J. J. MULLER.

Ore Washer.

No. 34,721. Patented March 18, 1862.

Fig. F,

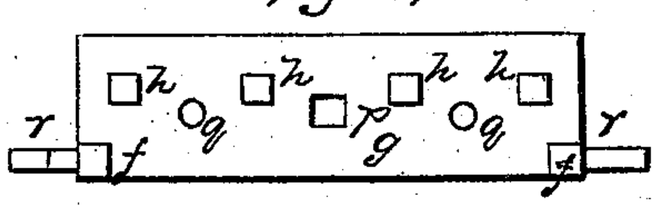


Fig. A

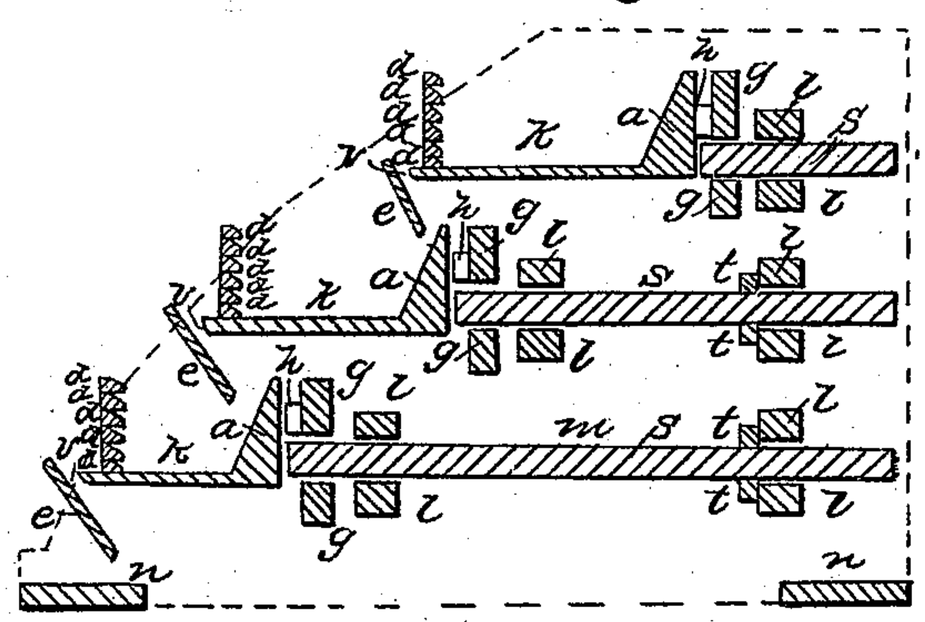


Fig. D.

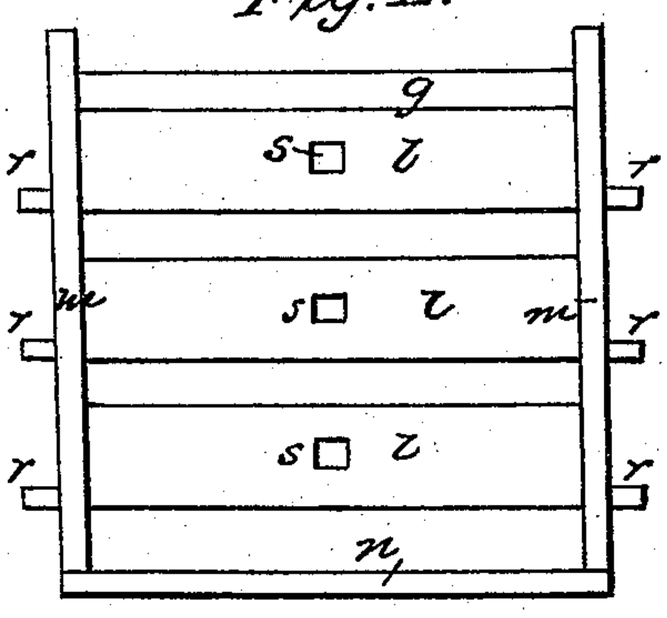


Fig. B,

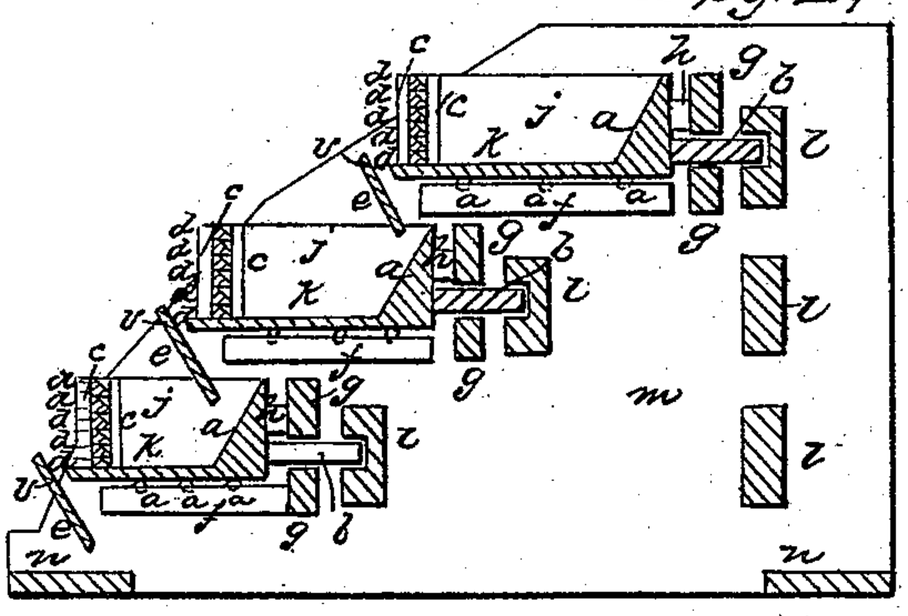


Fig. C,

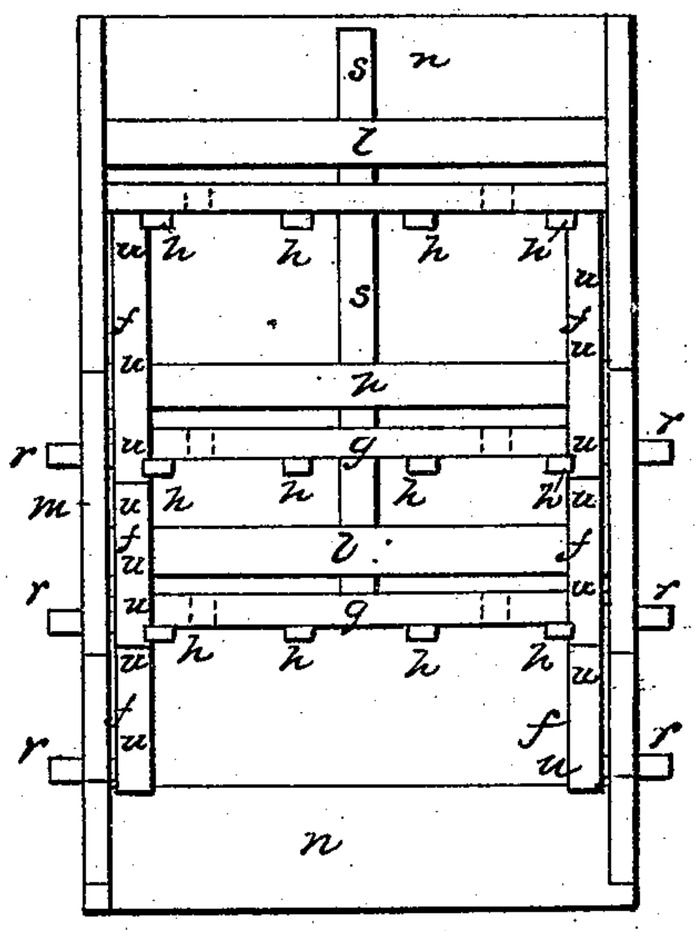
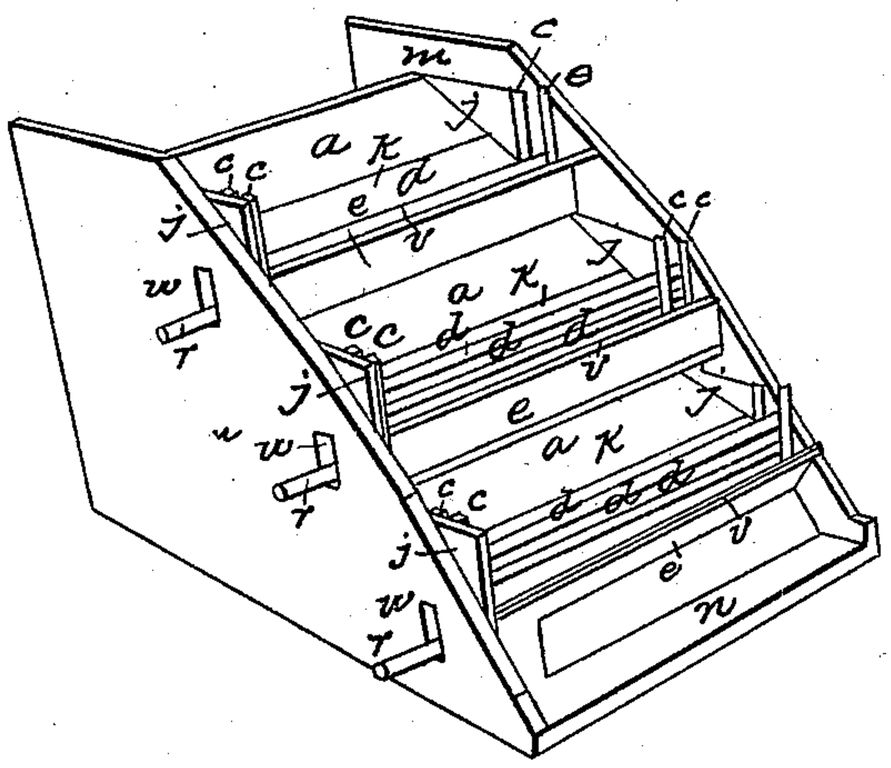


Fig. E;



WITNESSES

Geo. Mesby

H. Hamain.

INVENTOR

Julius J. Muller

UNITED STATES PATENT OFFICE.

JULIUS J. MÜLLER, OF NEW YORK, N. Y., ASSIGNOR TO FREDK. FRANEK AND JNO. A. TAUBER, OF SAME PLACE.

IMPROVED ORE SEPARATOR AND WASHER.

Specification forming part of Letters Patent No. **34,721**, dated March 18, 1862.

To all whom it may concern:

Be it known that I, JULIUS J. MÜLLER, of the city of New York, in the county of New York and State of New York, have invented a new and useful Improvement on a Machine called "the Shaking-Table," and used for separating or concentrating ores or other mineral substances; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure A is a vertical section through the center of the machine. Fig. B is a similar section between the center and one side of the machine. Fig. C is a plan of the framework and slides of the shaking-table. Fig. D is an elevation of the back of the machine. Fig. E is an elevation of one of the slides for the shaking-table, and Fig. F is a perspective view of the machine.

One of the machines heretofore used for concentrating or separating ores or other mineral substances, and called "the shaking-table," is generally constructed of lumber in the form of a plain table, from ten to twenty feet long and from three to four feet wide, with side boards, and hangs in such a manner on four chains or ropes that, by receiving a shake against the head or upper part, it is thrown out of its proper resting-place, to which it returns again when the power by which the shake is produced ceases to be active. The frame in which the table moves is constructed of strong pieces of lumber, and has a head-piece against which the table strikes when on its return to its proper resting-place. This is what is called "the shake." The operations on this table are as follows: The crushed ores or other pulverized mineral substances are mixed with water, and flow, before they reach the shaking-table, over the table of distribution. The object of this latter one is to bring the ores or other mineral substances equally to the head of the first one, the shaking-table. The water is let on this latter one in such quantities that its force is sufficient to carry away the lighter or stony particles. The heavier or metallic particles settle down by their own weight. The shake not only assists the precipitation of these heavier particles, but also the flowing off of the lighter particles and the water; but as the shake is principally felt on the upper part of the shaking-table, where the separation is principally effected, the rest of the table that contains by far the largest part of the precipitated ores or other mineral substances remains a mixture of these with the stony particles of which the ore has been composed before being operated on. These residues therefore have to undergo a second, third, or more operations until the ores or other mineral substances contained therein are as much as possible extracted. It is easily to be perceived that by a repetition of operations not only money and time are lost, but also a considerable quantity of the ores or other mineral substances originally contained in the crushed mass. The shaking-tables as heretofore used therefore labor under many disadvantages; also, all the other machines known and in use for the same purpose.

By applying the improvement I have invented to the shaking-table before described, or by constructing them accordingly, all the ores or other mineral substances originally contained in crushed masses may be separated or concentrated by one operation.

The following contains a description of the construction and operation of my improved shaking-tables:

The frame of the machine consists of the two side pieces *m* and the two pieces *n* by which the two side pieces are connected. The two pieces *n* are fastened to a square and strong wooden frame, which rests on the ground, and forms thereby the basis of the whole. The two side pieces *m* are furthermore connected and strengthened by the cross-pieces *l*, which have square holes in which are the shaking-bars *s*, by which the shaking-tables are moved to and fro. The pairs of slides *f* are connected with the cross-pieces *g*, which are themselves attached by pins passing into holes in the side pieces *m*. Each of these slides has three friction-rollers *u*, on which the bottom *k* of the shaking-table rests. The shaking-table itself consists of the bottom piece *k*, the head-piece *a*, the two side boards *j*, the two guides *b*, the four ribs *c*, the dam-slats *d*, and the deflecting-board *e*. With the exception of these latter pieces *d* and *e*,

the shaking-table may be cast of one single piece. The projecting pins *r* are connected with the slides *f* and move in the holes *w* of the side pieces *m*. *h* on the cross-pieces *g* are square pieces of india-rubber buffers. In the holes *q* in the cross-pieces *g* the two guides *b* move. *p* is a square hole in the same cross-piece *g*, through which the shaking-bars *s* pass, to come in contact with the shaking-table. *t* are flanges on the shaking-bars *s*. *v* represents the opening between the shaking-table and the deflecting-board *e*. The slides *f* not only serve as a resting-place for the shaking-table, but are also the means by which the shaking-table may be placed in a more or less inclined position by raising or lowering the pins *r*, and they are held in place by a screw or otherwise. Behind the shaking-bars *s* stands a perpendicular shaft with as many cams as the frame contains shaking-tables. This shaft is connected wi th a motive power, by which it is moved. The shaking-bars *s* move in the cross-pieces *l*, and when pushed forward by the cams on the perpendicular shaft press against the head of the shaking-table, which slides over the friction-rollers *u;* but as soon as the pressure against the head of the shaking-bar ceases the shaking-table, by its own weight and the inclined position it occupies, slides back to its resting-place, and by doing so strikes against the india-rubber buffers *h*, which, on account of their elasticity, give an additional vibrating movement. The vibrating motion produced thereby is of great importance, as the precipitation of the ores or other mineral substances is greatly assisted, as well as the flowing off of the stony particles and water. The number of shakes to be given and in a given time differs and is regulated by the degree of fineness of the mass under treatment.

The perpendicular shaft by which the shaking-tables are moved, the table of distribution, and the mechanical contrivances in which the crushed mass is mixed with water are all well known and in use, and need no further description.

The operations on these my improved shaking-tables is as follows: The crushed ores or other pulverized mineral substances are mixed with water, and to a degree that every particle becomes independent of the other. This mixture of crushed mass and water flows over the table of distribution, and from this to the first or top shaking-table. At the same time clear water is let on the shaking-table, and in such quantities that the force produced thereby is strong enough to carry away the lighter or stony particles, so that but a highly-concentrated residue of ores or other mineral substances is left on the shaking-table; but this latter result cannot be obtained without a large percentage of the ores or other mineral substances contained in the mass under treatment flowing off with the water and the lighter or stony particles. A second shaking-table is therefore placed below and in front of the first one, as seen in the annexed drawings; but as the mass which flows from the first table on this second table contains a smaller percentage of ores or other mineral substances, in consequence of which a smaller quantity of highly-concentrated residue will be left on the second table, this latter, therefore, must be of less length than the first table. The materials under treatment flow then from the second to the third, and from this to the fourth table, and so on until almost all the ores or other mineral substances originally contained in the crushed or pulverized mass are extracted or separated from the stony particles. This operation admits but a very small loss of valuable matter—say from two to five per cent.—while the loss on the shaking-table heretofore in use amounts to from fifteen to thirty per cent., and even more.

When the shaking-tables are put in motion, and before the crushed mass is let on it, one of the dam-slats *d* is placed across the front part (see drawings) of each shaking-table, by which contrivance the separation of the ores or the mineral substances is assisted and the concentrated ores prevented from flowing to the next shaking-table. When the residue has reached the height of this dam-slat *d*, then another one is placed on top of it, and so on until the shaking-table is full of precipitated ores or other mineral substances, and to the height of its side boards *j*. The ore is then removed and the operation recommenced as before.

I do not claim the shaking-table in itself, nor the cams and slide-bars for giving motion; but

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

1. The arrangement of a series of shaking-tables below and in front, respectively, of each other and set on inclined slides and actuated in the manner and for the purposes specified.

2. The dam-slats *d d*, in combination with the shaking-tables, for the purpose and as set forth.

3. The india-rubber buffers *h h*, applied as specified, in combination with the shaking-tables, in the manner and for the purpose set forth.

Dated New York, this day, the 27th of December, 1861.

JULIUS J. MÜLLER.

Witnesses:

HIRAM SMITH,

PRINDLE PEAKE.