No. 686,088. Patented Nov. 5, 1901.

J. KLEIN.

ORE CONCENTRATOR.

(Application filed Feb. 25, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

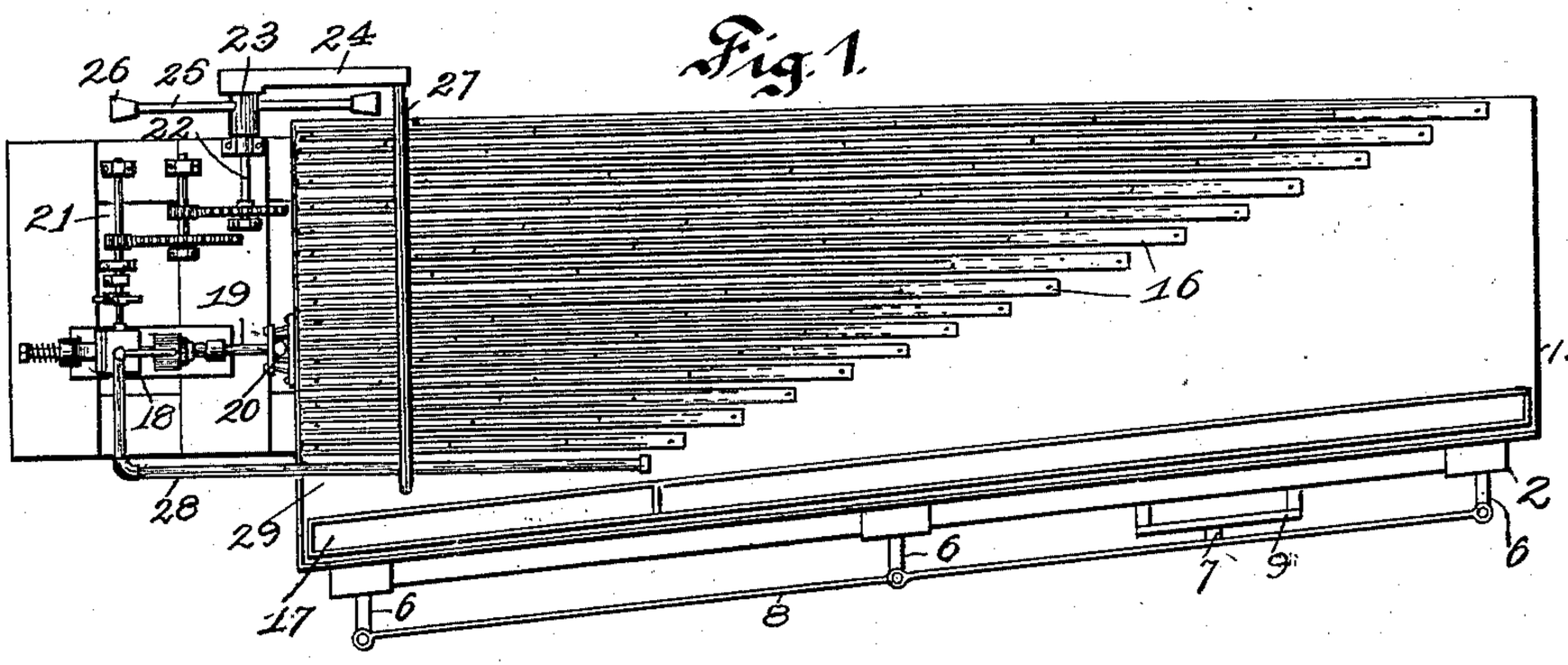


Fig. 2.

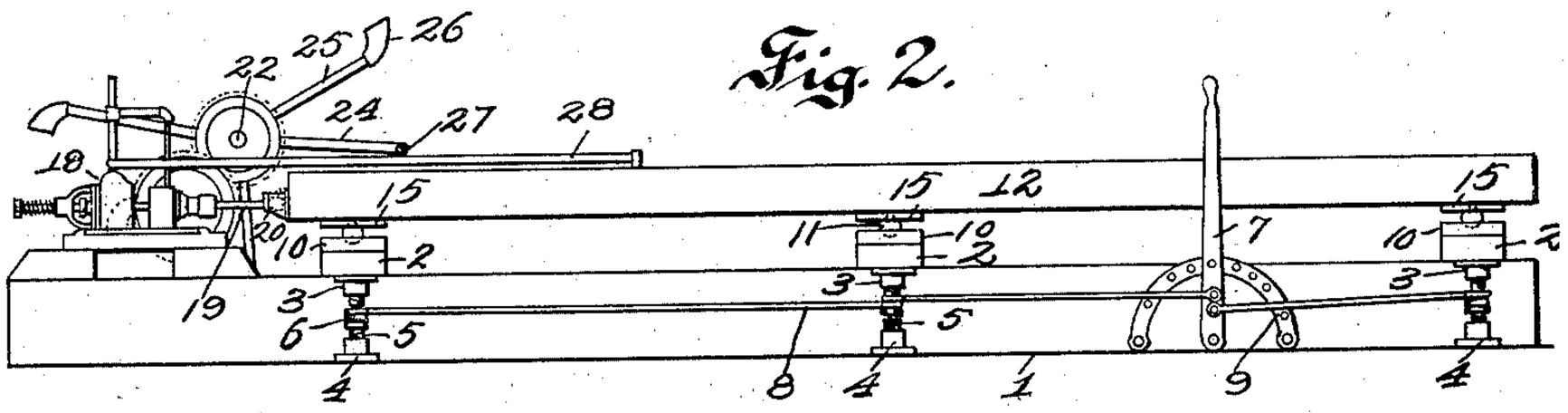


Fig. 3.

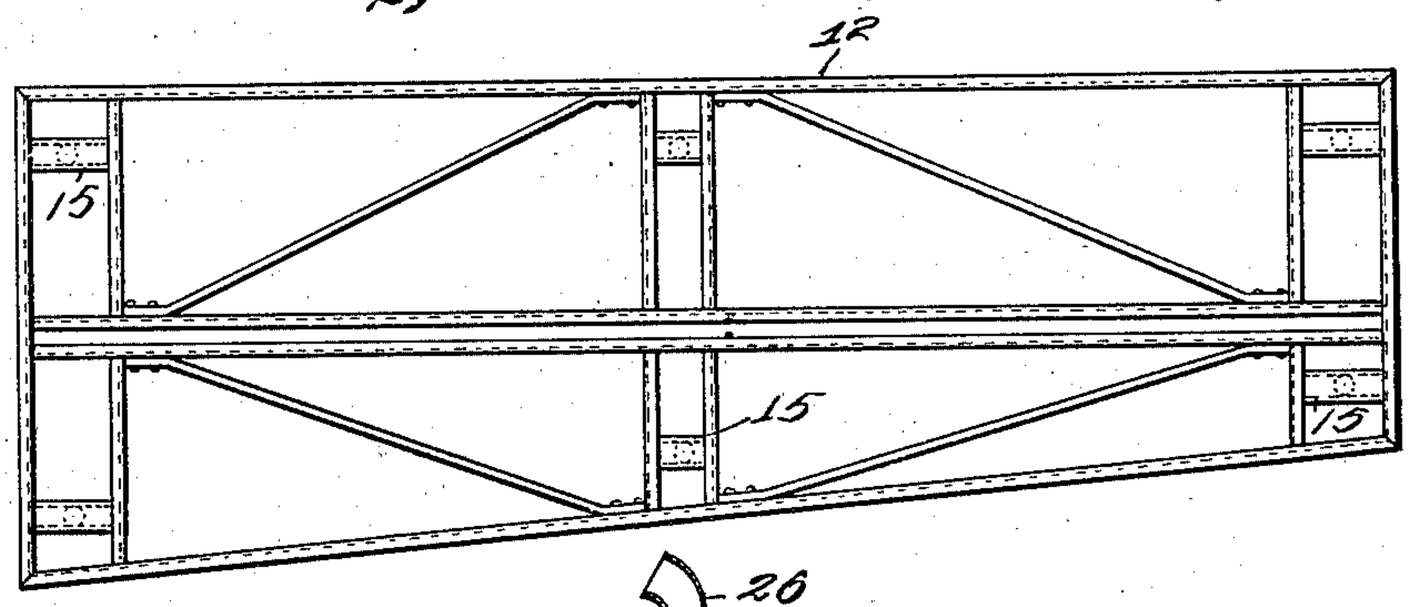
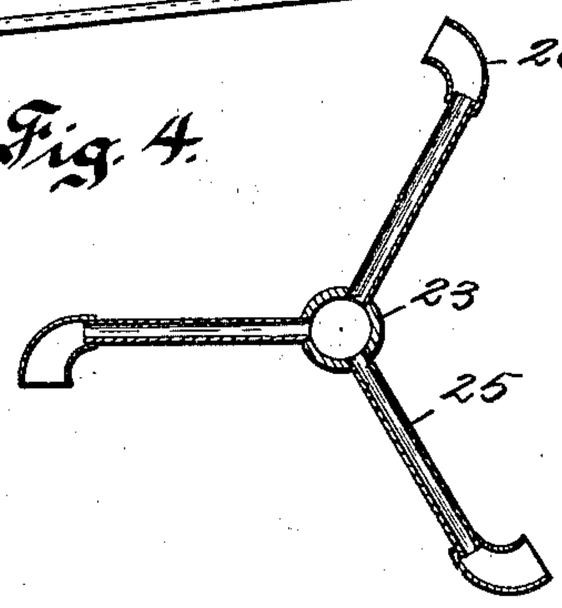


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 5

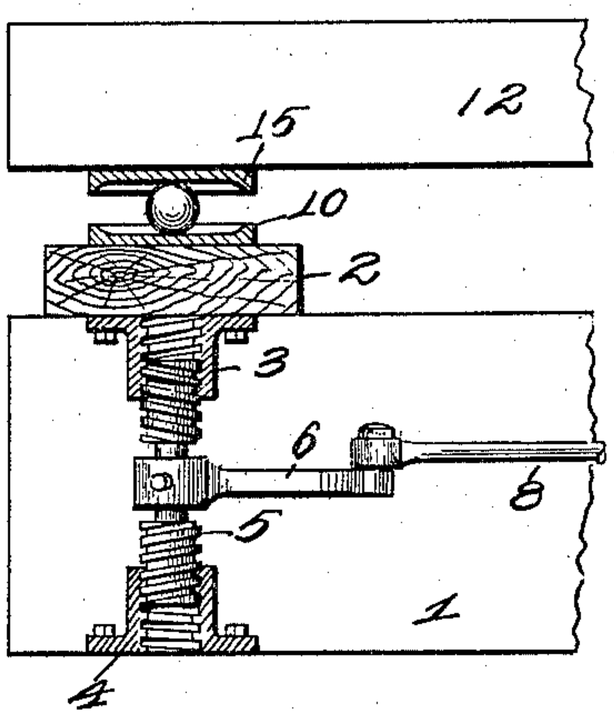


Fig. 6.

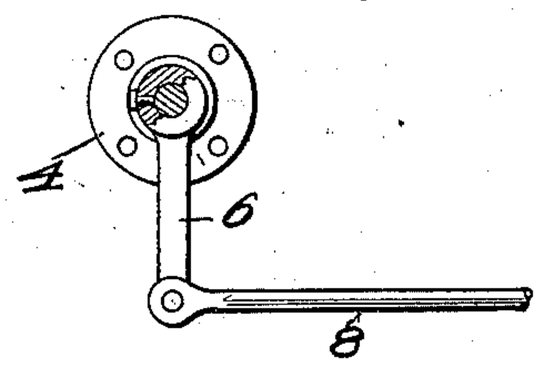


Fig. 7.

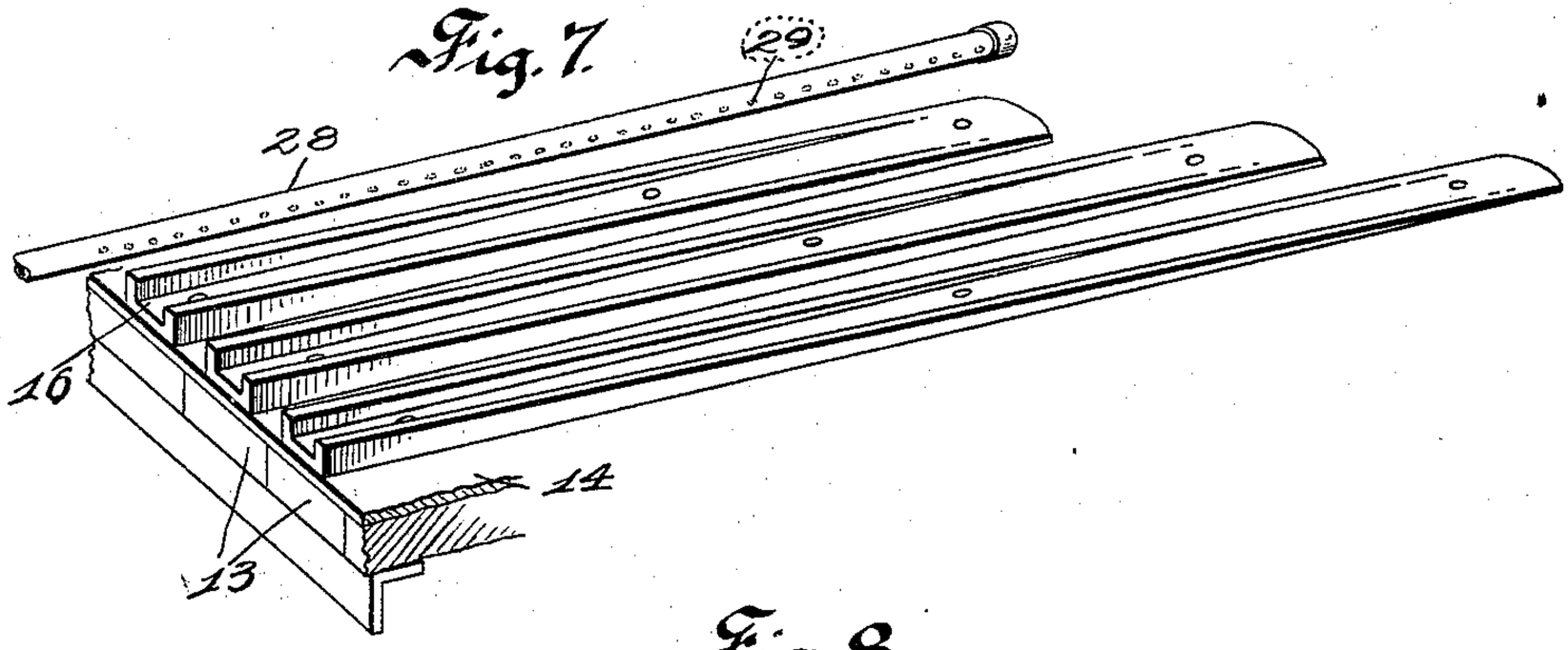
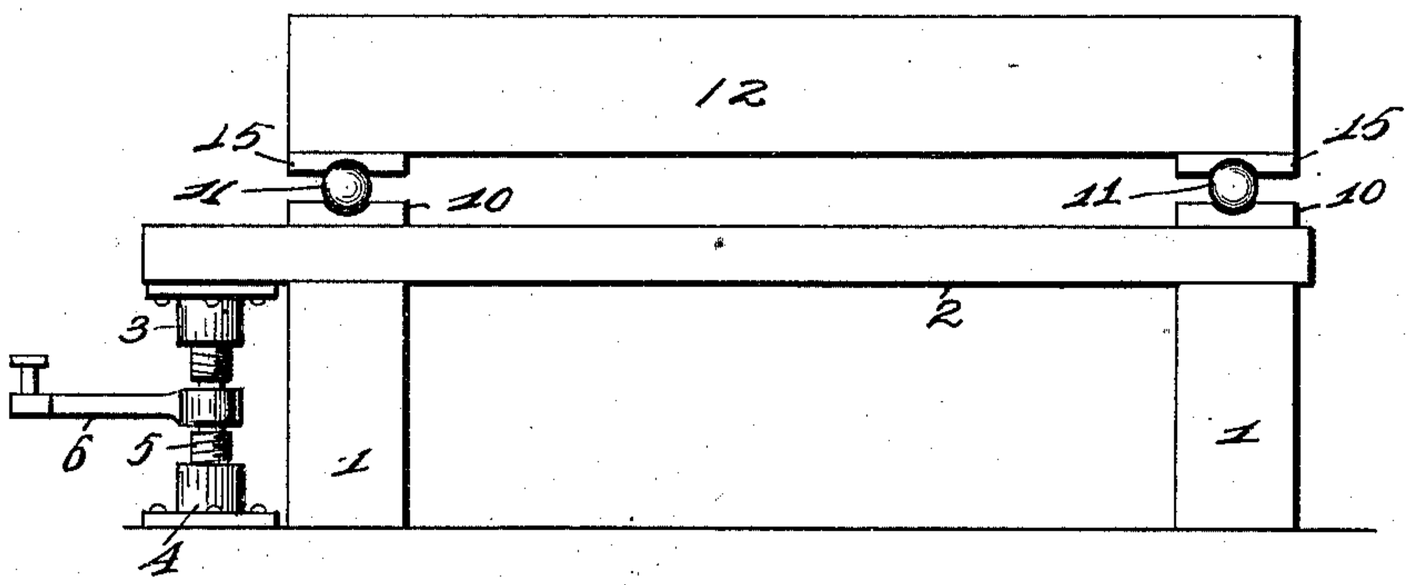


Fig. 8



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UNITED STATES PATENT OFFICE.

JOHN KLEIN, OF DESLOGE, MISSOURI, ASSIGNOR OF ONE-HALF TO PAUL A. FUSZ, OF GRANITE, MONTANA, AND CHARLES D. McLURE, OF ST. LOUIS, MISSOURI.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 686,088, dated November 5, 1901.

Application filed February 25, 1901. Serial No. 48,668. (No model.)

To all whom it may concern:

Be it known that I, JOHN KLEIN, of the city of Desloge, St. Francois county, State of Missouri, have invented certain new and useful Improvements in Ore-Concentrators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to ore-concentrators; and it consists of the novel construction, combination, and arrangement of parts hereinafter shown, described, and claimed.

My improved concentrator consists of a table located upon a suitable support and provided with ball-bearings which reduce to a minimum the resistance encountered in operating the table and avoid the wear which would otherwise result were the bearing-blocks constructed to slide upon each other. The table is provided with the usual feed-trough near one side, from which the pulp can be fed in a steady stream upon the table. A series of channels is arranged upon the table, gradually lengthening toward the side opposite from the feed-trough, and these channels are arranged so that the table-surface is almost doubled and the elevated flat surfaces caused by the usual riffles are avoided. The table is provided with an adjusting device whereby it can be tilted, giving the proper inclination. A suitable motor is located at the front end of the table and operates the same, and also operates a secondary feeding mechanism which conveys back to the table any of the material which needs additional concentration or separation. I also provide an air-pipe for subjecting the pulp to the action of the air immediately after it leaves the feed-trough and before it reaches the channels.

In the drawings, Figure 1 is a plan view showing my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a view showing the frame of the table. Fig. 4 is a sectional view showing a feed-wheel forming a part of my invention. Fig. 5 is a detail view showing one of the ball-bearings and the screw by which the table is raised or lowered. Fig. 6 is a detail view showing a part of the invention. Fig. 7 is a perspective view illustrating the arrangement of the channels on the table. Fig. 8 is a view showing the end of the table.

In the construction of this invention I provide a base or support 1, upon which the table and motor operating the same are mounted. At intervals along the base 1 are transverse members 2, which support the table and one end of which may be raised or lowered to give the table the proper inclination. As shown in Fig. 8, the members 2 project at one side beyond the base 1, and secured to the under sides of said members 2 are sleeves 3, provided with internal threads, and a similar sleeve 4 is supported in vertical alinement with each of the sleeves 3. A rod 5 operates in each adjacent pair of the sleeves, and the said rods are provided with opposite threads on their different ends, so that when they are turned they may be operated into or out of the sleeves 3 and 4, and thereby lower or raise the table. Connected to each of the rods 5 is an arm 6, and the said arms are connected to an operating-lever 7 by means of connecting-rods 8. The lever 7 is pivoted to the base 1, and a segment 9 is located adjacent to the said lever, so that it may be retained in the different adjustments in which it is placed. Upon the transverse members 2, adjacent the ends thereof, are the grooved blocks 10, within which are located balls 11, which form ball-bearings for the support of the table.

The table is constructed with a frame of angle-iron and is given additional strength by means of transverse and longitudinal braces which prohibit any of the parts from becoming loosened during the movement of the table. Upon the frame 12 is secured the top of the table, which consists of a series of longitudinal strips 13, bolted or otherwise fastened to the said frame 12. A covering 14, of linoleum or other suitable material, is secured over the top of the table, and upon this covering the pulp is delivered during the operation of the machine. Blocks 15, corresponding to the blocks 10, are secured to the under side of the table and are provided with grooves similar to the grooves in the blocks 10 for the reception of balls 11. These grooves, as shown in Fig. 5, are arranged parallel with the length of the table, so that the

table may have a certain backward and forward movement, the scope of which is only limited by the length of the bearing-blocks. By this construction of bearing the resistance encountered in the operation of the table is greatly reduced and the blocks do not become worn, as would occur were they permitted to operate directly against each other. The advantage of this construction will be readily apparent to those familiar with machines of this character.

Upon the top of the table above the covering 14 is secured a series of metallic channels 16, which are spaced a suitable distance apart, as shown in Fig. 1 of the drawings. The vertical sides of these channels become gradually lower toward the rear end of the table, until at the extreme rear ends of the channels they disappear entirely and are even with the upper sides of the bottom of the channels. (See Fig. 7.) As shown in Fig. 1, the channels become gradually longer toward the discharge side of the table, the channel at that side being almost of equal length with the table. The channels constructed as described provide greater table-surface than results when strips are used as riffles, for the reason that no flat elevated surfaces are presented, except a small area of the vertical sides of the channels. The material may pass toward the rear end of the table, either between the channels or within them, thus economizing space and very nearly doubling the capacity of the table.

Upon the feed side of the table is located a trough 17, having divisions, one of which is at the rear of the table and the other at the forward end. The division at the front is to receive and deliver the pulp, and that part of the trough at the rear of the table receives the pure water and permits it to pass onto the table in a steady stream.

Located on the base 1, in front of the table, is a motor 18, which operates a rod 19, connected by a sort of universal joint 20 to the end of the table. The rod 19 is reciprocated by the motor 18, and as it does so it operates the table on the bearings above described. The connection 20, as stated, permits the table to assume different positions without interfering with the operation of the rod 19.

Located in any desired manner above the base is a shaft 21, adapted to rotate and which is connected by suitable intermediate gears to a shaft 22, carrying on its outer end a short pipe 23, the inner end of which is closed and the outer end of which opens into a trough or pipe 24. That part of the pulp or material which it is desired to pass over the table a second time is conveyed to a receptacle located beneath the outer end of the pipe 23 and from which it is taken and delivered onto the table to be again operated upon. A series of pipes or tubes 25 project radially from the pipe 23 and are carried around as the said pipe 23 and its shaft 22 are rotated. On the outer ends of the pipes 25 are carried elbows 26, which operate into the receptacle containing the mixture below the pipe 23 and receive a portion and retain it therein until the pipe assumes a vertical or inclined position, at which time it falls out of said pipe 25, in which it is contained, and into the pipe 23 and then into the pipe or trough 24, from which it is conveyed to the feed side of the table by means of an inclined pipe 27. The pipe or trough 24 and the pipe 27 are preferably inclined, so that the material will gravitate toward the end of the pipe 27, from which it is permitted to fall to the top of the table and pass through the concentrating process as the table is reciprocated by the motor 18. A pipe 28 leads from any suitable source of air-supply and projects over the front end of the table at the feed side thereof, and the said pipe is provided with a series of perforations 29, through which the air is forced to act upon the material immediately after it leaves the trough 17 and before it reaches the channels. By this action of the air the mineral is forced down toward the rear of the table and is passed along the ends of the channels to the point at which it is delivered from the top of the table.

A table constructed as above described is comparatively simple. The adjusting device whereby the table may be inclined permits of a very delicate and exact adjustment, and the table may be retained in the different positions by locking the lever 7 to the segment 9 in any known manner. The ball-bearings supporting the table reduce the resistance to a minimum and prevent any wear of the bearing-blocks. The material can be conveyed upon the table in a steady stream and is acted upon by the air from the pipe 28 before reaching the channels, and the ore is forced by the air toward the rear end of the table and permits the lighter particles to pass over the channels and to be conducted thereby toward the rear end of the table. Any material which it is desired to pass a second time over the table can be done so by conducting it to the receptacle located beneath the pipe 23, from which it will be raised by the rotary arms 25 and delivered into the trough or pipe 24, from which it flows by gravity to the opposite or feed side of the table.

The motor 18 is an air-motor, and air is supplied thereto through any suitable source and also to the table through the pipe 28. The table is reciprocated with a sudden and impulsive action, such as only motors of this class can give, and the frame 12 of the table is purposely constructed of strong angle-iron in order to withstand the strain. The rod or shaft 19, having the connection 20, does not in any manner interfere with the adjustment of the table; but the machine will be operated with equal effectiveness in whatever position it is placed.

I claim—

1. An ore-concentrating table, consisting of a rigid metallic frame, longitudinal strips

secured thereto, a linoleum covering upon said strips, a series of metallic troughs or channels having tapering sides, fixed upon said covering, screws for tilting the table, a lever for rotating said screws, and a lock for locking the lever to hold the screws, substantially as specified.

2. In a concentrating-table, a frame formed of angle-iron and having longitudinal and transverse braces, strips 13 rigidly secured to said frame, a covering of linoleum upon the said strips, a series of metallic channels 16 having vertical sides which taper from the front end to the rear of the table, secured upon the linoleum covering, the said channels becoming gradually lengthened toward the discharge side of the table, and means for reciprocating the table, substantially as specified.

3. In an ore-concentrator, a table, means for conveying the ore thereon in a steady stream, a series of metallic channels having vertical sides, removably secured to the top of the table and extending longitudinally thereon, transversely to the feed of the ore, the said channels tapering from the front to the rear of the table and being spaced apart to provide other channels, and means for reciprocating the table, substantially as specified.

4. In an ore-concentrator, a table having a series of metallic channels or troughs with vertical sides removably secured to its top and extending longitudinally thereon, the said channels or troughs tapering from the front to the rear of the table transversely of the feed of the ore and being spaced apart to form other channels, and means for reciprocating the table, substantially as specified.

5. An ore-concentrating table, consisting of a rigid metallic frame, a number of strips secured thereon and forming the top of the table, means for feeding the ore onto the table in a steady stream, a series of parallel metallic troughs or channels removably secured upon the top of the table and extending longitudinally thereon transversely of the feed of the ore and tapering from the front to the rear of the table, means for tilting the table, means for retaining the table in different positions, and means for reciprocating the table, substantially as specified.

6. An ore-concentrator, consisting of a table having a series of metallic channels or troughs secured to its top and spaced apart to provide other channels or troughs, means for delivering the pulp onto the table, an air-motor for reciprocating the table, an air-spraying pipe leading from the motor and extending over the table, a pipe adjacent to the table, means for rotating the pipe, a series of hollow radial arms carried by said pipe and rotated therewith, and means for delivering pulp onto the table when the said parts are rotated, substantially as specified.

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

JOHN KLEIN.

Witnesses:
W. T. HAMMOCK,
S. E. JACKSON.