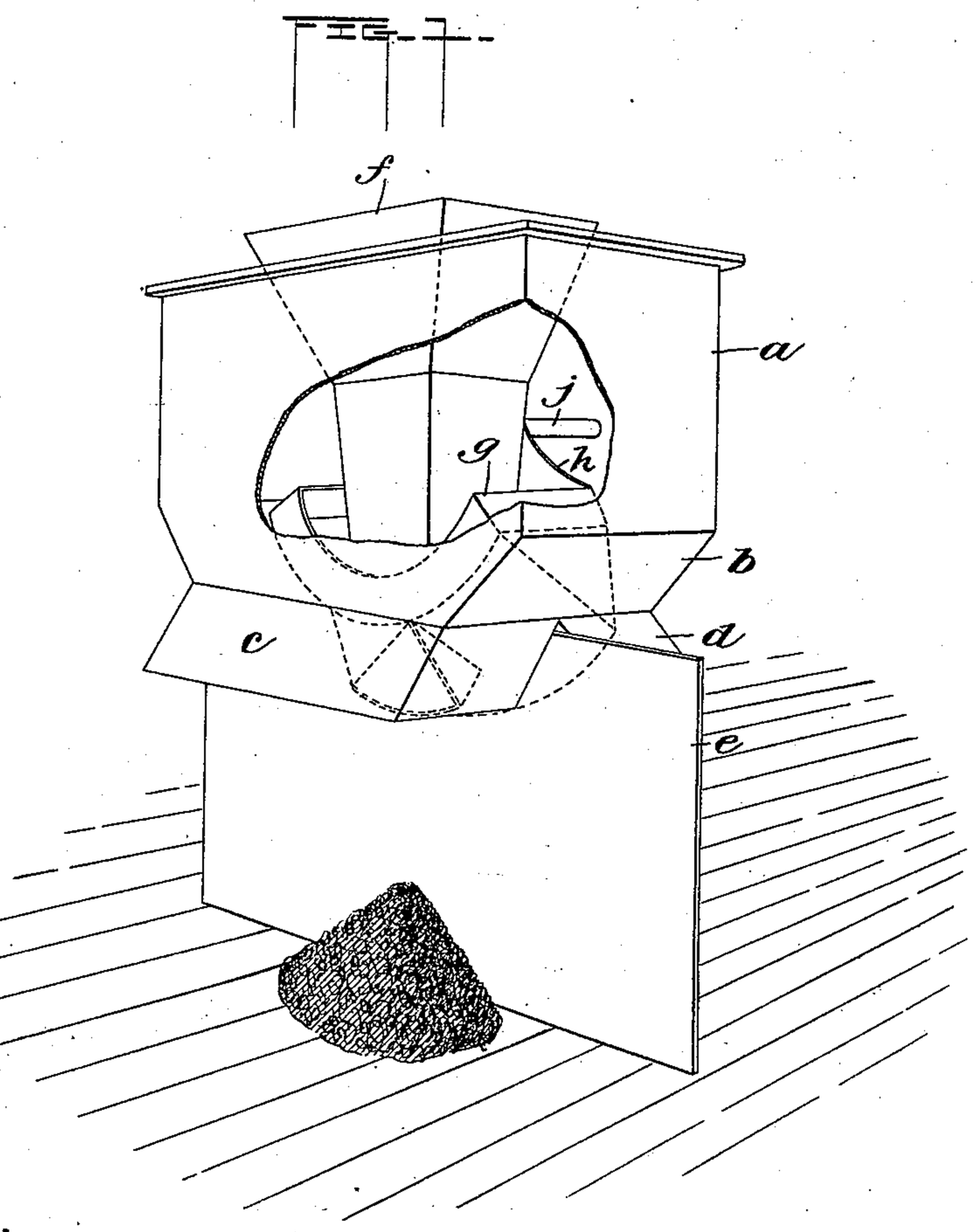
(No Model.) 2 Sheets—Sheet 1.

D. W. BRUNTON.

ORE SAMPLING MACHINE.

No. 553,508. Patented Jan. 28, 1896.

FIG. 1.



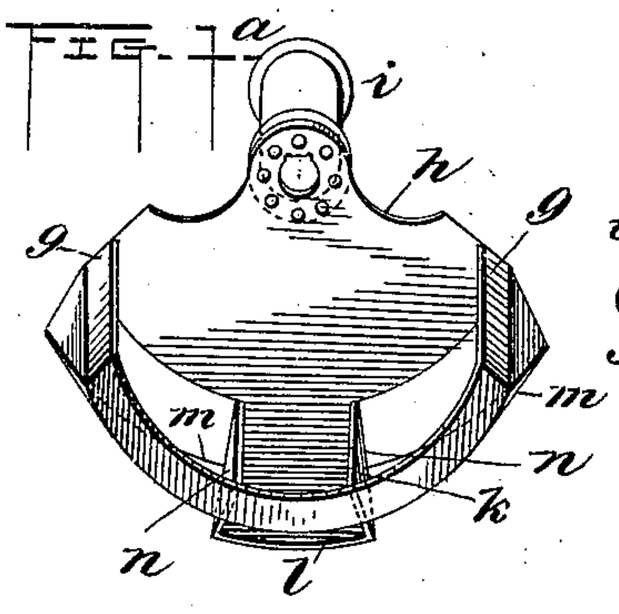
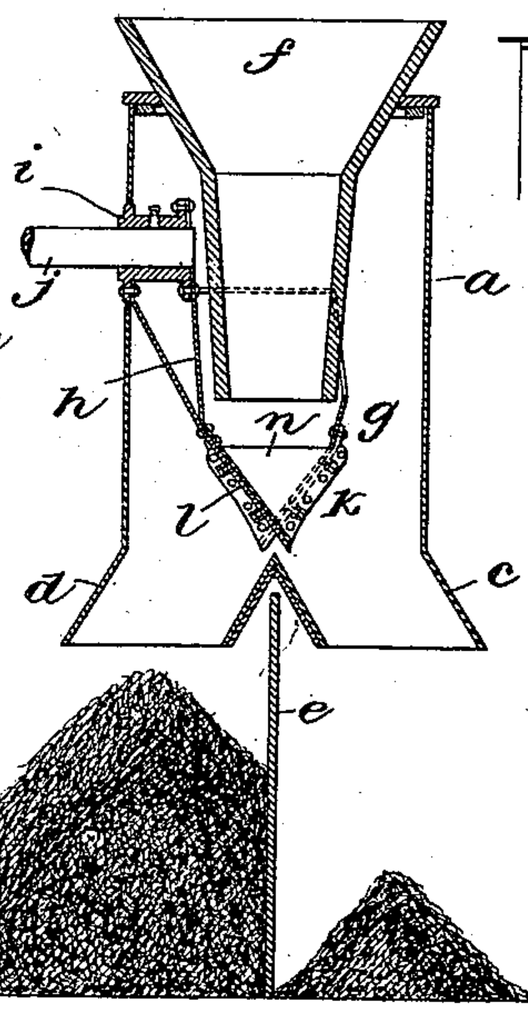


FIG. 2.



Witnesses;
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(No Model.) 2 Sheets—Sheet 2.

D. W. BRUNTON.

ORE SAMPLING MACHINE.

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FIG. 3.

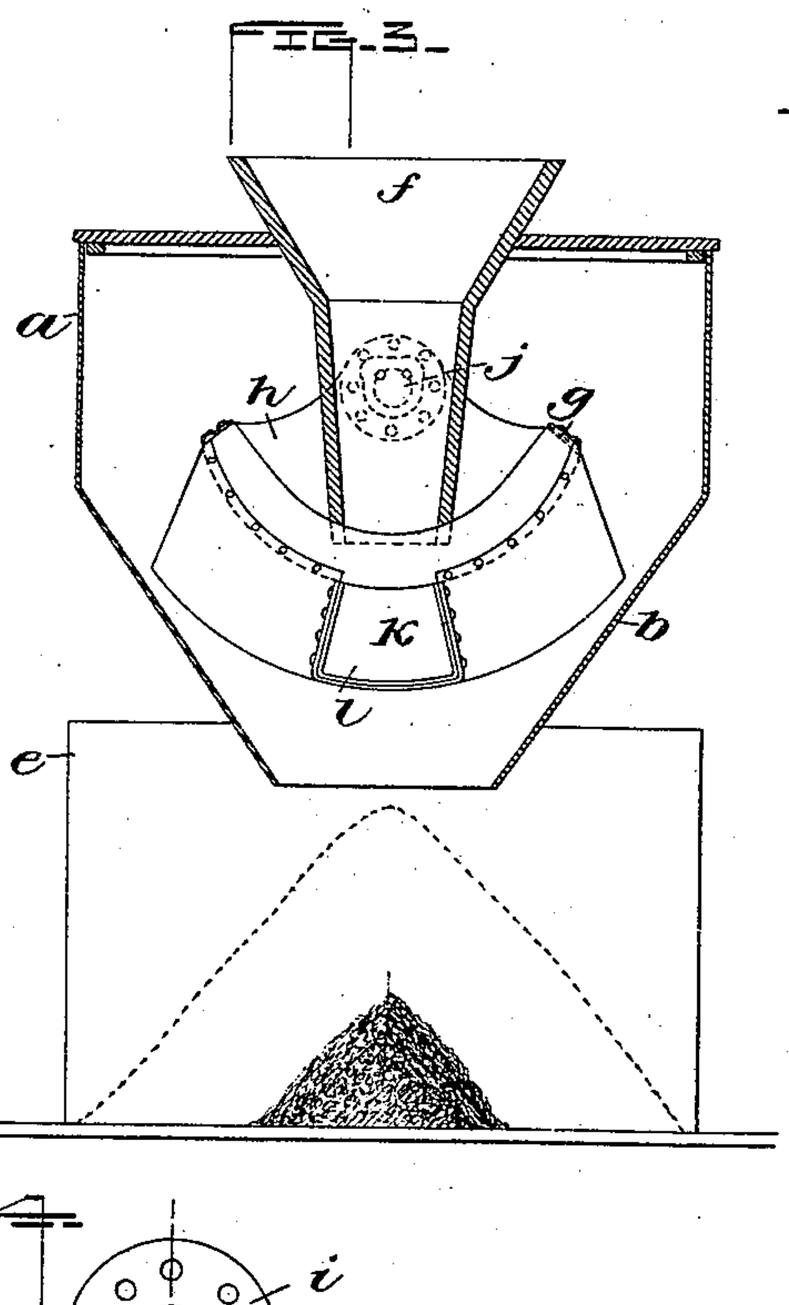


FIG. 4.

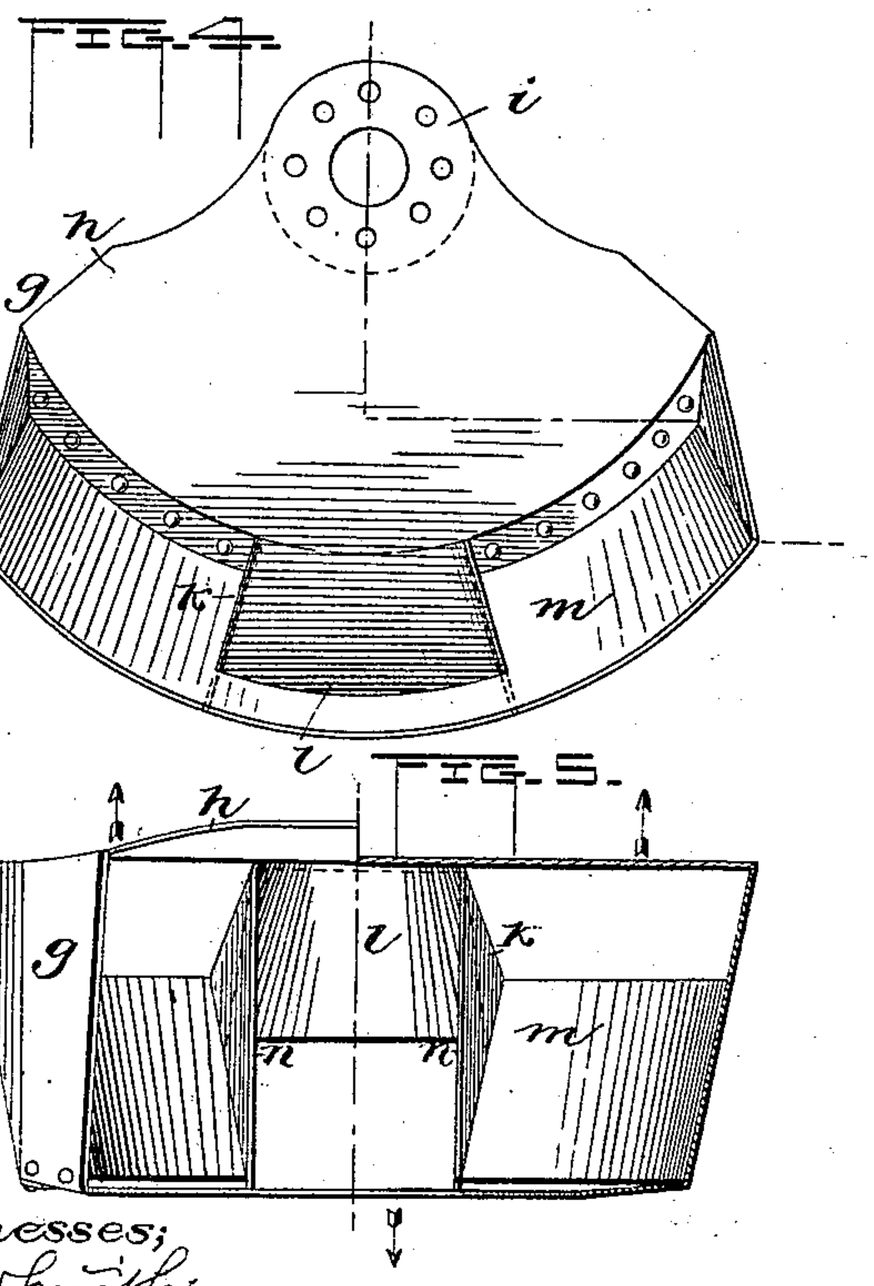


FIG. 5.

FIG. 6.

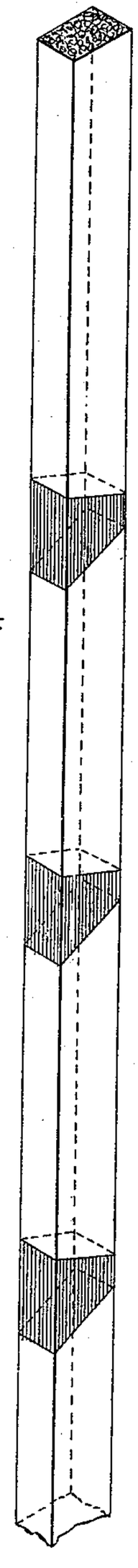
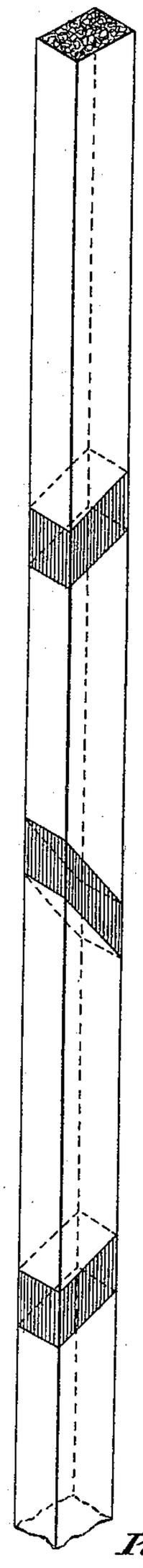


FIG. 7.



Witnesses;
C. W. Smith
E. L. Fancel

Inventor
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UNITED STATES PATENT OFFICE.

DAVID W. BRUNTON, OF ASPEN, COLORADO.

ORE-SAMPLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 553,508, dated January 28, 1896.

Application filed August 24, 1895. Serial No. 560,394. (No model.)

To all whom it may concern:

Be it known that I, DAVID W. BRUNTON, a subject of the Queen of Great Britain, residing at Aspen, in the county of Pitkin and State of Colorado, have invented a certain new and useful Improvement in Ore-Sampling Machines, of which the following is a full, clear, and exact description.

This invention relates to that class of machines or apparatus by means of which ore is divided, or, as it is technically termed, "sampled," for the purpose of determining with sufficient accuracy for all practical purposes the metalliferous grade or value of the ore.

Coming within my experience there have been used three plans for mechanically sampling ore. In one plan a small part of the ore has been divided or cut continuously out of a falling stream of ore by means of narrow spouts or dividing-flanges. I have found this plan unreliable and unsatisfactory for the reason that the falling stream of ore, in either an inclined or vertical spout, is never entirely uniform in all its parts, there being a constant tendency to the greater proportion of coarse rapidly-traveling particles in the center of the stream and an excess of the finer slower-moving particles on the sides, and thus it follows that no part of the stream would exactly represent an average of the whole.

In another plan, traveling or revolving buckets or spouts are used to secure a sample, and in this plan the dividing edges of the buckets or spouts soon become covered by chips, bark, sack-strings and drill-rags, that render the division of the stream inaccurate. In addition to this, where buckets are used, the coarse particles rebound from the bottom and find their way into the wrong division. In the traveling or horizontal revolving buckets or spouts the finer particles of ore continue to drop from the spouts during the entire revolution and have to be gathered into a long funnel-shaped receptacle, thereby necessitating a great amount of vertical height in the apparatus, and rendering it almost impossible to clean the apparatus after a lot of ore has been run through.

A third plan has employed a vibrating spout by which the entire stream of ore is deflected alternately to the right and to the left. In this class of apparatus the dividing edge of the spout does not cross the falling stream instantaneously, but consumes an appreciable portion of time, during which the ore has descended a considerable distance into the spout, thus rendering the sample section taken out of the falling stream a rhomboid or frustum of a wedge, the base of which is taken from the side of the stream toward which the rejected ore is being deflected, and because of this operation it follows that unless both sides of the stream of ore are exactly alike the sample taken will not be an accurate or average representation of the entire lot.

It is the purpose and object of my invention to obviate all these objections and to provide an ore-sampling machine or apparatus which, by its construction and operation, will so divide or cut a falling stream of ore as to secure a sample which will be an exact average of the entire mass of ore.

My invention, therefore, consists of a double swinging or vibrating spout arranged in the path of a descending stream of ore, and movable back and forth therein, to cut from such stream a series of parallel-sided rhombic prisms, each of which contains an absolutely accurate sample, no matter how the falling stream of ore may vary in composition across its width or depth; and I prefer to give to this swinging or vibrating spout a rapid movement, one of the effects of which is to prevent the accumulation of strings, chips, or bark on the dividing edges. The spout, in its preferred form, is tripartite, the central division taking out the sample, and its adjacent divisions receiving the rejected ore, the proportion of sample to rejected ore being determined by the ratio of the distance between the dividers to the entire travel of the spout.

Having thus stated the principle of my invention, I will proceed now to describe the best mode in which I have contemplated applying that principle, and then will particularly point out and distinctly claim the part, improvement or combination which I claim as my invention.

In the accompanying drawings, illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is a perspective view of sufficient of an ore-sampler to illustrate my invention, parts of the framework and casing being omitted.

Fig. 1ª is a perspective view of the swinging spout or deflector. Fig. 2 is a vertical transverse section. Fig. 3 is a vertical longitudinal section. Fig. 4 is a rear elevation of the spout or deflector detached. Fig. 5 is a half plan and section of the spout or deflector. Fig. 6 is a diagram illustrating one of the objectionable plans of sampling, and Fig. 7 is a diagram illustrating my plan of sampling.

a may represent a box, or boot, or casing, of any suitable construction, and, as herein shown, having a slanting bottom *b* and the two spout-like outlets *c d*, between which latter may be erected the wall or partition *e*.

As already intimated, I have omitted from the drawings the adjuncts which form no part of the present invention, and which may be of any usual or approved construction.

Within the box *a* is erected the hopper or funnel *f*, and beneath the outlet of this hopper or funnel is arranged the swinging or vibrating spout or deflector *g*, which is the material and essential portion of my invention. This deflector or spout is composed of a back plate *h*, to which may be applied the hub *i*, and by means of this hub the deflector or spout is secured to a shaft *j*, to which a rocking motion is applied in any suitable manner. The deflector, as herein shown, is made with three compartments or pockets, one, *k*, of which has the upper edge of its bottom *l* coterminous with the lower edge of the back plate *h*, and its said bottom *l* slants laterally and downwardly toward one side of the casing so as to discharge through the spout *c*. The bottom *m* of the deflector through which the compartment *k* opens slants in a direction opposite to that of the bottom of the said compartment *k*, so as to discharge into the spout *d*. As shown, this bottom *m* of the two end compartments is oblique to the plane of the back plate. The various compartments are separated by the walls or partitions *n*, erected in and upon the bottom *m* and projecting within the body of the deflector. The deflector as a whole is essentially a segment of an annulus having an apparent **V** shape in cross-section.

The deflector, as shown, is suspended beneath the discharge or outlet of the hopper or funnel *f* and is vibrated beneath the same and within the path of a falling stream of ore precipitated into and through the said hopper or funnel, and the arc of movement of the said deflector or spout is sufficiently great to tip the end walls and also the partitions *n* sufficiently far to dislodge any chips, strings, or other extraneous matter that may have fallen upon them, and thus the said walls and more particularly the efficient dividing-walls *n* have their edges kept clean and in good working order for action upon the falling stream of ore.

In the operation of the machines heretofore in use, and characterized hereinbefore as the third plan of such machines, the sample taken from the falling stream, and which has been characterized as an imperfect and unreliable sample, in that it does not cut through the stream equally in all parts, is illustrated in the diagram Fig. 6, while the more mathematical and accurate sample obtained by the operation of my machine is represented in the diagram Fig. 7. In one case the sample is composed of a larger quantity taken from one side of the stream of falling ore than from the other, while in my case the stream is evenly divided throughout, and thus a sample is obtained which is of complete uniformity throughout.

The operation of the machine will be understood from the foregoing; but it may be observed that the intermediate pocket or compartment *k*, which is designed to cut out the sample, discharges its successive loads to one side of the partition *e*, while the other compartments discharge their successive loads on the other side of such partition. The ratio of ore thrown to the right and to the left may be determined by the length of time which the compartment *k* occupies in passing underneath the spout compared with the time required by the deflector to traverse through its entire arc of motion. It is evident that the ratio of the sample with that of rejected ore may be changed by altering the width of the compartment or pocket *k*, or by changing the length of the arc of motion through which the deflector swings.

What I claim is—

1. In an ore sampling machine, a swinging or vibrating spout or deflector having a number of compartments, the central one of which has a lateral and downward discharge at one side and the others of which on opposite sides of such central compartment have lateral and downward discharges on the opposite side of the spout or deflector, combined with means to precipitate a stream of ore upon such deflector in the path of its vibration, so that such falling stream of ore will be alternately deflected to the right and left for such relative periods of time as may be necessary to secure the requisite sample, substantially as described.

2. In an ore sampling machine, the combination of a hopper or funnel through which a stream of ore is precipitated, a deflector suspended to swing or vibrate beneath the outlet of such hopper or funnel and divided into a number of compartments the bottoms of which alternately slant in opposite directions and the outlets of which alternate on opposite sides of the deflector and which compartments are closed against one another, and means to swing or vibrate said deflector across the path of the falling stream of ore, substantially as and for the purpose described.

3. In an ore sampling machine, the combination of a hopper or funnel through which a stream of ore is precipitated, a swinging or vibrating deflector hung beneath the said hopper or funnel and in the path of the falling stream of ore and having a series of compart-

ments separated by solid division walls, the alternating compartments having bottoms which slant in opposite directions and also having discharge openings arranged alternately at opposite sides of the deflector, thereby alternately to deflect the falling stream of ore to the right and to the left for such relative periods of time as may be necessary for securing the requisite sample from the falling stream of ore, and means to swing or vibrate said deflector through an arc of motion sufficiently great to tip up the upper edges of the division walls to throw off from them any accumulation and thereby always to present clean sharp edges to the falling stream of ore, substantially as described.

In testimony whereof I have hereunto set my hand this 17th day of August, A. D. 1895.

DAVID W. BRUNTON.

Witnesses:

HARRY G. MCCULLOCH,

J. S. MCCORMAC.