(No Model.) 2 Sheets—Sheet 1.

E. Z. KIDD.

CONCENTRATOR.

No. 426,821. Patented Apr. 29, 1890.

Fig. 1.

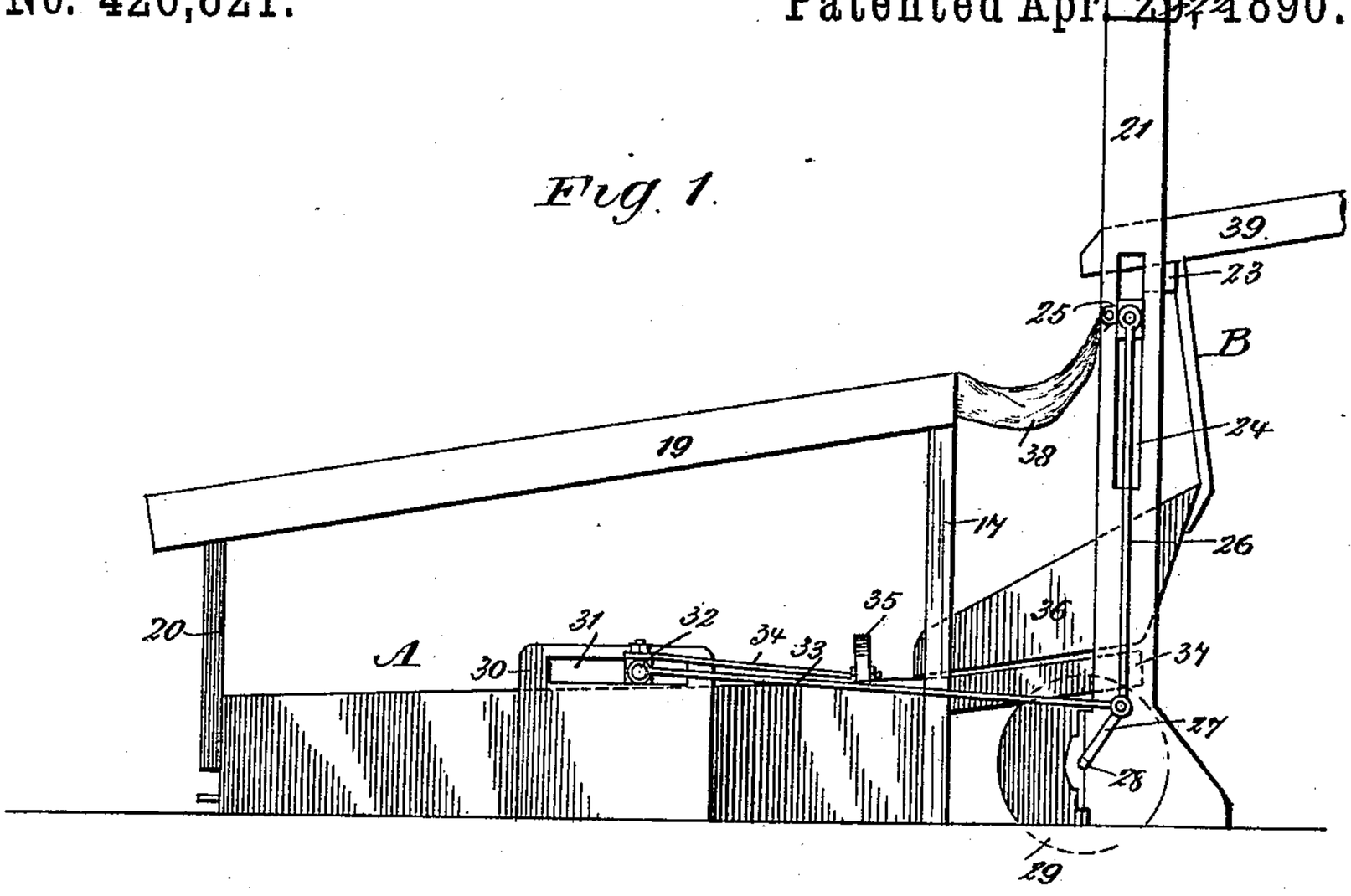


Fig. 2.

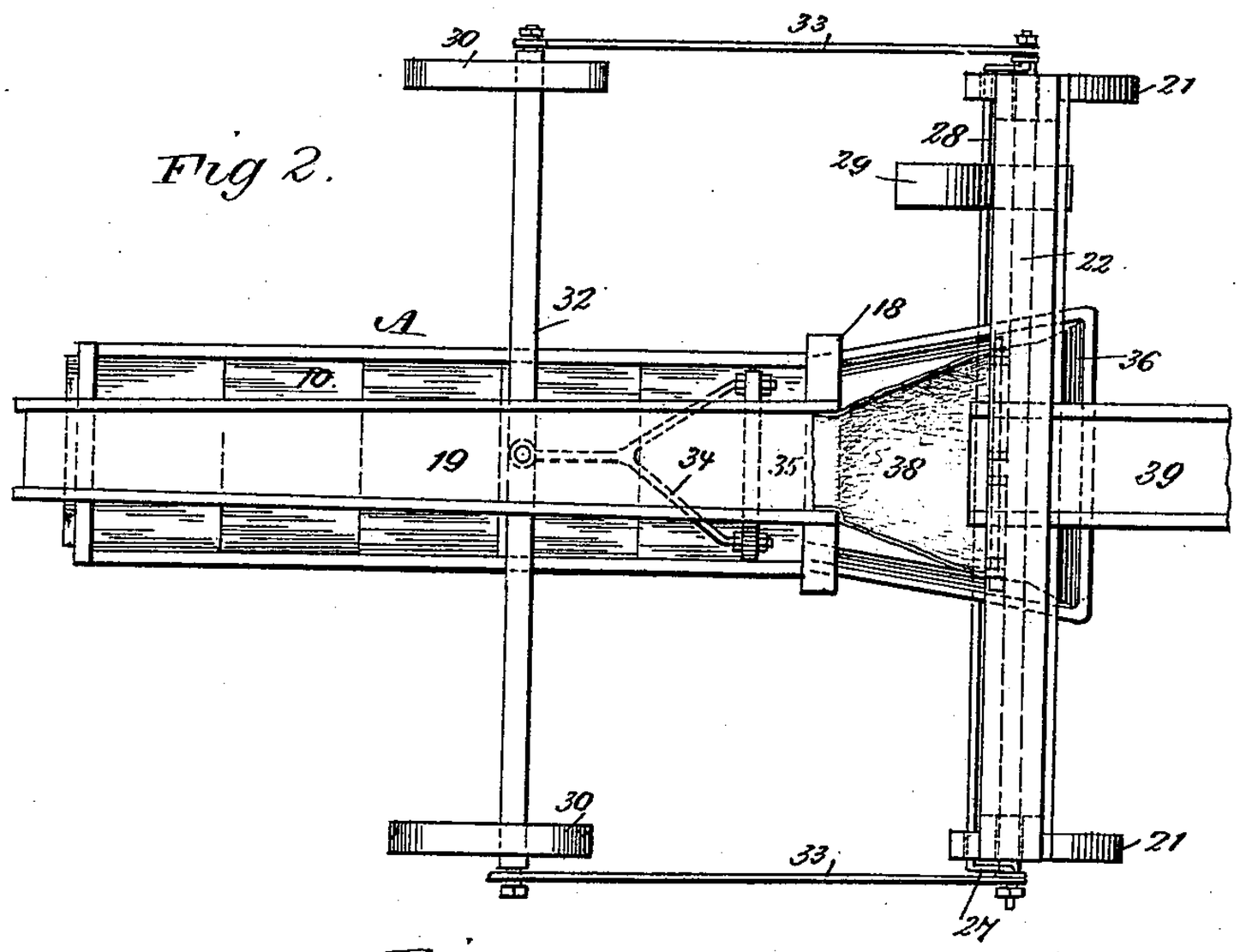
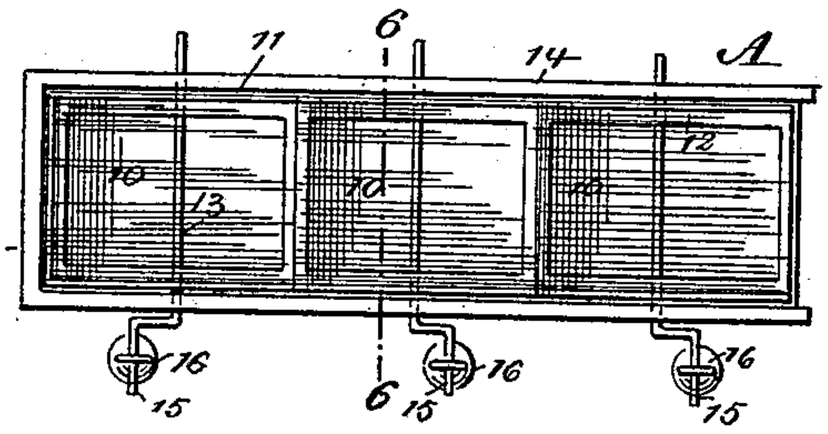


Fig. 3.



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ATTORNEYS

(No Model.) 2 Sheets—Sheet 2.

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Fig 4.

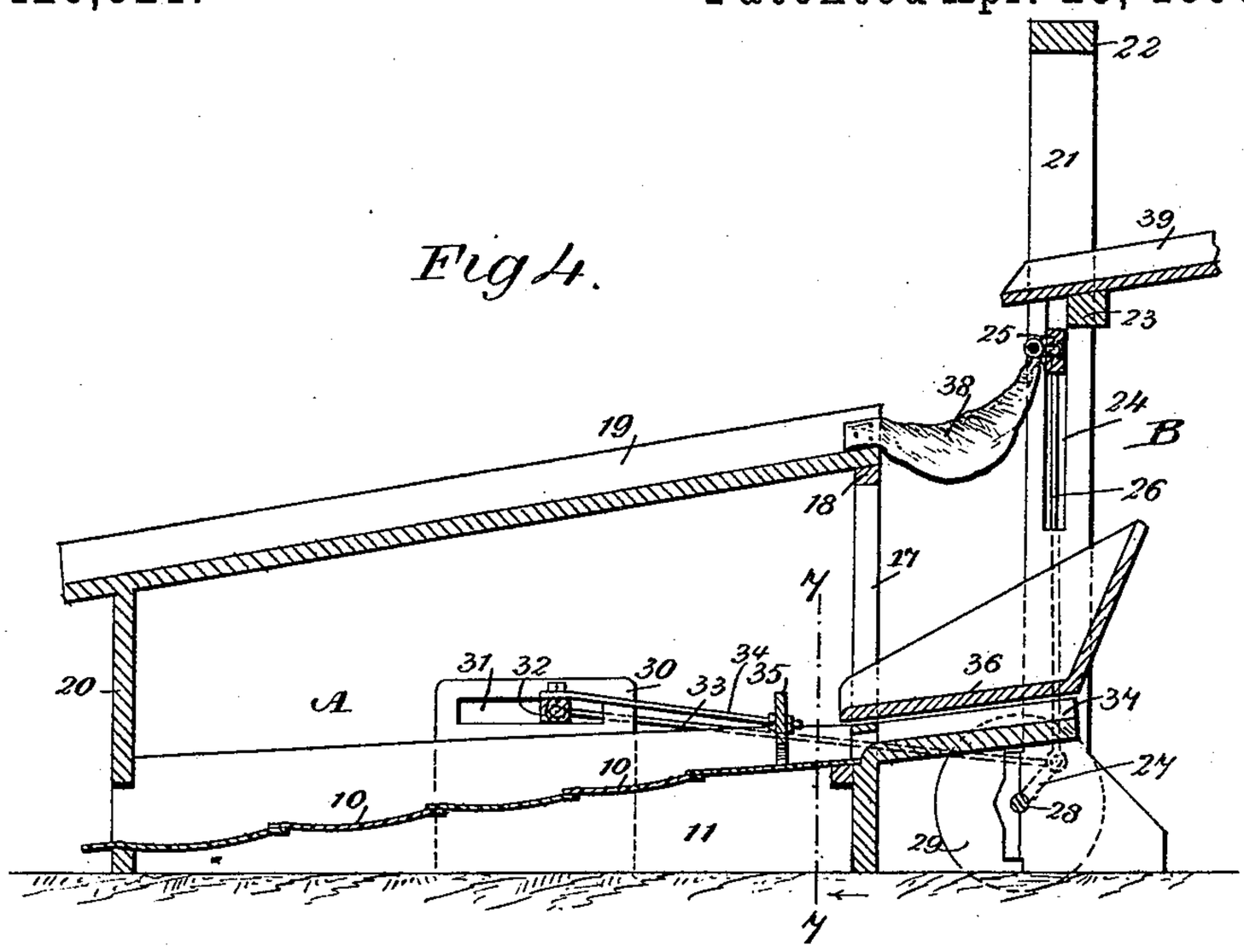


Fig 5.

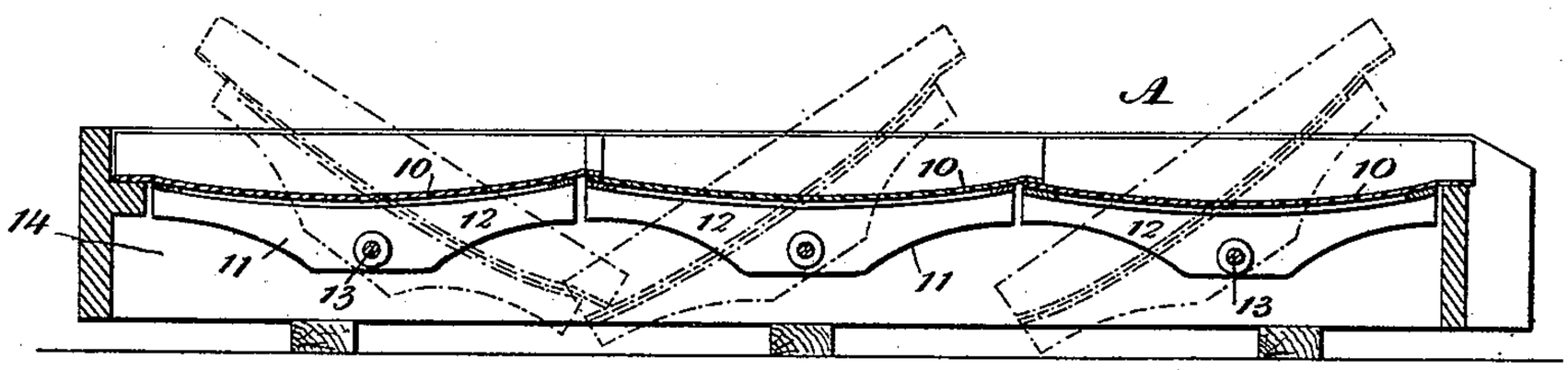


Fig 6

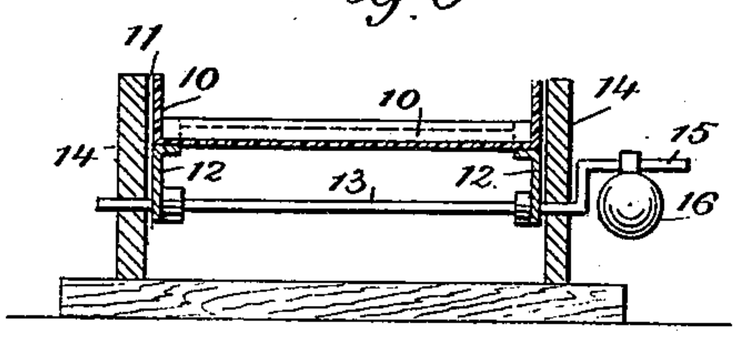
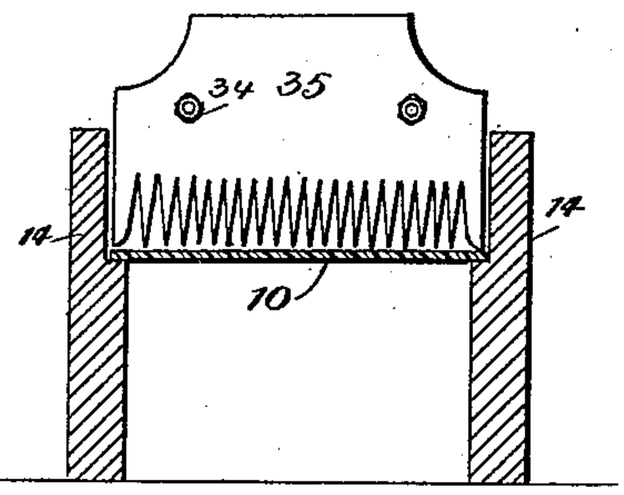


Fig 4.



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UNITED STATES PATENT OFFICE.

EDWARD Z. KIDD, OF DEADWOOD, SOUTH DAKOTA, ASSIGNOR TO HIMSELF AND SQUIRE P. ROMANS, OF SAME PLACE.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 426,821, dated April 29, 1890.

Application filed January 28, 1890. Serial No. 338,341. (No model.)

To all whom it may concern:

Be it known that I, EDWARD Z. KIDD, of Deadwood, in the county of Lawrence and State of South Dakota, have invented a new and useful Improvement in Concentrators, of which the following is a full, clear, and exact description.

My invention relates to improvements in concentrators adapted for working pulverized ore-bearing rock, earth, or sand, or tailings and like material; and the object of the invention is to provide an efficient and extremely simple and durable machine, and one capable of being constructed at an exceedingly low figure.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters and figures of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the concentrator. Fig. 2 is a plan view of the same. Fig. 3 is a plan view of a modified form of concentrating-table. Fig. 4 is a central longitudinal section through the concentrating-table illustrated in Figs. 1 and 2. Fig. 5 is a central longitudinal section through a concentrating-table constructed as illustrated in Fig. 3. Fig. 6 is a transverse section taken on line 6 6 of Fig. 3, and Fig. 7 is a transverse section on line 7 7 of Fig. 4.

The concentrating-table A consists of a series of sections 10, each section comprising a pane of glass, the upper face of which is concaved, and a frame 11, into which the glass pane is fitted with a water-tight joint. The frame 11 varies in construction in the different forms of concentrating-table. In that illustrated in Figs. 1, 2, and 4 the frame consists of the side pieces of the table, in which side pieces a suitable groove is formed to receive the ends of the glass panes, or battens are fixed to the inner faces of the sides of the frame upon which the glass panes rest.

In the form of table illustrated in Figs. 3 and 5 the frame is made, preferably, in skeleton rectangular form and provided integral with each side edge with downwardly-extending ears 12, and through the ears of each frame a shaft or spindle 13 is passed, rigidly attached to the frame, which shaft or spindle is made to rock in suitable bearings formed in side uprights 14, as best illustrated in Fig. 5. One outer end of each of the spindles or shafts 13 is formed in the shape of a crank-arm, as illustrated at 15 in Fig. 6, and upon said crank-arm a weight 16 is placed, which weights retain the tables in whatever position they may be placed. The tables when in their normal position incline from their upper ends in the direction of their outer or lower ends, as shown in the cross-section, Fig. 4, and each table is placed below that immediately above it. Thus the combined sections of the table in plan view or side elevation, when in position to receive the material to be treated, represent, essentially, an inclined plane.

It will be observed that when each table is provided with a shaft or spindle, as above described, it may be tilted at will, as shown in dotted lines, Fig. 5; and instead of making the shafts or spindles of the several sections of the tables independent of each other they may be connected by suitable links or rods, so that they may be tilted or manipulated in unison.

At the upper end of the table uprights 17 are secured to its sides, connected by a suitable cross-bar 18 at the top, and upon this cross-bar 18 the upper end of a waste-flume 19 is securely fastened, the other end of said flume being supported by a standard or standards 20, secured to the bottom of the table, the standard or standards 20 being shorter than the upper uprights 17.

At the rear of the upper end of the table a frame B is constructed, comprising two spaced standards 21, united by an upper cross-bar 22 and a lower cross-bar 23, and each of said standards 21 is provided below the cross-bar 23 with a longitudinal slot 24. In these slots the ends of a beam 25 are held to slide, and the extremities of said beam are connected by links 26 with the crank-arms 27 of a rock-shaft 28, journaled at or near the base of the stand-

ards 21, the said crank-arms of the rock-shaft being formed at its ends. The crank-shaft is also provided with a driving-pulley 29, or the said shaft may be driven in any other manner.

At each side of the concentrating-table a pillar 30 is constructed, and in the upper surface of each pillar a transverse opening 31 is formed. The ends of a beam 32 are made to extend through and slide in the openings of the pillars, and the extremities of said beam 32 are united with the crank-arms 27 of the rock-shaft by a link-connection 33. From the center of the beam 32 an arm 34 is projected in the direction of the upper end of the concentrating-table, which arm is preferably bifurcated, as illustrated, and the members of its bifurcated end are attached to an agitating-comb 35, which comb is adapted to reciprocate over one or more of the upper sections of the table, which sections are provided with a flat upper face, and at the upper end of the table a fixed hopper 36 is secured. Below the said hopper a water-chute 37 is placed, whereby a current of water may be turned upon the face of the concentrating-table at any time.

To the upper end of the waste-flume one extremity of a pan or hopper 38 is securely fastened, which hopper is constructed of any suitable flexible material—such as, for instance, rubber, heavy canvas, or rawhide—and the said pan or hopper may be made of any desired size. The other end of the flexible pan or hopper is detachably attached to the vertically-reciprocating beam 25. The preferred mode of attachment consists in forming eyes upon the pan or hopper adapted to register with eyes fixed to the beam, and through the said eyes pins are passed, as best shown in dotted lines, Fig. 2, whereby when it is necessary to drop the contents of the pan or hopper into the fixed hopper 36, which is located immediately beneath, it is expeditiously and conveniently accomplished by simply withdrawing the pins above referred to.

Upon the cross-bar 23 a water-chute 39 is made to rest, whereby a current of water may be brought to bear upon the flexible pan or hopper upon any desired occasion.

In operation the pulp, gravel, ground earth, and rock or other material to be worked upon is placed in the pan or hopper 38 and water is caused to flow from the chute 39, whereupon as the rock-shaft 28 is turned the end of the pan or hopper affixed to the beam 25 is made to alternately rise and lower. At every rise and fall of the pan or hopper the pulp is rolled backward and forward, keeping it in constant motion, and as the stream of water from the chute 39 is continuous at every upward motion of the pan or hopper light substances—such as slums, light gravel, and rock—pass off with the water through the waste-flume 19, while the concentrates—such as iron, black sand, lead, and stream-tin—settle in the center of the pan or hopper. When the charge has been sufficiently washed, the upper end of the pan or hopper is released from the vertically-reciprocating beam 25, whereupon the contents of the hopper are dumped into the fixed hopper below it, and are there further cleaned and concentrated by being made to pass over the glass sections of the concentrating-table in the presence of water passed over said tables through the lower chute 37, the material being kept constantly agitated at the upper end of the table by the action of the comb 35.

In a full-sized and working machine the glass sections of the concentrating-table are usually set about one inch below each other, the highest section being at the upper end of the table. All of the glass sections have a uniform grade.

As the upper portion of the table needs cleaning oftener than the lower portion, it is very advantageous to have the concentrating-surface of said table constructed in sections. In the form of the machine illustrated in Fig. 4 any one of the sections may be slid out of its frame and cleaned, and in the other form of table (illustrated in Fig. 3) each section may be instantly cleansed by tilting the same.

A great advantage in the use of glass consists in the fact that fine particles—pyrites of iron, lead, tin, or gold—cling to hard substances more tenaciously than to a slimy or very smooth surface—such as rubber, wood, or even copper plates. Rubber will soon contract a slimy surface; so will wood, and even copper will become coated with verdigris. Glass is less liable to do so, and is more readily kept clean.

By concaving the upper face of the glass sections of the table the law of gravity and the force of water make a peculiar combination favorable for the concentration of heavy particles. The heavy particles usually commence to accumulate at the base of the concavity and continue to pile up, while the lighter matter will roll off to the sides and pass off with the water. All that is necessary in the operation is to watch the accumulations on the table and empty them or the table at the proper time. The upper section of the table is preferably made stationary in an operative machine.

As heretofore stated, the comb or rake 35 tends to keep the concentrates uniformly distributed as they come from the hopper 36.

With reference to the flexible hopper, it may be noted as a known fact that in concentrating ores the slum or muddy portion is the most difficult to get rid of. Experienced miners to dispose readily of the slum usually employ a gold-pan, and fill the same with pulverized quartz or gravel, when by shaking or violently agitating the pan laterally the heavy particles are kept at the bottom, and the pan when lifted from the water is placed in a tilted position, thereby causing the light substances to flow off by the action of the water. This operation is continued until nothing is left in the pan but the heavy sub-

stances—such as gold, stream-tin, or pyrites of iron, copper, or lead.

It will be observed that the action of the flexible pan described in connection with my improved machine is somewhat similar to the manipulation of the gold-pan just referred to, as the lower end of the pan is stationary, being attached to the waste-trough, and at each upward motion the water flows into the spout or waste-flume, together with the slums and light particles, leaving the heavy particles to be dumped upon the table below, where, in passing over the convexed glass surface of the table, the process of concentration is completed.

As many of these machines as may be required for a plant may be placed side by side and all of them connected to a line-shaft and operated at the same time. The machines may also be made portable, whereby they may be transferred from mill to mill or from one point on a stream or bar to another where it is necessary to concentrate any substance.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an ore-concentrator, the combination of a pan of flexible material and having one end secured to a fixed support, and a vertically-reciprocating mechanism, to which the other end of the pan is secured, substantially as described.

2. In an ore-concentrator, the combination, with a waste-flume, of a pan or hopper of flexible material and having one end secured to said flume, and a vertically-reciprocating mechanism, to which the other end of the said pan or hopper is attached, substantially as and for the purpose set forth.

3. In a concentrator, the combination, with a waste-flume, of a flexible pan or hopper attached at one end to said flume, and a reciprocating mechanism detachably secured to the opposite end of said hopper, substantially as and for the purpose set forth.

4. In a concentrator, a table having its concentrating-face constructed of a series of adjustable glass sections, substantially as shown and described.

5. In a concentrator, a table having its concentrating-face constructed of a series of adjustable glass sections, the said sections being formed with a concaved upper face, substantially as shown and described, and for the purpose specified.

6. In an ore-concentrator, the combination, with a table and slotted guideways at the sides thereof, of a bar having its ends working in the guideways, a comb, a connection between the comb and bar, a crank-shaft, and links connecting the said bar and crank-shaft, substantially as described.

7. In an ore-concentrator, the combination of a waste-flume, a flexible pan or hopper having one end connected to the flume, a vertically-reciprocating bar, to which the other end of the flexible pan or hopper is attached, a table below the flume, a horizontal reciprocating bar above the table, a comb connected to said bar, a crank-shaft, and connections between the crank-shaft and the said bars, substantially as described.

8. In a concentrator, the combination, with a waste-flume, a reciprocating mechanism, and a flexible pan or hopper fixedly secured at one end to the waste-flume and detachably attached at its other end to the reciprocating mechanism, of a table beneath the said pan or hopper, having its concentrating-surface constructed of a series of glass sections, each of said sections being formed with a concaved upper face, substantially as and for the purpose specified.

EDWARD Z. KIDD.

Witnesses:
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ALVIN CLARK.