

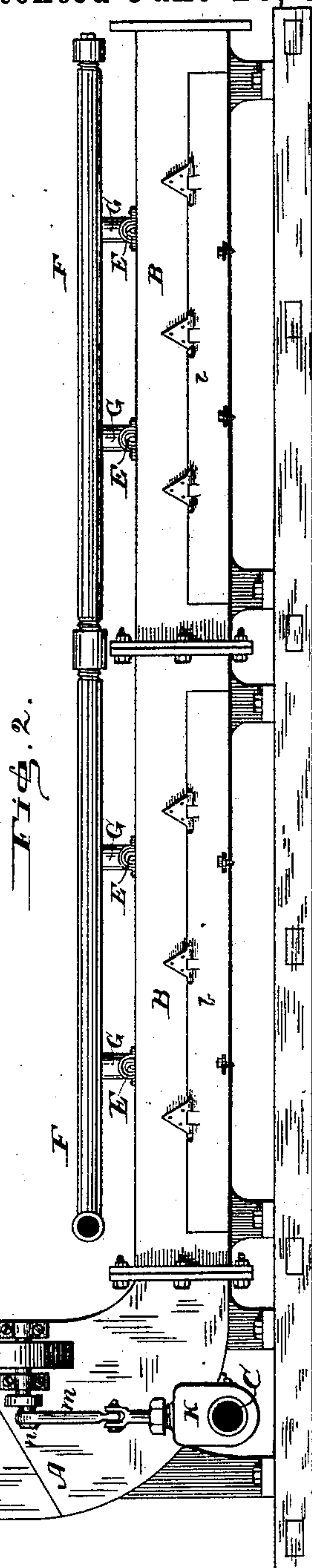
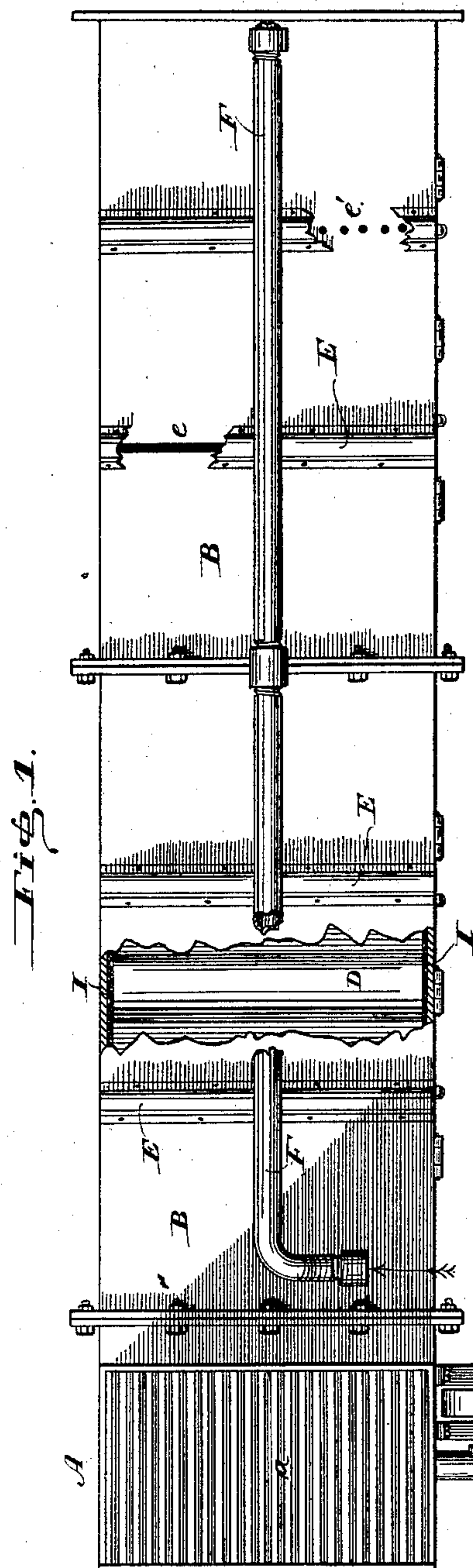
(No Model.)

2 Sheets—Sheet 1.

E. W. NELSON & E. H. COWLES.  
AMALGAMATOR.

No. 280,069.

Patented June 26, 1883.



Witnesses:

C. J. Bell

W. B. Keyser

Inventors,  
Edward W. Nelson and  
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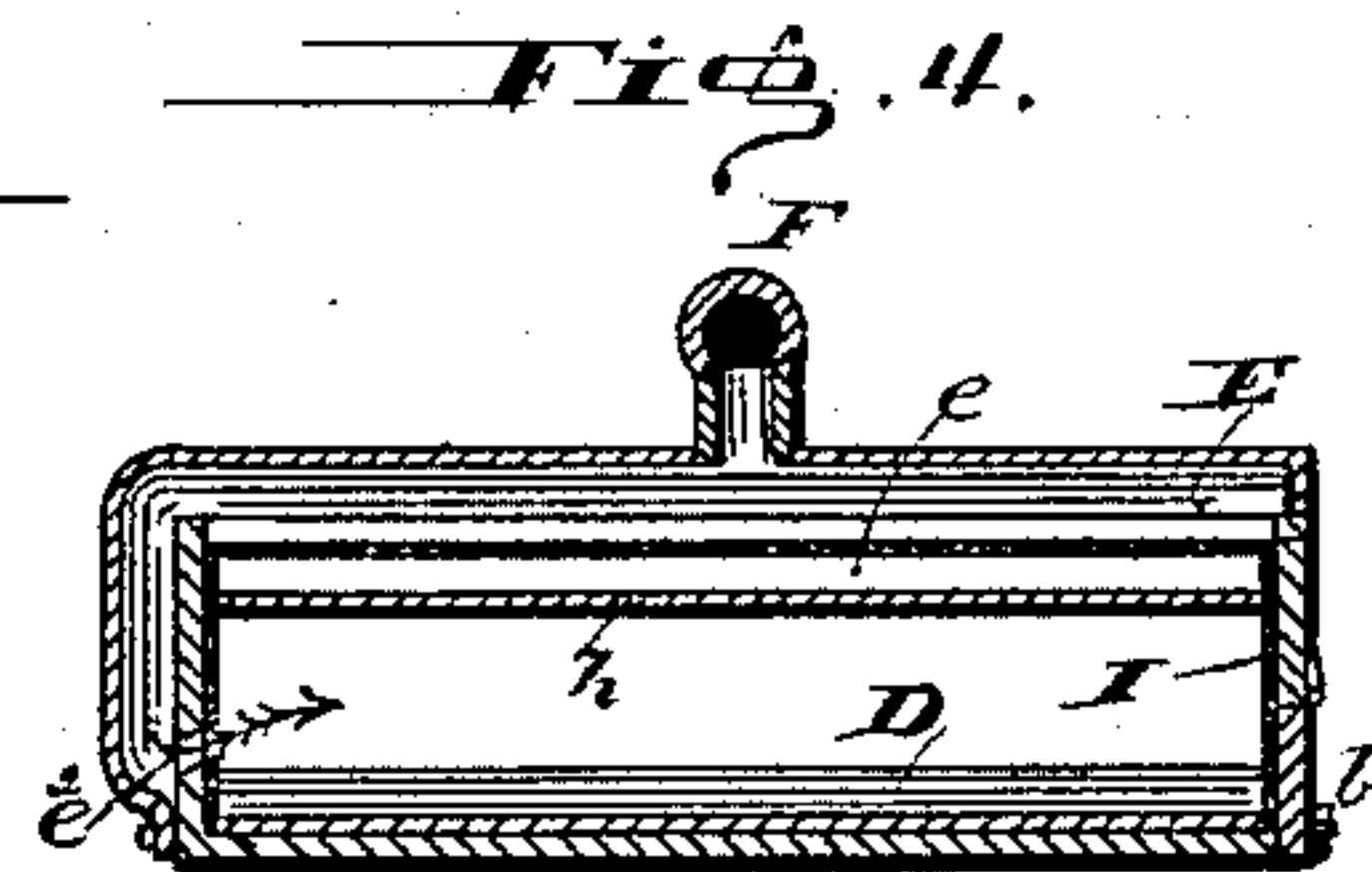
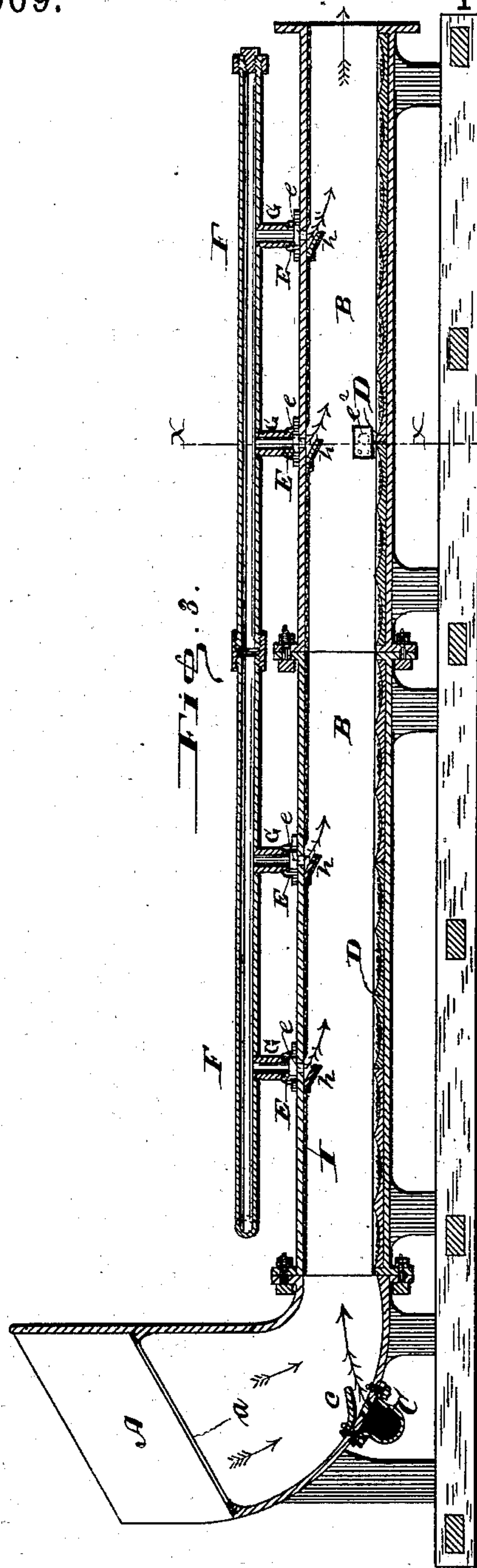
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Attorneys



# UNITED STATES PATENT OFFICE.

EDWARD W. NELSON, OF CHICAGO, ILLINOIS, AND EUGENE H. COWLES, OF CLEVELAND, OHIO.

## AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 280,069, dated June 26, 1883.

Application filed November 25, 1882. (No model.)

*To all whom it may concern:*

Be it known that we, EDWARD W. NELSON, residing at Chicago, in the county of Cook and State of Illinois, and EUGENE H. COWLES, residing at Cleveland, in the county of Cuyahoga and State of Ohio, citizens of the United States, have invented certain new and useful Improvements in Amalgamators; and we 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Our invention relates to improvements in machines for amalgamating the fine gold found in placer-beds and alluvial deposits, in which an air-blast is used to drive the earth or gravel through the apparatus; and the object of our improvement is to devise a machine in which the action of an air or steam blast upon the gravel shall resemble, as nearly as practicable, the action of a stream of water upon gravel in an ordinary sluice-box. We attain this object by means of a long box resembling an ordinary gold-washing sluice-box closed on top, which is provided at one end with a strong blast and proper devices for feeding in the gold-bearing earth or gravel. Said box has its bottom covered with shallow pans of quicksilver, and at intervals secondary blasts of air or steam are admitted, either through the top or sides, or both top and sides, which cause eddies or ripples in the main current, and sooner or later all the gold-particles are caught in the amalgamating-pans below; and to secure still more perfect results we may use a cut-off in the blast-pipe, or other device that will cause the blast to be intermittent; and our invention consists in the dry sluice-box or machine herein described, and certain details of construction connected therewith, which will be fully understood from the drawings, in which—

Figure 1 is a plan view, and Fig. 2 is a side elevation, of one of our improved dry amalgamators. Fig. 3 is a vertical longitudinal section of the same, and Fig. 4 is a vertical cross-section taken in the line  $x x$  of Fig. 3.

The hopper-section A and two of the box-

sections B are shown in the present instance. For a working machine we propose to use four or five of the box-sections, giving a length of from thirty to forty feet; and it will be seen that the apparatus can be made of any length by using few or many sections to adapt it to the character of gold in the gravel to be treated. If the gold is very fine, a long box will be necessary to catch all of it, and if it is coarse a short box, as in the case of sluice-washing. The hopper A is provided with an inclined screen,  $a$ , to remove bowlders and stones too large for the blast to carry through the machine. The gravel is delivered upon the screen by means of a steam-shovel or endless chain and buckets.

C is the pipe for the main blast of steam or compressed air, which may be supplied by a powerful compressor or blower.

The opening from the inlet-pipe into the machine is preferably in the form of a horizontal slot extending across the full width of the machine, and the deflecting-plate  $c$  directs the blast down the box and also protects the opening from gravel.

The box-sections B are made with flanges at the ends, so that they can be bolted together and to the hopper-section. Along one side of each section there is a low door,  $b$ , to reach the amalgamating-pans D. The door is made to fit tight, and is fastened by staples and keys, or other suitable devices for fastening. The amalgamating-pans D cover the bottom of the box-sections, and can be withdrawn through the doors for removing the amalgam and refilling with quicksilver. The secondary air or steam blasts for producing the ripples and eddies in the main current are admitted through the openings  $e$ , arranged at regular intervals along the top of the box.

F is the main distributing-pipe for supplying the auxiliary blasts with steam or compressed air, connected by the short pipes G with the cross-pipes E, extending across the top of the boxes. The openings  $e$  may be either narrow slots extending across the top of the box, or series of holes, as shown at  $e'$ . Each opening or line of openings has a deflecting-plate,  $h$ , which gives the proper direction to the blast and protects the openings



from clogging. These secondary blasts may also be placed in the sides of the box, as shown at  $e^2$ , to cause additional eddies in the main blast and to prevent the gravel from settling in the corners.

In addition to the eddies produced by the auxiliary blasts, we also give a wave motion to the main blast by causing it to be intermittent, either by means of an automatic cut-off or other suitable device, so that it will drop its load of ore or gravel, at short intervals, to the bottom of the sluice during its passage through the box. In the present instance we accomplish this by means of a valve-plate inclosed in the casing K, which is operated by means of the connecting-rod  $m$  and crank-arm  $n$  on the shaft of the band-pulley N. This pulley may be driven by a belt from the engine that drives the blower. The valve-operating mechanism may be adjusted so as to cut off the blast entirely, or only in part, and the interval between the waves thus produced will be determined by the speed at which the pulley is driven. The auxiliary blasts may also be made to be intermittent in like manner.

The sides and top of the boxes may be lined with felt, I, or other suitable material, saturated with quicksilver, for the double purpose of catching the fine gold and preventing the destruction of the iron walls from the attrition of the sand-blast. The felt lining in like manner covers the exposed sides of the deflecting-plates.

The distributing-pipe is provided with cocks for shutting off the blasts, and with suitable couplings, so that any number of sections can be connected. The end of the last of the series is closed by a cap or plug.

We have shown shallow pans of quicksilver for collecting the gold; but we may, in place thereof or in addition thereto, use amalgamating plates or blankets saturated with quicksilver.

The apparatus may be mounted on wheels or rollers, so as to be moved as the work progresses, and proper appliances are employed—as, for instance, an endless apron or chain of buckets—to remove the gravel thrown out at the bottom of the machine.

The machine can be used with steam or compressed air, as desired, or with a combined blast of steam and compressed air, and under

certain circumstances it may be advantageous to use one for the main blast and the other for the side blast—as, for instance, compressed air for the first and steam for the latter—all of which comes within the scope of our invention.

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

1. In a dry amalgamator, the combination of a tube or box having a continuous interior amalgamating-surface or a series of amalgamating-surfaces, means for admitting a main blast of air or steam at the end of said tube or box, and means for admitting a secondary blast at right angles to the course of the main blast for the purpose of causing eddies or ripples in the latter, substantially as and for the purpose set forth.

2. In a dry amalgamator, the combination of the tube or box B, having its bottom covered with amalgamating surfaces or pans D, and having top openings,  $e$ , with suitable means for admitting blasts of air at the end of the box or tube and through the openings in its top, substantially as herein set forth.

3. In a dry amalgamator, the combination of the section A, having a screen,  $a$ , and main-blast inlet-pipe, with the box-sections B, provided with the secondary blast-openings  $e$  and amalgamating-surfaces, as and for the purpose set forth.

4. In a dry amalgamator, the combination of a box or tube having an interior amalgamating surface or surfaces, with means for admitting a pulsating blast of air or steam to convey the material to be treated through the box or tube, substantially as and for the purpose set forth.

5. In a dry amalgamator, the combination of the box or tube B, having an interior amalgamating surface or surfaces, apertures in its top, the transverse pipe E, covering the apertures, and the longitudinal pipe F, with a suitable blast device connected with the latter, substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

EDWARD W. NELSON.  
EUGENE H. COWLES.

Witnesses:

MARY E. HOLDING,  
R. B. KINSELL.