D. DEVERELL.

CONCENTRATING APPARATUS.

APPLICATION FILED FEB. 6, 1911.

1,068,633. Patented July 29, 1913.

Fig. 1.

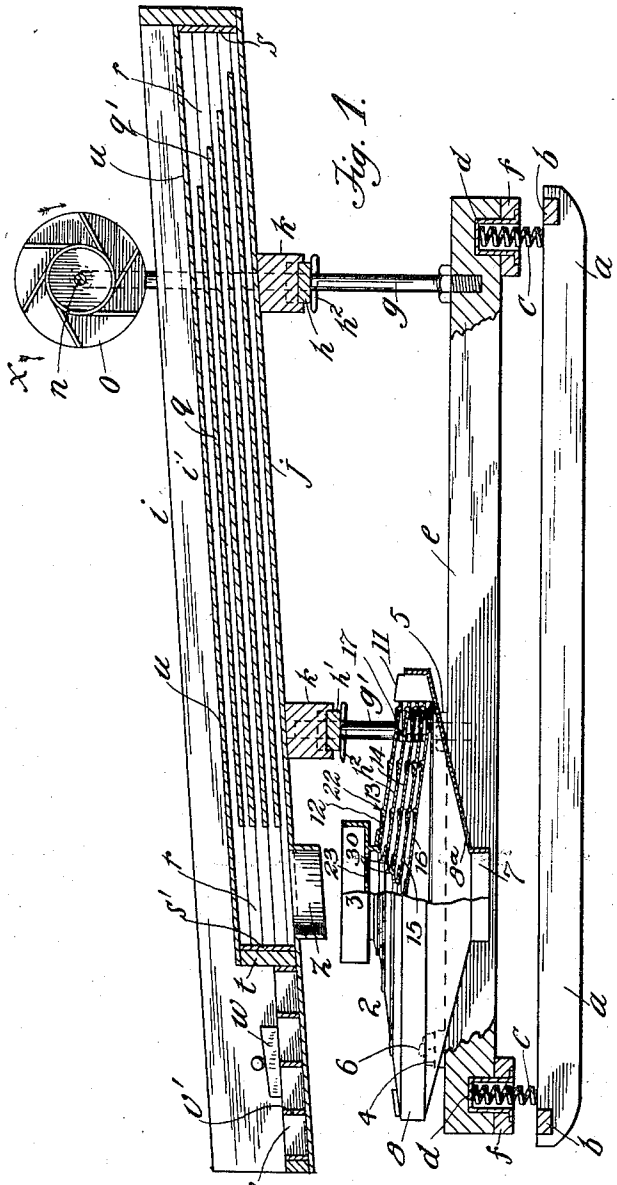


Fig. 2.

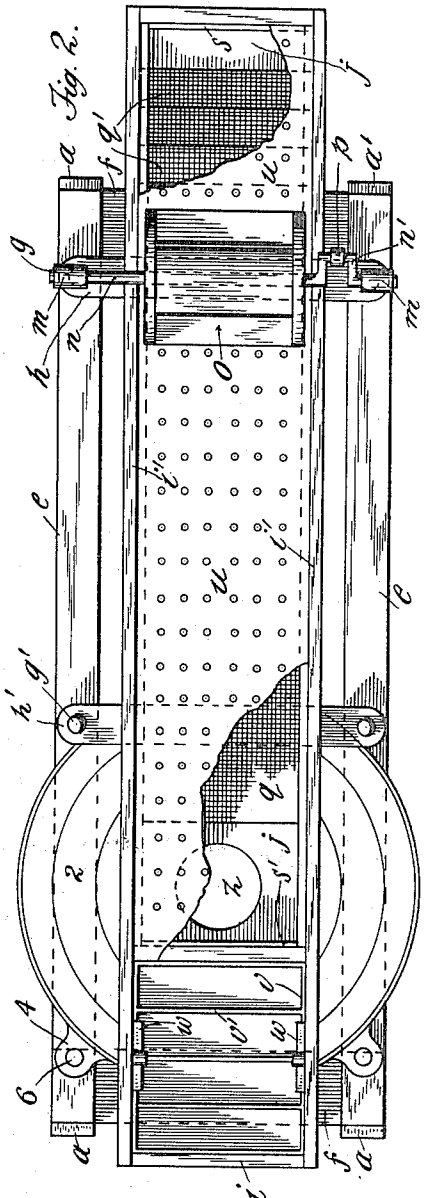
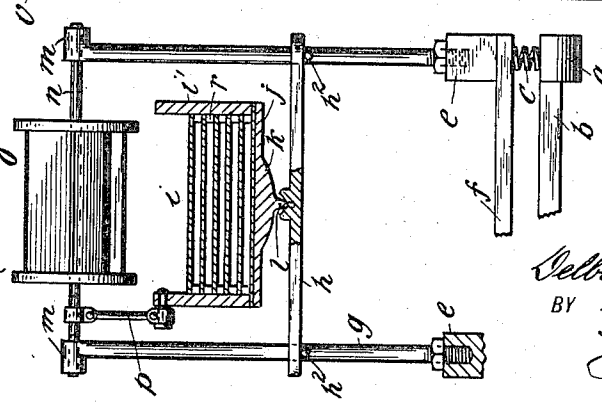


Fig. 3.



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CONCENTRATING APPARATUS.

1,068,633. Specification of Letters Patent. Patented July 29, 1913.

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To all whom it may concern:

Be it known that I, DELBERT DEVERELL, a citizen of the United States, and a resident of Woodstock, county of Multnomah, State of Oregon, have invented a new and useful Improvement in Concentrating Apparatus, of which the following is a specification.

This invention has for its object the obtaining of a compact, comparatively small sized concentrating apparatus adapted for handling a large quantity of material in an effective manner.

To this end my invention comprises a concentrating device consisting of a sluice box containing a nest of concentrating tables and supported by means which will permit it to be freely vibrated in all directions, so as to cause the material to be distributed in a thin film over the entire working area of the tables. From the concentrating device the material is finally discharged into a supplementary concentrating means in order that all particles of metal may be saved. For such supplemental concentrating means I prefer to use a device of special construction, to wit: a circular trough in which are stacked one above the other a series of circular concentrating tables, the overlying tables each made with a central opening progressively enlarged upward throughout the stack, so that the underlying tables will each expose, step-like, a circular surface or ledge projecting beyond the verge of the central opening of the overlying table; the tables being vertically spaced apart. On the rim of the central opening of the top table, and arranged over said central openings of the stack of concentrating tables is a hopper made with a bottom having a series of perforations arranged in concentric circles and adapted to discharge simultaneously an approximately equal portion of the material contained in the hopper on each of said projecting surfaces of the underlying concentrating tables.

Other features of my invention will appear from the body of the specification.

In the accompanying drawings: Figure 1 is a longitudinal vertical section of my apparatus, also showing in connection therewith one of my said improved concentrating tables; Fig. 2 is a top or plan view, with parts broken away, of the devices shown in the preceding view; and Fig. 3 is a partial cross section, taken directly back of the overshot water wheel, approximately on the plane pointed by the line x in Fig. 1 and looking forward.

The mud sills, a, a', are made of any convenient shape, and preferably are curved at their ends so as to facilitate the dragging of my apparatus from one place to another over the ground. The sills, a, a', are connected by tie members b, b. On the sills, at the ends, are secured vertically arranged coil springs c, the upper ends of which extend into socket castings d, set into the bottom of the longitudinal timbers e, constituting the base of the frame of my apparatus. The longitudinal timbers, e, e, are connected on the bottom by transverse pieces f, and they have mounted on them four posts, two in front (g) and two in the rear (g'). On the posts g, g' are adjustably secured transverse frame members h, h' secured in place by pins h^2, and on such transverse frame members h, h' rests the rocking sluice box i. The described supporting means of the latter are adapted to allow it to be rocked laterally. The sluice box, i, comprises vertical side pieces i' and a metal bottom j, to the under side of which are secured, near the ends, transverse rockers k, (see Fig. 3) and the rockers are provided with pendent central dowel pins, seated in a socket therefor provided on the upper faces of the cross frame members h, h', so as to hold the sluice box in place, while being rocked laterally.

The upper ends of the front posts, g, are made with journal boxes m, m (see Fig. 2) in which is journaled a crank-shaft n, on which is secured a type of "overshot" water wheel o. The crank n' of the shaft, n, is connected by a pitman, p, with one side of the sluice box i, so that by revolving the crank-shaft, n, the sluice box will be rocked laterally.

In the interior of the sluice box, i, is removably placed a stack of sheet metal plates q, so arranged as to project in steps at the receiving ends q' one above the other. The plates have fastened to the bottom, at the sides, longitudinal cleats r, by which they are supported, one over the other, spaced apart about one-half inch. The cleats, r, extend the full length of the sluice box, and at the opposite ends there are wedged between them transverse pieces, or wedges, s, s', by which the stack of plates q is temporarily secured in place. The piece s' is wedged in front of the cross piece t, which

is permanently secured between the walls *i'* of the sluice box. Overlying the stack of plates *q* is a perforated plate or grizzly *u*. The purpose of the latter is to catch the courser material and allow the sand and fine material to drop through onto the plates *q*. Each of the plates *q* is covered with a cloth made of canton flannel and now generally in use for such purposes.

The sluice box is provided with a discharge spout *z*, and is so arranged as to slope toward such spout.

Back of the plates *q* I provide a riffle box *v*, wedged in place between the side walls of the sluice box *i* by wedge blocks *w*, and comprising a series of cross bars *v'*, and thus providing a series of pockets in which to catch the material which is too coarse to work through the perforations of the grizzly *u*.

Beneath the spout *z* of the sluice box are placed the supplemental concentrating means 2. These consist of a circular box or trough 8, made with a bottom 8^a, sloping to the center, where it is provided with a discharge spout 7. The trough has radial spacing blades 11, and in it are stacked a nest of circular concentrating tables 12, 13, 14, 15 and 16; the overlying tables being each made with a central opening progressively enlarged upward throughout the stack, so that the underlying tables will each expose, step-like, a circular surface or ledge projecting beyond the verge of the central opening of the overlying table. The tables are held spaced apart by the posts 17, with which the tables, 12, 13, 14, 15, are provided. On the rim of the central opening of the top concentrating table 16 is supported a hopper 3. Said hopper is made with a bottom 23, provided with a series of perforations, arranged in concentric circles and adapted to discharge simultaneously an approximately equal portion of the material contained in the hopper on each of said projecting surfaces of the respective underlying tables.

On the margins of the central openings of the respective tables are affixed shields 30, provided with a circumferential flange, adapted to overlie the marginal surface about the opening of the concentrating table on which it is affixed; the shields being provided with a number of pins, as 32, on the bottom, for holding them in place. Said shields hold the centers of the concentrating cloths in place, the centers of such cloths being cut out to correspond with the tables on which they are placed.

The upper faces of the concentrating tables are preferably provided with a series of concentric rings or riffles 22, so as to arrange the cloths in pockets, as it were, in which to catch the coarser particles of metal.

The trough 8 is made with perforated ears 4, 5. Through the front pair of ears, 5, the posts *g'* project, and through the ears 4 are inserted stud bolts 6, thereby securing the concentrating table on the frame members *e*.

My apparatus is designed to work with crushed rock or gravel. It operates as follows: The material to be run through is dropped onto the grizzly, *u*, in front of the wheel *o*. A stream of water is discharged upon the latter to cause it to rotate, as indicated by the arrow, and the water falls on the grizzly, *u*, in the front part of the sluice box, and washes the material there deposited over the grizzly *u*, causing the smaller particles thereof to fall upon the projecting ledges of the underlying stack of plates *q*. The revolution of the wheel, *o*, causes its crank-shaft, *n*, to laterally rock the sluice box *i*, as mentioned, thereby imparting to my apparatus, as a whole, a vibrating motion, by reason of the frame thereof being supported on the springs *c*, as mentioned. Thus the water and mineral, working over the stack of plates *q* in the sluice box *i*, and that which is discharged therefrom into the concentrating table 2 are spread in thin equal portions over the whole working surface. The vibrating of my apparatus also serves to keep the material running through the same, also that running through the concentrating table, in a constant state of agitation, which greatly facilitates the work. The material should be fed in approximately even quantities on the front end of the sluice box, so as not to overload my apparatus, for such would impede its efficiency.

My device can be built on any convenient scale, following substantially the proportions given in the drawings, so as to be able to work from five to five hundred or more yards per day. The wheel, *o*, could be substituted by another device operated by a convenient power, to rotate the shaft, *n*, and produce an equivalent rocking effect.

I claim:

1. In concentrating apparatus, the combination of a supporting frame, means for supporting the same vertically reciprocable; a concentrating device vibratably carried by the supporting frame; a water wheel mounted on the supporting frame, overlying the concentrating device; and connections between said water wheel and the concentrating means adapted to transmit motion to the latter and thereby transmit other motion to the supporting frame.

2. In concentrating apparatus, the combination of a supporting frame, resilient means for supporting the same; a concentrating device vibratably carried by the supporting frame; a water wheel mounted on the supporting frame, overlying the concentrating device; and connections between

said water wheel and the concentrating means adapted to transmit motion to the latter and thereby transmit other motion to the supporting frame.

3. In concentrating apparatus, the combination of a supporting frame, means for supporting the same vertically reciprocable; a concentrating device vibratably carried by the supporting frame; a water wheel mounted on the supporting frame, overlying the concentrating device; and eccentric connections between said water wheel and the concentrating means adapted to rock the latter and thereby transmit other motion to the supporting frame.

4. In concentrating apparatus, the combination of a supporting frame, resilient means for supporting the same; a concentrating device vibratably carried by the supporting frame; a water wheel mounted on the supporting frame, overlying the concentrating device; and eccentric connections between said water wheel and the concentrating means adapted to rock the latter and thereby transmit other motion to the supporting frame.

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