toward the inclined side of the bed, while the upper bars, *f*, run at a reverse inclination to the opposite side of the machine. The spaces between the lower bars form channels, into which the heavier particles gravitate, and are thereby guided to the lower or ore-discharge corner, while the earthy particles rise between the upper bars, and are guided in an opposite direction to the outlet for the tailings and middlings in the usual manner.

The cloth bed *a'* rests on the grated plate *g*, fixed on the top of the air-chamber or bellows *h*, its bars corresponding with the lower bars, *b*, on the upper side of the cloth, which is thus clamped between the two gratings, as shown, while the air is forced through the cloth in the spaces between the bars.

The air-chamber is divided beneath the table, as shown in Fig. 2, into several distinct sections or cavities, *i*, each forming an independent bellows to actuate a distinct area or section of the cloth bed, and these bellows are operated by the rods *k k*, which are actuated by mechanism within the hollow base of the machine, as shown in Fig. 1, from which the driving-pulley *l* extends and by which power is applied to the machine.

In the improved machine, as shown in Fig. 2, I prefer to divide the air-chamber by a central longitudinal and transverse partition into four chambers, each forming a separate bel-

lows, the bottom or movable part of which is preferably formed by a diaphragm of rubber, *m*, fixed to the edges of the air-chamber and to its partitions, as shown.

Now, in my improved machine the base is adapted to be fixed firmly to the floor or other support, while the table or bed is made universally adjustable with reference to the air-chamber or bellows and fixed part of the machine, so that any inclination may be given to the table, which constitutes the main feature of my invention. The frame or top *n*, on which the table or ore-bed is mounted, is connected, as shown, with the air or bellows chamber by the flexible leather or rubber sides *o o*, and which, as will be observed, enable the table to be inclined either lengthwise or sidewise, or in both directions, but without allowing any escape of air except through the cloth bed.

Screws *p p* project from the sides of the air-chamber near its four corners, and pass through short brackets *r r* projecting from the corresponding corners of the frame, while nuts *s s* are fitted upon the screws above and below the brackets, so that by turning these nuts any desired inclination, either lengthwise or crosswise, or both combined, may be given to the bed, which at the same time will be firmly held in the desired adjustment, as will be readily understood.

It is found that different ores require different inclinations of the bed, both lengthwise and crosswise, in order that separation shall occur quickly and perfectly, and also that the point of separation shall occur as near as possible to the point of delivery, for some ores separate at a much shorter travel than others, so that one kind of ore would become separated and again mixed before it reached the outlet with the same adjustment of the bed which would be correct for another kind of ore. It will be seen, however, that the universal adjustment which my improvement provides adapts the machine for all kinds of ores, and renders its separating action always certain and effective.

Heretofore the bed of these machines has been firmly fixed to the air-chamber or bellows, and any inclination or adjustment of the bed had to be obtained by blocking up the machine.

Now, another feature of my invention, which also contributes to the same result above described, consists in the adjustable hopper *t*, which is capable of being moved back and forth on the bed to deliver the inflowing stream of ore at any part thereof, thus increasing or decreasing the travel of the ore, and causing the separation to occur at the desired point.

The hopper rests on the edges of the trough of the bed, as shown, and is provided with slotted arms *u u*, which embrace the sides of the trough and are guided by pins *v*, the hopper being also fitted with a gate, *w*, by which the flow of the ore is governed. Instead of a single movable hopper, a long hopper, made in a

number of compartments, each fitted with a gate, may be employed, the ore being fed into and out of either of the compartments, according to the travel to be imparted to the ore.

A valve, *y*, is preferably employed between the different sections of the bellows to allow the air to escape from one series of bellows into the other in cases where a portion of the bed will be covered with a thick layer of ore, as when the hopper is adjusted forward, in which case the bed back of the hopper will be covered with the ore.

It will be readily understood that any suitable adjustable air-tight connection of the bed-frame with the bellows-chamber may be employed instead of the flexible sides *o o*. Thus the bed-frame may be provided with pendent sides to fit into the bellows-chamber like a "box-bellows," a tight joint being effected by a marginal packing or a rubber curtain. The construction illustrated, however, is preferred.

It has been found advantageous to vary the size of the air-chamber, so as to increase or diminish the amount of air contained in it, whereby the steadiness of the blast may be varied to suit circumstances, as the larger the air-chamber the steadier is the blast. This can be done by raising or lowering the ore-bed on the frame, or, in other words, bringing the top and bottom of the air-chamber or bellows closer together. This closeness of the bed to the acting part of the bellows will also affect the power of the blast on the ore independent of the amount of air in the chamber beneath the ore-bed.

What I claim as my invention is—

1. A pneumatic ore-separator provided with an adjustable ore-bed, connected with the air-chamber or bellows by an air-tight connection, whereby the inclination of the ore-bed may be changed without altering the position of the bellows or bellows mechanism, substantially as herein set forth.

2. The combination, with the adjustable ore-bed and bellows, of the flexible sides connecting the two, substantially as and for the purpose specified.

3. The combination of the supporting-screws *p p* and adjusting-nuts *s s* with the ore-bed *a* and air-chamber *h*, having a flexible air-tight connection, *o*, substantially as herein shown and described.

4. The combination, with an ore-separator, of a hopper adjustable over the bed, whereby the ore may be delivered at different points over said bed, substantially as and for the purposes set forth.

5. An ore-separator provided with an ore-bed and an air-chamber or bellows, combined with suitable adjusting devices, whereby the ore-bed may be set at varying degrees of distance from the acting part of the bellows, substantially as specified.

6. In an ore-separator, the combination of an air-chamber or bellows with adjusting devices attached to its casing, whereby a por-

tion of said casing may be extended to increase its air-holding capacity independent of the air-forcing parts, substantially as described.

7. In combination with the bed of an ore-separator, an air-chamber or bellows having independently-adjustable walls, whereby the capacity of said bellows or chamber may be

graduated without changing the position of the air-forcing parts, substantially as described.

JOHN H. PADDOCK.

Witnesses:

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JOHN E. GAVIN.