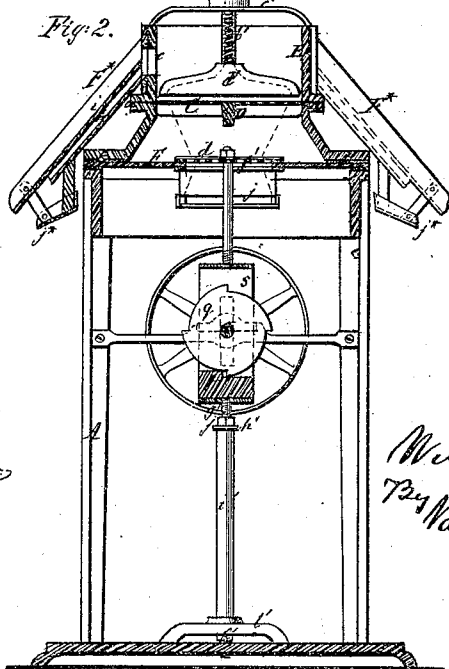
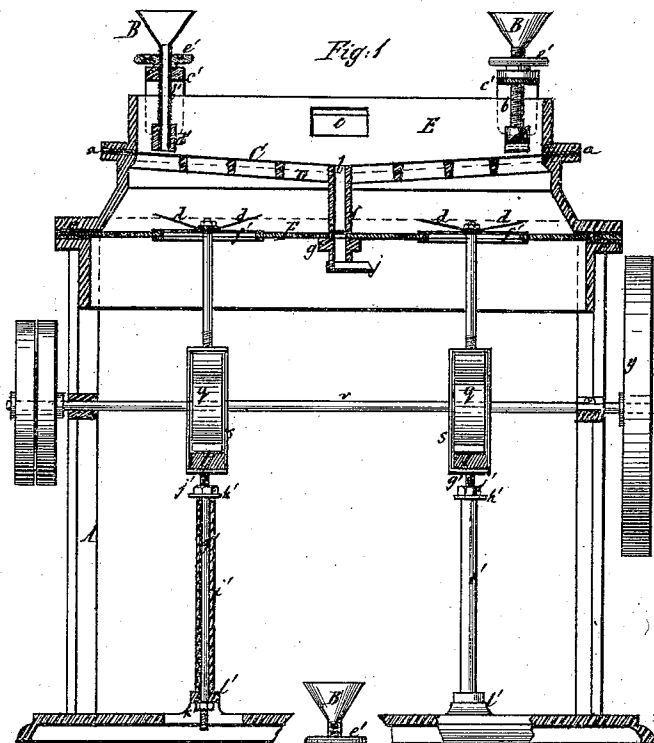


W. Hooper.

Ore Separator.

No. 112,918.

Patented Mar. 21. 1891.



Witnesses:
C. Mahler
E. J. Kastenhuber

Inventor:
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his atty

UNITED STATES PATENT OFFICE.

WILLIAM HOOPER, OF TICONDEROGA, NEW YORK.

IMPROVEMENT IN ORE-SEPARATORS.

Specification forming part of Letters Patent No. **112,918**, dated March 21, 1871; antedated March 10, 1871.

To all whom it may concern:

Be it known that I, WILLIAM HOOPER, of Ticonderoga, in the county of Essex and State of New York, have invented a new and useful Improvement in Dry-Ore Separators; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 represents a longitudinal vertical section. Fig. 2 is a transverse section.

Similar letters indicate corresponding parts.

This invention relates to certain improvements in that class of machines in which intermittent blasts, jets, or currents of air are projected or forced through a perforated plate, sieve, or porous bottom or bed containing ore or other substance to be separated, so as to loosen and agitate the mass in a manner which has been found peculiarly favorable for separating lighter from heavier grains, granules, or particles, the lighter being driven upward while the heavier particles sink and arrange themselves below in strata according to their specific gravities.

The improvements in this new machine consist in, first, a driving mechanism, constructed with cams or trip-wheels, or eccentrics mounted on the driving-shaft, and acting on shoes in cages which embrace the trip-wheels or eccentrics, and are connected at one end to a flexible bellows-diaphragm, and at the other end to adjustable rods, which are subjected to the action of springs in such a manner that a very quick impulse can be imparted to the flexible diaphragm in its upper throw without exposing any of the moving parts of the driving mechanism to injurious blows or shocks, and that the length and frequency of the strokes and of the movements of the diaphragm can be increased or decreased at pleasure; secondly, a feed-mechanism composed of hoppers, which can be raised and lowered, and which are connected with gages extending across the ore-bed in such a manner that by adjusting said gages the depth of the ore-bed can be regulated to suit the nature of the material to be separated.

The other parts of my machine are substan-

tially the same as described in the specification annexed to the Letters Patent issued to me by the United States, No. 101,132, dated March 22, 1870.

While the driving mechanism therein described satisfactorily serves the purpose intended, I found it would be preferable in the treatment of some kinds of ores to construct such driving mechanism so that the vibration of the flexible diaphragm would be produced by having it brought down by means of cams or trip-wheels, or by eccentrics, and thrown upward to force the air through the mass on the ore-bed by means of a spring or springs.

It will be seen, on referring to such specification, that I then had such a new device in contemplation, and that I therein intimated my intention of thereafter making application to have the same secured to me by Letters Patent.

Since making application for the Letters Patent above mentioned, I have also found it desirable to invent and adopt an improved method of feeding and distributing the ore upon the ore-bed. This new driving mechanism and this new device for feeding and distributing the ore upon the ore-bed form the subject of the present application, and I will incorporate in this specification as much of the other parts of the machine as may tend more clearly to elucidate what I now desire to secure by further Letters Patent.

In the drawing, the letter A designates a frame, made of metal or any other suitable material, and so constructed that it is capable of supporting the driving mechanism, the bellows, the ore-bed, and other working parts.

The ore or other substance to be treated by this machine, if not already in a pulverized or granular condition, is first reduced to the required fineness by suitable crushers or stampers, and it is then fed into the hoppers B, from which it is allowed to run out and to spread over the ore-bed C. Said hoppers are provided with tubular screw-shanks *b'*, which extend loosely through a bridge-piece, *c'*, and to the lower end of which are connected the gages *d'*. Suitable hand-wheels *e'*, the hubs of which are provided with internal screw-threads, fit on the screw-shanks above the bridge-pieces *c'*, so that by turning said hand-wheels the

hoppers, together with the gages, are raised or lowered. By this arrangement the stratum of ore on the ore-bed can be easily retained at a uniform depth, and the depth of said stratum can be regulated to suit the nature of the material to be separated.

The ore-bed is constructed of a perforated plate of sheet metal, or of wire-gauze, or of cloth, buckskin, or other porous material, and it is supported by a grate, D, to the top of which is secured a box, E, which supports the bridge-pieces *c'*, carrying the hoppers B. Said ore-bed is clamped between the upper surface of the grate D and the bottom surface of the box E, and a packing-piece, *a*, of india-rubber, or other suitable material, is interposed so as to produce an air-tight joint.

The bellows which I use, in preference to any other, is constructed of a diaphragm, F, made of india-rubber or other suitable flexible material, and provided with air-valves *d*, as shown in Fig. 1 of the drawing. This diaphragm is clamped between the supporting-frame of the grate D and the main supporting-frame A, and it receives a reciprocating motion by the driving mechanism that will be presently described.

The joint between the supporting-frame of the grate D and the diaphragm is rendered air-tight by clamping the outer edges of the flexible diaphragm between such frame D and the main supporting-frame A; and I sometimes insert a packing-piece, *e*, of india-rubber or other suitable material, which serves to protect the diaphragm from abrasion, wear, or injury by being brought in contact with the frames between which it is clamped. This packing-piece may be cast or cemented upon the rubber diaphragm; but the risk of wear is so slight it may be dispensed with entirely without material injury to the machine.

When the ore-bed is constructed with a bottom delivery the diaphragm F is perforated in its middle with an aperture corresponding to such bottom delivery, and a tight joint is produced round this aperture by a cross-bar, *f*, secured to the supporting-frame of the grate D, and pressing the diaphragm down upon another cross-bar, *g*, secured to or forming a portion of the main frame A, both cross-bars being perforated with apertures corresponding to the bottom delivery *b* of the ore-bed, such perforations being somewhat larger than the openings in the ore-bed, to allow the free passage of anything that once enters the opening, and thus clogging is prevented.

By these means the diaphragm F is divided in two parts, each of which is provided with a separate air-valve or set of valves.

The diaphragm thus constructed prevents any fine particles of ore which might pass through the ore-bed from dropping down upon and from injuring the working mechanism, and also affords a means of readily saving and securing such fine ore, owing to the facility of removing the entire top and exposing the diaphragm.

This is an important feature, particularly when the machine is employed in separating ores containing precious metals.

The mechanism for imparting the required motion to the diaphragm F consists of two cams or trip-wheels, *q*, or eccentrics, mounted on the driving-shaft *r*, and working against the bottom parts of cages *s*, which are connected at one end to perforated metal valve-plates *f'*, secured to the diaphragm F, and at the opposite end to a rod, *g'*, which is provided with loose flanges *h'*, resting upon a spring or springs, *i*, and with two nuts, *j k*, one of which bears on the flange *h'*.

In the bottom part of the cages *s* are fitted shoes *t*, with offsets, against which the trip-wheels *q* work.

I prefer to make the springs *i* of india-rubber, and the shoes *t* of hard wood.

By revolving the driving-shaft the cages *s* are depressed against the action of their springs, and the flexible diaphragm is drawn down so as to admit air through its valves *d*; and whenever one of the cams of the trip-wheel, or whenever the eccentric passes the offset of the shoe in the appropriate cage, the diaphragm flies up, and puffs of air are projected through the mass of ore on the ore-bed.

By means of the nuts *j k* the cages can be raised or depressed, and the throw of the diaphragm can be adjusted according to the nature of the material under treatment.

By this driving mechanism great advantages are gained. It is very simple in its construction, it is not liable to sustain any injury by the dust, and it allows of imparting to the diaphragm F very rapid oscillations without producing injurious shocks or blows.

A fly-wheel, *y*, mounted on the driving-shaft, adds greatly to produce this steadiness of motion.

My machine, as now constructed and as shown on the drawing, is made wholly of metal, except the wooden shoes and the rubber diaphragm, valves, packing-pieces, and springs.

What I claim as new, and desire to secure by Letters Patent, is—

1. A driving mechanism constructed with cams or trip-wheels, or eccentrics, mounted on the driving-shaft, and acting on shoes in cages supported by springs, and connected to the flexible diaphragm F, said cages being so arranged that they can be adjusted in relation to their cams, or trip-wheels, or eccentrics, substantially in the manner described.

2. A feed mechanism composed of hoppers which can be raised and lowered, and which are connected to gages controlling the depth of the ore-bed, substantially in the manner herein set forth.

WILLIAM HOOPER.

Witnesses:

J. B. RAMSAY,
JOHN C. FENTON.