A. H. STEBBINS.

ORE CONCENTRATOR.

APPLICATION FILED AUG. 9, 1907.

900,442.

Patented Oct. 6, 1908.

6 SHEETS—SHEET 1.

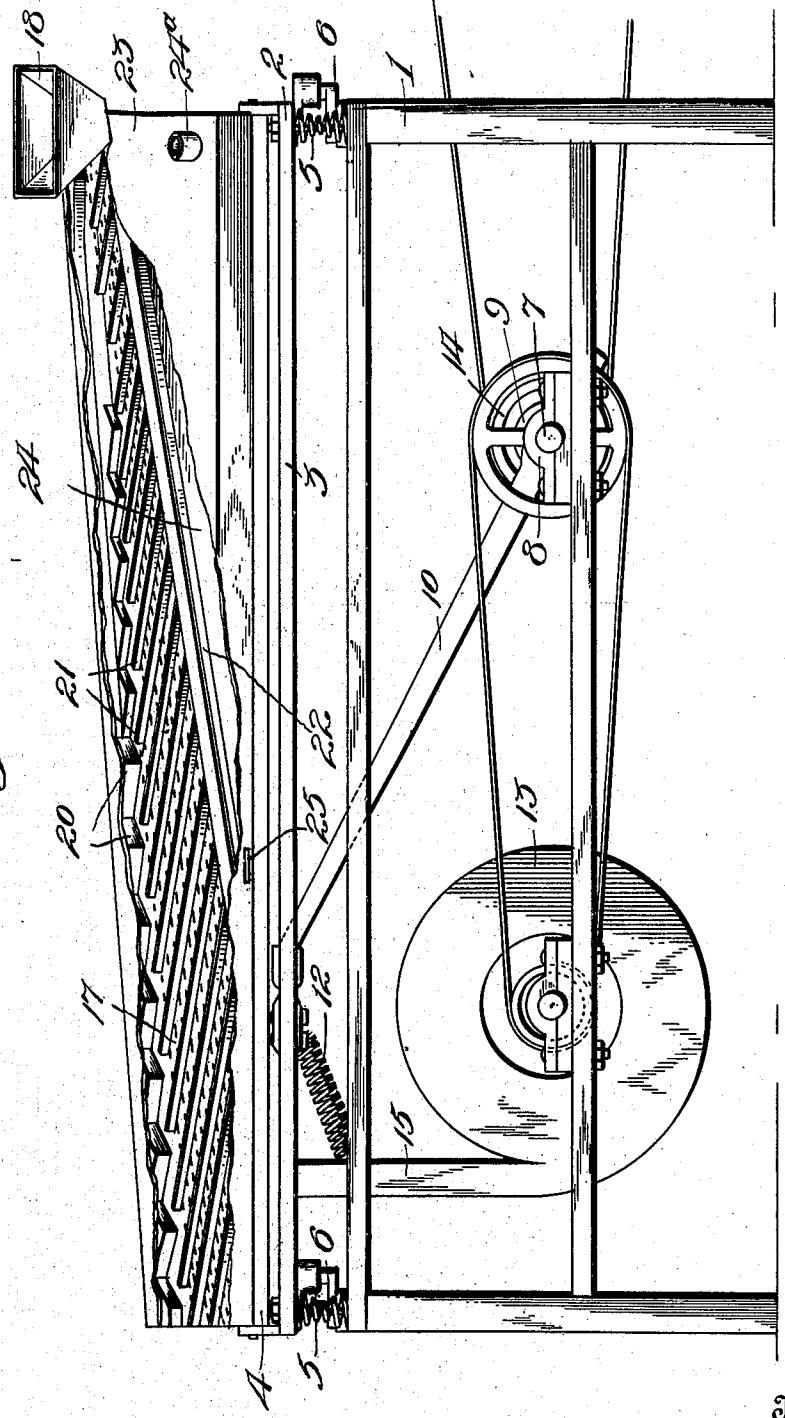


Fig. 1.

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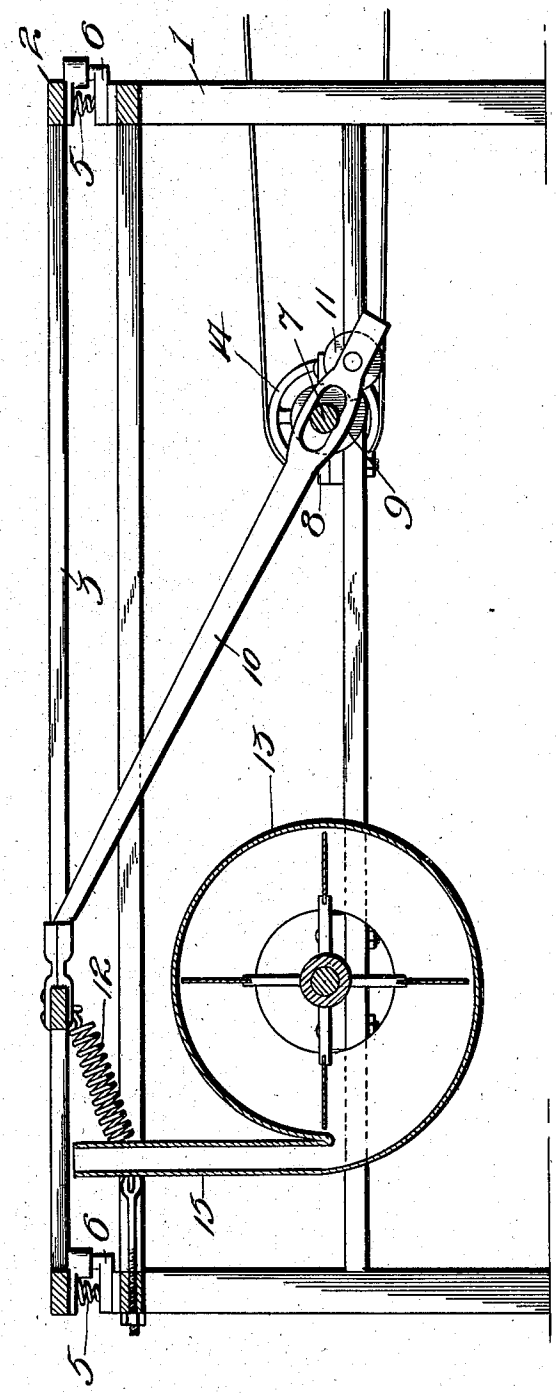


Fig. 2.

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6 SHEETS—SHEET 3.

Fig. 3.

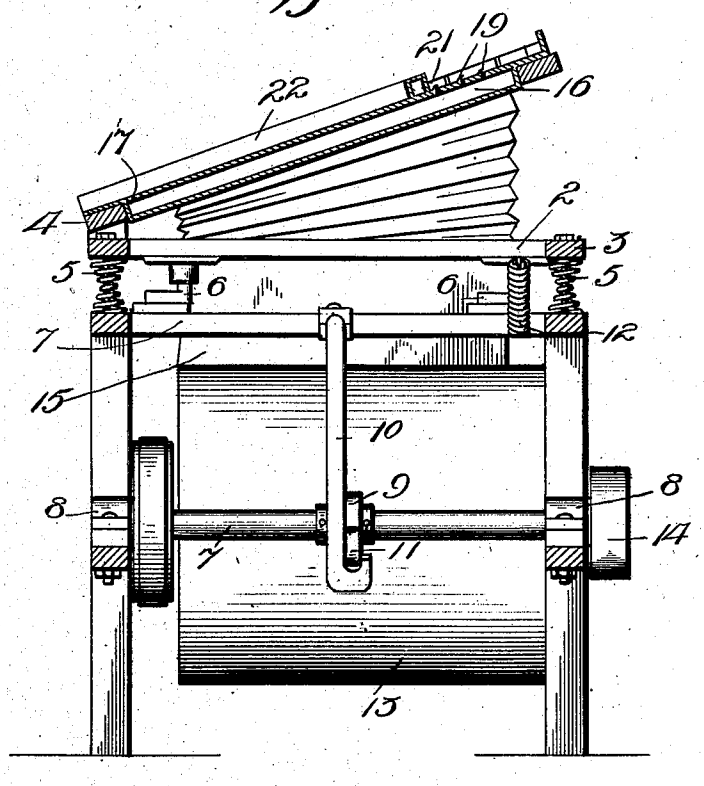
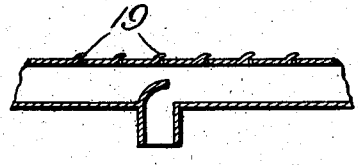


Fig. 5.



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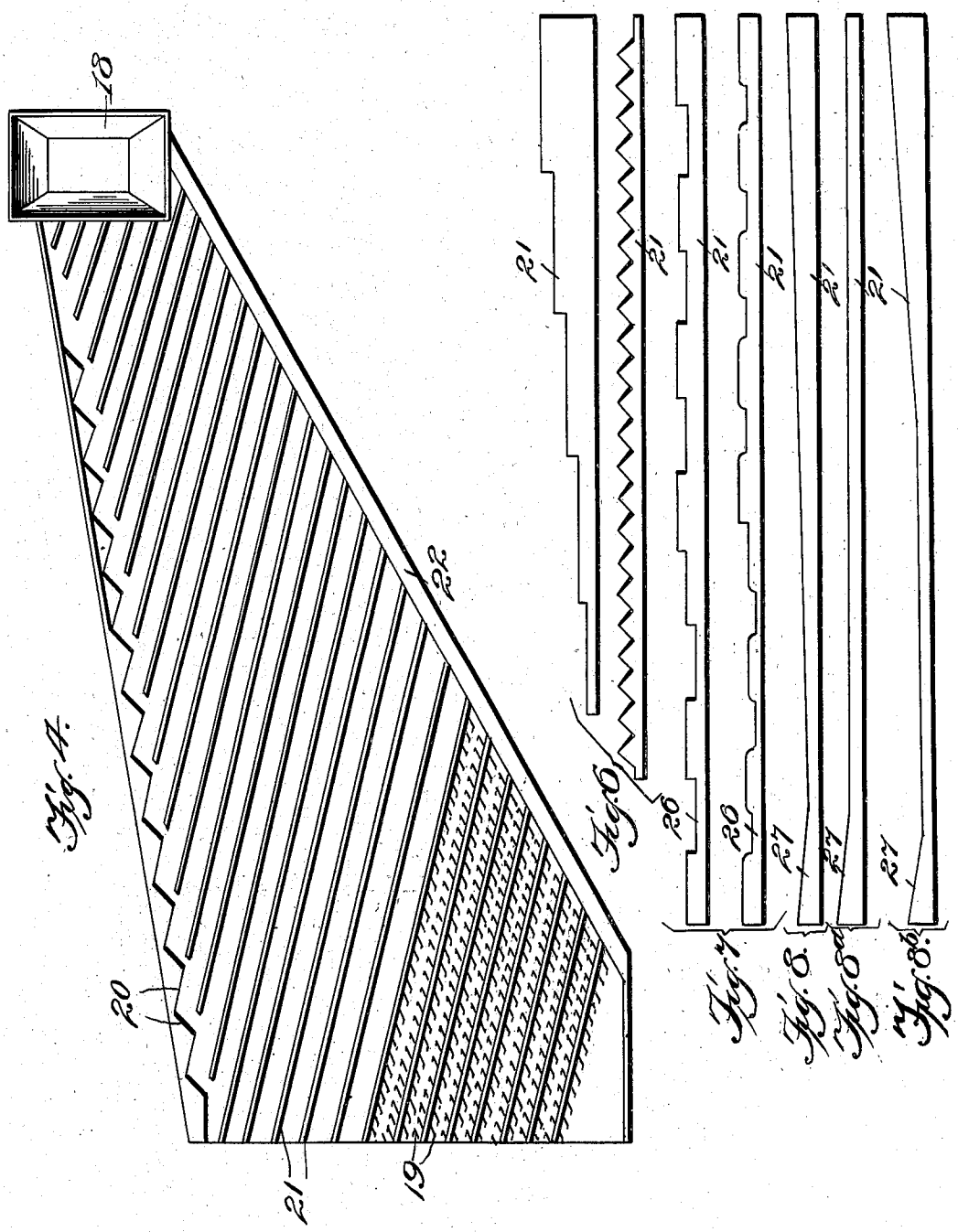
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6 SHEETS—SHEET 4.



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6 SHEETS—SHEET 5.

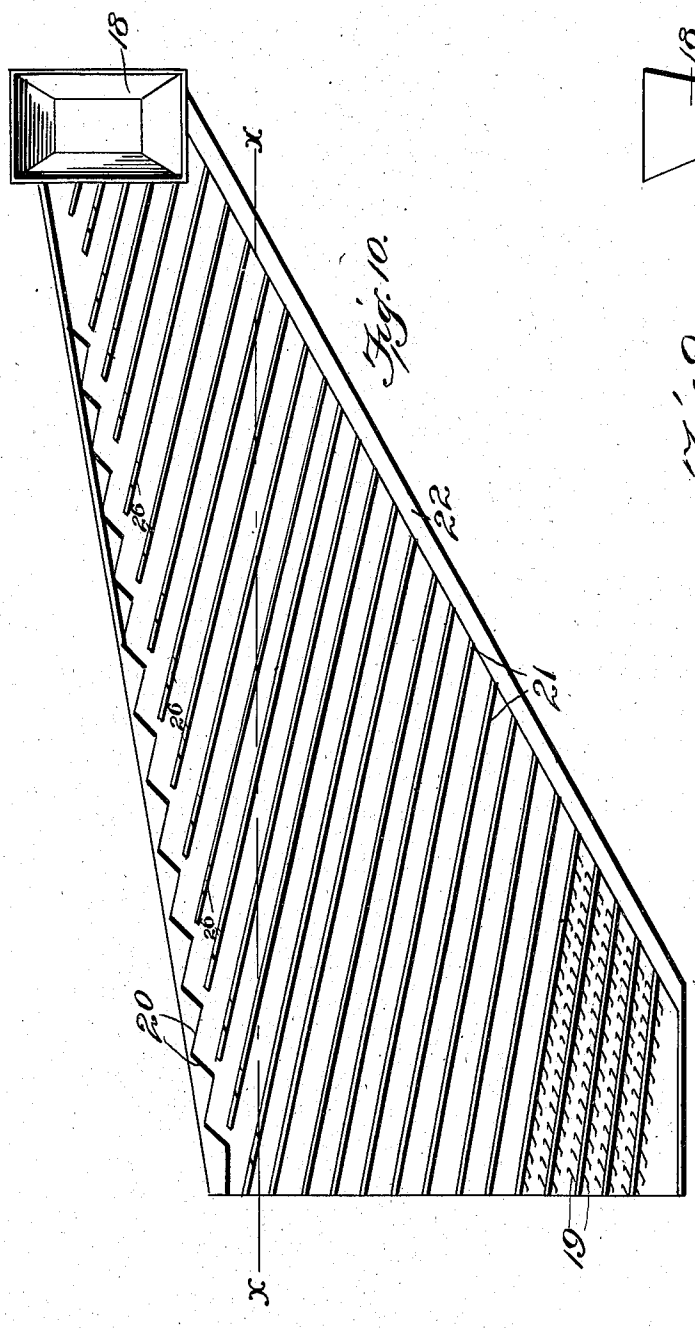


Fig. 10.

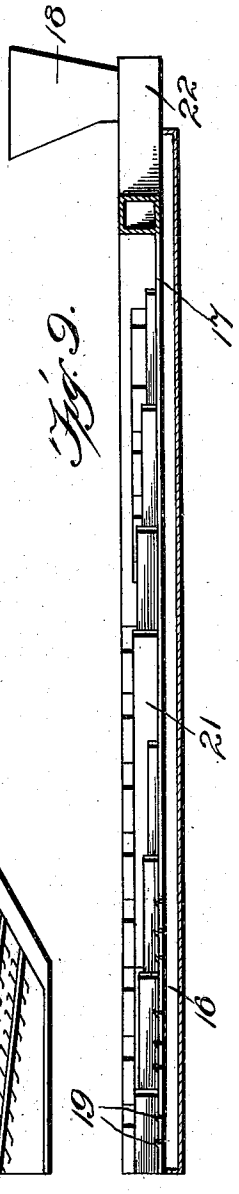


Fig. 9.

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6 SHEETS—SHEET 6

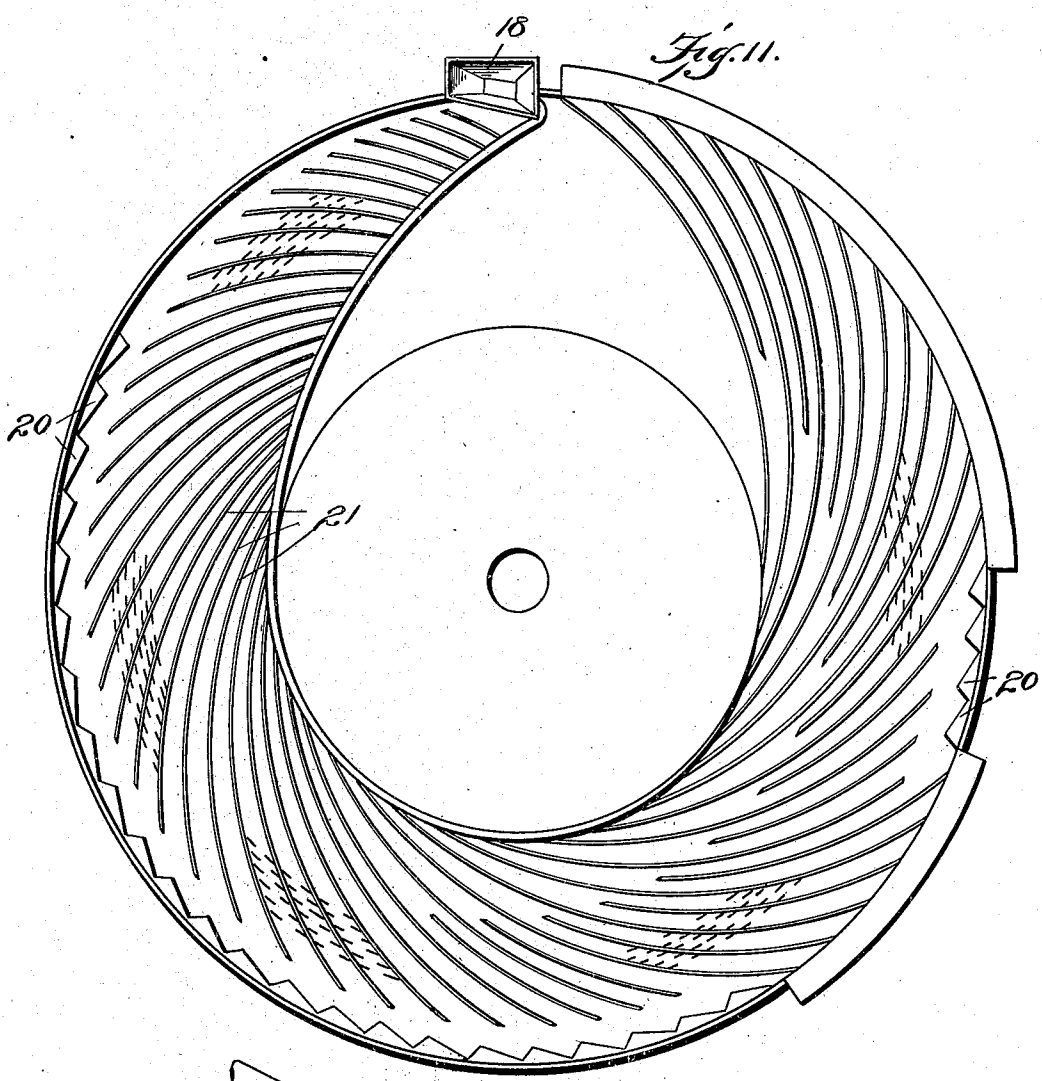


Fig. 11.

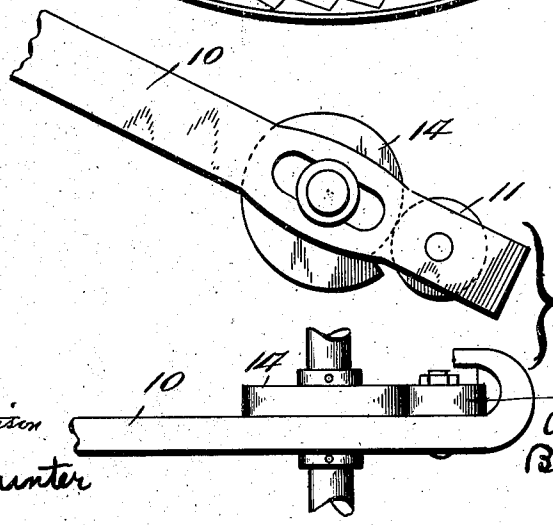


Fig. 12.

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UNITED STATES PATENT OFFICE.

ALBERT H. STEBBINS, OF LOS ANGELES, CALIFORNIA.

ORE-CONCENTRATOR.

No. 900,442. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed August 9, 1907. Serial No. 387,766.

To all whom it may concern:

Be it known that I, ALBERT H. STEBBINS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Ore-Concentrators, of which the following is a specification.

My invention relates to improvements in ore concentrators, an object of the invention being to provide an improved construction of concentrator surface, over which air jets are directed away from the entrance end thereof and across the surface.

A further object is to provide an improved construction of upper wall comprising a zigzag formation, providing a series of buffers against which the ore is directed by the action of the machine.

A further object is to provide improved constructions and arrangements of riffles on the concentrating surface.

A further object is to provide an improved dust chamber in which the dust is collected from the concentrator.

A further object is to provide an improved inclined and angularly-disposed shaking concentrator with improved mounting and operating mechanism, which will be extremely simple in construction, strong and durable in use and perfectly perform the functions of a machine of this character.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a broken view in side elevation illustrating my improvements. Fig. 2 is a view in longitudinal section of the supporting framework. Fig. 3 is a view in cross-section. Fig. 4 is a plan view of the washer. Fig. 5 is a fragmentary view in section of the same. Figs. 6, 7, 8, 8^a and 8^b are views of modified forms of riffle. Figs. 9 and 10 are views in plan and longitudinal section respectively, showing clearly the arrangement of riffles. Fig. 11 is a modified form of concentrator and Fig. 12 illustrates a modified form of eccentric for reciprocating the washer.

1 represents a rectangular supporting framework, on which a reciprocating carriage 2 is mounted. This carriage 2 comprises a horizontal frame 3 and an inclined frame 4, the former supported on spiral springs 5 at the corners of frame 1 and connected by cranks 6 at its ends with the end portion of frame 1, to give to the reciprocating carriage the desired angle of movement when reciprocated. The inclined frame 4 has my improved concentrator secured thereon and disposes the latter at the proper angle and inclination, as will more fully hereinafter appear.

7 represents a drive shaft supported in suitable bearings 8 on frame 1 and having an eccentric 9 fixed thereto. A pitman 10 pivotally connected to carriage 2 and slotted to receive shaft 7 carries a roller 11 in contact with eccentric 9, and a spring 12, connecting carriage and frame 1, serves to move the carriage in one direction, maintaining the roller 11 against eccentric 9 and permitting the latter to reciprocate the carriage. A cylindrical blower or fan 13 is supported in frame 1 and driven by a pulley 14 on shaft 7, and an air tube 14 connects the blower with an air chamber 15 extending entirely below the concentrator surface plate 16, said air chamber being subdivided into a number of small chambers if desired. The concentrator surface is of general triangular form, having an entrance hopper 18 at its upper narrower end and gradually widening to its lower discharge end. The plate 17 is provided with a great number of perforations formed by bent-lips 19 from the plate, and said lips serve to direct the jets of air issuing from the perforations away from the entrance end of the concentrator and across the surface thereof, and are a very important feature of my improvements.

The upper wall of the concentrator plate is of zigzag formation, consisting of a series of steps providing a great number of buffing surfaces or walls 20, against which the ore is directed by the riffles 21, the latter being preferably spaced apart a distance equal to the length of the buffing surfaces and spaced from the latter to provide passageways for the concentrate to pass. The riffles 21 connect with the lower wall 22 of the concentrator and are located preferably at a slight angle to the line of reciprocation of the concentrator and may be made and arranged in various ways, some of which will be hereinafter pointed out.

A dust-collecting hood or casing 23 incloses the upper portion of the concentrator proper and communicates with a dust-col-

lecting chamber 24 of general triangular form and located at the lower forward edge of the concentrator to collect the dust therein. An air suction pipe 24ª communicates with this chamber 24 to draw the dust therein, and an exit 25 is provided in the chamber for the heavier particles therein.

In the preferred form of my improvements, the riffles extend from the lower wall 22 to near the buffing walls 20 and are located at an angle to the longitudinal movement of the concentrator which tends always to move the concentrate higher and higher and into buffing action against walls 20.

In Fig. 6 a stepped form of riffles is illustrated, which will exert a buffing action to all material passing along their stepped face.

Fig. 7 illustrates riffles having alternately arranged high and low parts. The riffles are so placed that the high parts of a riffle are opposed to the low parts of the riffle next above it. The movement of the machine keeps the ore pulp spread out about evenly over the surface. A portion of the ore pulp working over a low place flows down against a high place in the riffle next below and must move on, be shaken up, and be subjected to another air effect before it gets to a low place in that riffle and so on from one riffle to another. These riffles, like most of the others, may be gradually reduced in height as they progress toward the discharge end.

Fig. 8 illustrates riffles beginning high at the back wall and tapering down as they extend in the direction of the discharge end of the machine.

Fig. 8ᵇ illustrates riffles beginning high at back wall and gradually tapering down for a part of their length and thereafter progressing at a more or less uniform height.

In Fig. 11 I have illustrated a modified form of riffles, in which the concentrators are shown arranged in a generally spiral path.

Fig. 12 illustrates a modified form of stepped eccentric for reciprocating the washer. In many and, perhaps, in the majority of cases, it is desirable to run over a table, material composed of a wide range of sizes. For instance, on a concentrator, material as coarse as an eighth of an inch and all finer down to dust. And on a dry washer, material as coarse as a half inch and all finer down to dust. If the riffles are placed more than a half inch apart, they are too wide apart to do good work. At the same time, if riffles, five sixteenths of an inch high, are placed only a half inch apart, the coarse material will get down between them and clog and pack. But by placing high riffles an inch or more apart and having them interspersed with low riffles, as shown in Fig. 9, the good of the high riffle is retained without their clogging and at the same time the good results of having the riffles close together is not lost. Therefore, high riffles interspersed with low riffles will always be the proper construction. In some constructions, they will alternate while in others there will be two or three, possibly more, low riffles between two high ones.

Fig. 9 illustrates high and low riffles arranged in successive series. Each series beginning with a low riffle and each following riffle increasing in height until a high one is reached, then again beginning a lowest one and repeating.

Fig. 8ª illustrates a riffle which is in effect about the same as a tapering riffle, but when it comes to the mechanical construction of the machine, they have or have not certain advantages according to which way the machine is made.

Another desirable form is to provide low places in riffles, as shown at 26, just under a point where a concentrate bumper in the upper wall discharges down on to it, and at other desirable places. This is a very desirable feature. Where these low places are provided at desirable points a higher riffle can be used at other points and an advantage thereby obtained. Also in construction it is a convenient thing sometimes to reduce the height of a riffle only at some particularly desired point. Where a riffle parallels the top wall after passing a bumper, it is desirable to have it rise in height, as shown at 27, so that it will create an accumulation up against the next bumper. It is by means of having an accumulation rise up in height from the surface that the last residual of waste or lighter particles are raised high enough to get them well started in a flow down over the riffles below. Also at the end of the machine, it is often desirable to create an accumulation by stopping the discharge of the concentrates except at intervals. This is particularly true of gold for the quantity of gold to be discharged is so small in proportion to the waste that it is necessary to cause it to accumulate and discharge only at intervals if a close concentrate is desired, as is always the case where one is running for gold values only. Under each of these circumstances the riffles would be made to rise as they neared the end. In fact, they would be raised at any place where it was desired to create an accumulation, but probably the above two instances about cover the desired range.

Some of the advantages of my improved structure are as follows: The air stratifies and imparts mobility to the ore pulp. The movement stratifies, increases general mobility and particularly moves the material along the riffles. The slant induces the top material to move down the surface over top of riffles. Riffles guide along themselves material below their tops, allowing that above their tops to flow over. Each successive rif-

fle catches more or less of the material flowing over the one above and by reducing in height as they proceed they gradually release more and more of the top material. The zigzag or top wall with offsets continually throws down part of the material brought up to it. The machine widening and the riffles lowering allows the ore pulp to thin out and spread over a wide surface. The gradual and progressive actions and eliminations of these conditions and forces working in conjunction causes the ore pulp to classify itself according to the various specific gravities of its component parts. The heaviest particles assume positions along the higher riffles and the various specific gravities grade themselves on down to the lightest at the bottom.

A great many slight changes might be made in the general form and arrangement of the parts described without departing from my invention and hence I do not restrict myself to the precise details set forth but consider myself at liberty to make such slight changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an ore concentrator, the combination with an inclined and diagonally disposed perforated plate, a stepped or zigzag wall at the upper side of said plate, and riffles extending across said plate from the wall opposite said stepped or zigzag wall so arranged as to direct the material against said zigzag wall.

2. In an ore concentrator, the combination with an inclined and diagonally disposed perforated plate, a stepped or zigzag wall at the upper side of said plate, and riffles extending across said plate from the wall opposite said stepped or zigzag wall, so arranged as to direct the material against said zigzag wall, whereby in effect said zigzag wall forms a buffing surface, said riffles being spaced apart a distance equal to the width of said buffing surfaces.

3. In an ore concentrator, the combination with a shaking screen, of riffles located thereon and disposed at an angle to the path of movement thereof, each succeeding riffle increasing in height and a plate or zigzag wall at the side of said screen adjacent the discharge ends of said riffles.

4. In an ore concentrator, the combination with a shaking screen, of a plurality of series of riffles thereon, each succeeding riffle of each series increasing in height and a plate or zigzag wall at the side of said screen adjacent the discharge ends of said riffles.

5. In an ore concentrator, the combination with a shaking screen, of a plurality of series of riffles thereon, the successive riffles of each series increasing in height and some of said riffles tapering in height and a stepped or zigzag wall at one side of said screen.

6. In an ore concentrator, the combination with a shaking screen, of riffles thereon located at an angle to the path of movement thereof, and some of said riffles having recesses in their upper edge and a stepped or zigzag wall at one side of said screen.

7. In an ore concentrator, the combination with a shaking plate, of a dust collecting hood above the plate, a dust receptacle or chamber receiving the dust from the hood, a suction pipe communicating with said chamber and an exit from said chamber for the larger and heavier particles.

8. In an ore concentrator, the combination with a frame, a reciprocating carriage, spiral springs supporting said carriage on said frame, crank arms connecting said carriage and frame whereby the desired angle of movement is imparted to said carriage when reciprocated, means for reciprocating said carriage, an inclined frame and a perforated plate on the carriage, and riffles on the plate, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT H. STEBBINS.

Witnesses:

EDWIN J. DE LANO,

A. B. DESSERY.