No. 651,006

Patented June 5, 1900.

S. T. CURTIS.

CONCENTRATOR.

(Application filed Sept. 5, 1899.)

(No Model.)

2 Sheets—Sheet 1.

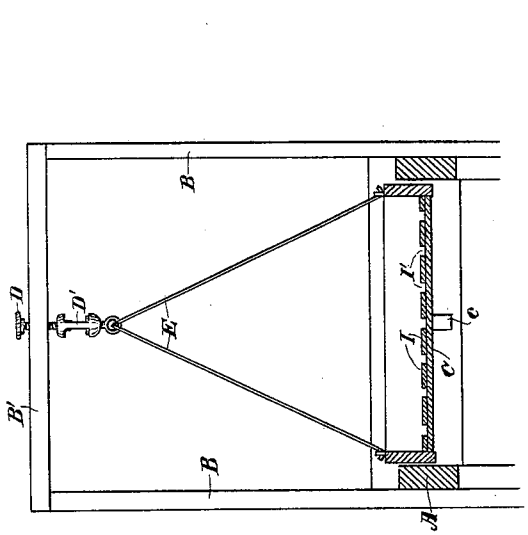


Fig. 2

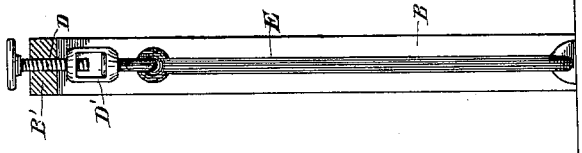
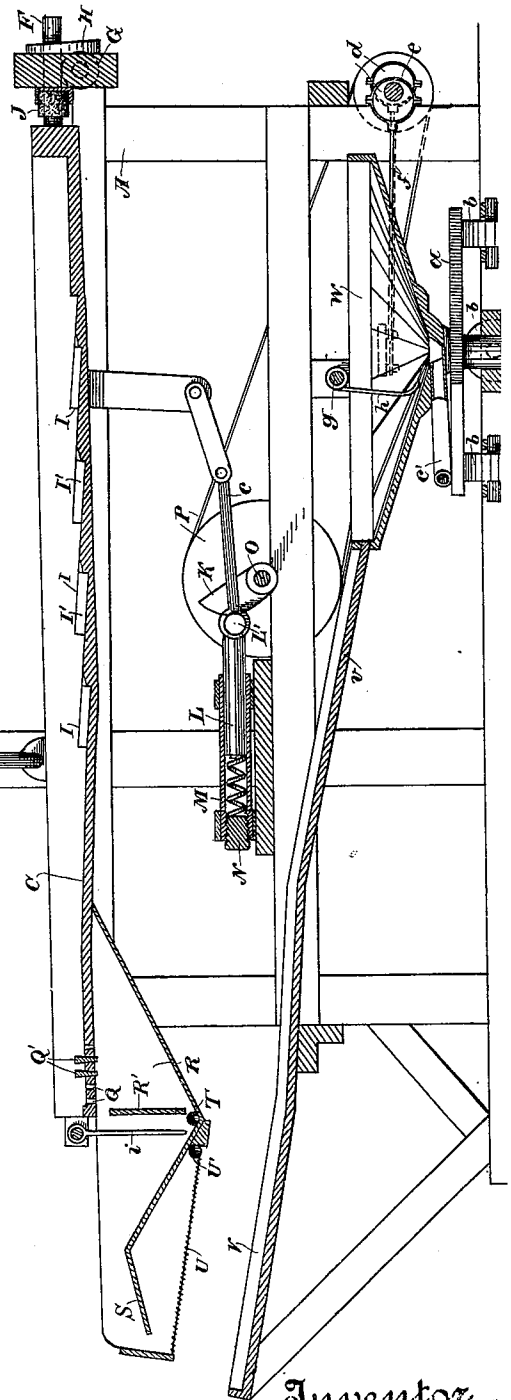


Fig. 1



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 3.

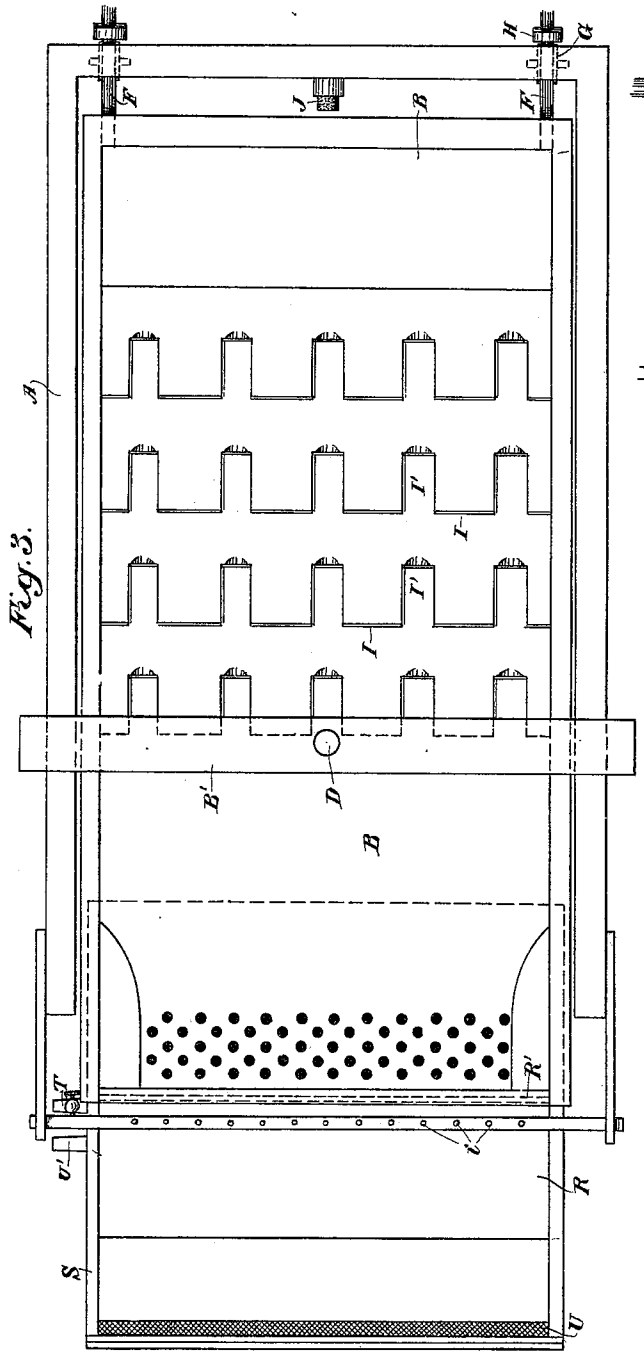
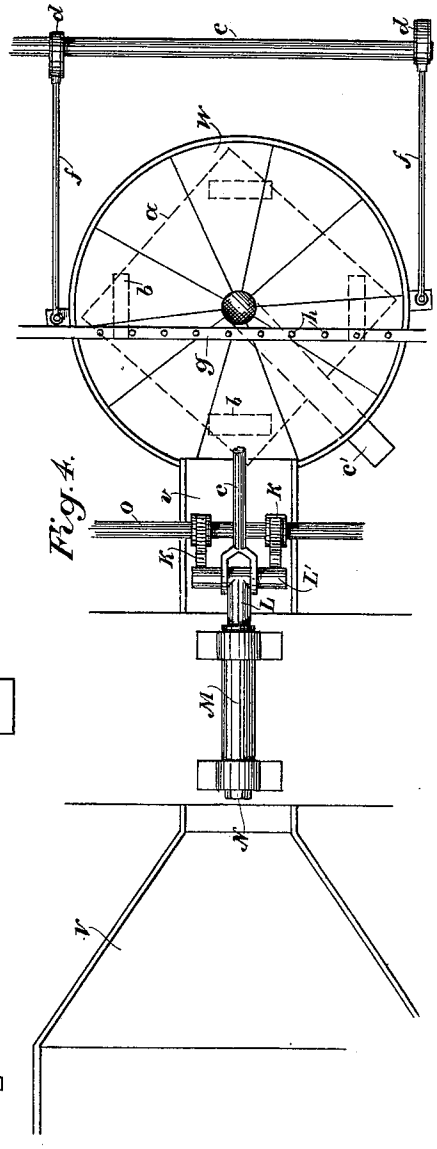


Fig. 4.



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UNITED STATES PATENT OFFICE.

SAMUEL THOMAS CURTIS, OF VIRGINIA CITY, NEVADA.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 651,006, dated June 5, 1900.

Application filed September 5, 1899. Serial No. 729,475. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL THOMAS CURTIS, a citizen of the United States, residing at Virginia City, county of Storey, State of Nevada, have invented an Improvement in Concentrators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus which is designed for the concentration of valuable sulfurets and other heavy material.

It consists of the parts and the constructions and combinations of parts hereinafter described and claimed.

Figure 1 is a longitudinal section through the concentrator. Fig. 2 is a lateral section through the concentrating-table. Fig. 3 is a plan view of the same. Fig. 4 is a plan view of the parts below the table.

A is a rectangular frame, of suitable size and material, having upon each side posts B, with a transverse cross-bar B′ at the top. From this cross-bar is suspended the concentrating-table C, which is freely movable between the sides of the upper part of the frame, which may be of suitable size and proportions. I have found that about four feet in width by nine feet in length is a very suitable proportion for the work. This table is suspended from the cross-bar by means of a centrally-disposed hanger D, with turnbuckle or screw D′, by which its height can be adjusted. From this the divergent rods E extend down to the sides of the table C, and these may also be capable of adjustment to level the table transversely. The upper end of the table has rods or bars F projecting outwardly from it, and these bars rest upon rollers G, journaled in the upper end of the frame, so that the table may oscillate freely in a longitudinal direction, the central and lower portion being suspended, as previously shown, and the upper end supported upon the rods or bars F. The table is designed to be nearly balanced upon these supports, and the grade of the table is regulated by the adjustment of the suspending device, so as to suit the character of the material which is being operated upon. By means of weights H, which may be fitted upon the projecting ends of the bars F, the balance of the table can be made as delicate as desired. The bottom of the table is made in steps I, these being placed at such an angle as to provide long flat surfaces, and when the table is in motion, the material flowing from the upper end toward the lower end, the heavier particles will be deposited and concentrated upon these steps and the lighter material will flow over the surface thus formed, which provides a surface grade of different angle from that of the steps. The steps are cut back to form notches I′, and as they are of less grade than the surface of the table longitudinally the heavier concentrates will settle on the steps and cover the bottom until they are filled up to a line across the head of the notches. The grade of the table will be so regulated that the percussion against the bumper will not be able to move them backward, and when the accumulation reaches the head of the notches the overflow must pass through the notches. The heavier concentrates having been settled on the bottom, the lighter material cannot work under them, and it will pass down from step to step, practically causing a reconcentration upon every step. The material passes onto the lower end of the table, where it is separated, as will be subsequently described.

At the upper end of the table is an elastic buffer J, against which the head of the table is caused to strike during its reciprocations, and this action serves to concentrate the material deposited upon the steps against the offsets between each flat surface and the one below. The movement of the table is effected by cams K and a spring-pressed plunger L, having a cross-head L′, against which the cams press when rotating and force the plunger against a spring located within a cylinder M. The tension of this spring is adjustable by means of a screw N in the rear end of the cylinder in which the spring is contained. The cams are mounted upon a shaft O, to which power is transmitted by belt and pulley, as shown at P, or in other convenient or well-known manner. The cross-head L′ is connected with the table by a loose rod or flexible connection *c*, so that when the cams press the plunger and cross-head in one direction the table will be moved with the cross-head. As soon as the cams pass the cross-head the spring within the cylinder acts to force the cross-head forward, and the table swings until the head strikes against the elastic

bumper at that end. The single suspension of the table and the rods or bars traveling freely upon the rollers allow the table to continue a quivering motion between the impulses of the cams, which is very effective in settling and separating the concentrates. The material which is separated by the steps previously described flows downwardly to the lower end of the table. This end of the table is normally perforated with holes, as shown at Q, and by means of pins Q' any number of these holes may be closed or opened, according to the character of the material passing. Beneath this part of the table and fixed to it so as to partake of the oscillating motion is a V-shaped trough or hopper R, having a vertical diaphragm R' extending from side to side above the apex of the trough, but one step short of the bottom of the trough, so that there will be a connection beneath this partition. The upper edge of the partition is higher than the discharge-apron S at the opposite side of the trough. The fine material falling through the holes Q will fall into the trough upon one side of the partition and will be allowed to settle freely to the bottom. The coarser and lighter material will flow over the end of the table and will fall into the outer portion of the trough, and the trough being eventually filled the overflow of the very light material will pass over the apron S.

T is a pipe having a suitable controlling cock or valve, and through this pipe the concentrates in the trough may be drawn off from time to time.

The material flowing over the apron at the lower end falls upon a screen-surface which forms a bottom, also carried by the trough and the table, and the coarser material will be retained by this screen U and can be drawn off by discharge pipe or pipes U'. The material passing through this screen will then fall upon an apron V, and from this apron it is conveyed by an inclined chute *v* beneath the table and is delivered into a circular pan W. This pan is of shallow depth and has a central pivot-pin extending into the base upon which it is carried, which serves to guide the pan in its movements. Below the pan is a flat plate *a*, which rests upon the periphery of rollers *b*, journaled below the level of the base, so that they may be continually lubricated the same as the pivot-pin which extends into the base. A central discharge-pipe from the pan delivers the material concentrated therein through a pipe *c'*, and any overflow may escape over the edges or otherwise, as desired. The pan is caused to oscillate by means of cranks or eccentrics *d*, mounted upon a shaft *e* and connected by eccentric-rods *f* with lugs upon opposite sides of the pan, so that the eccentrics act to move the pan with a rapid oscillation, and as it is mounted upon the rollers previously described there is very little friction in its movements. A shaft *g* extends across above the pan and is provided with dependent arms or fingers *h*, which dip into the material and serve to stir it while the pan is oscillating. Similar fingers *i* form a fixed support above the trough I at the lower end of the oscillating table, and these fingers in like manner stir and agitate the material within the trough as the latter moves with relation to them.

The whole apparatus provides an exceedingly-effective means for concentrating sulfurets and like materials.

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

1. A concentrator comprising a table, means by which it is freely suspended at a point between its ends whereby it is substantially balanced, means whereby the balance of the table is regulated, horizontal guides for the upper end of the table and means whereby the table is reciprocated longitudinally.

2. A concentrator consisting of an inclined table, rods or bars projecting from the upper end, journaled rollers upon which said bars are supported, convergent rods or chains connecting with the sides of the table between the center and the lower end thereof, a vertically-adjustable suspending-block to which said rods are connected whereby the table is suspended and its grade may be changed, and means whereby the balance of the table is regulated.

3. A concentrator consisting of an inclined table, bars extending horizontally from the head, journaled rollers upon which said bars are supported and movable, an adjustable suspending device connected with the sides of the table between the middle and the lower end, means connected with the table and regulating the balance thereof, and a mechanism by which the table is caused to oscillate longitudinally.

4. A concentrator consisting of an inclined table, horizontal bars projecting from the upper end, journaled rollers upon which said bars rest, an adjustable suspending device connected with the sides of the table between the center and the lower end, and weights adjustable upon the bars at the upper end whereby the balance of the table is regulated, and mechanism by which said table is given a longitudinal oscillation.

5. A concentrator consisting of an inclined table having one end suspended to swing from above, and the other end supported upon horizontally-slidable bars, an elastic concussion-plug against which the head may strike, means by which the table is reciprocated longitudinally, a floor consisting of successive steps so disposed as to form broad approximately-horizontal surfaces, said steps being cut backward to form recesses in which the material settles and a receiving box or trough connecting with the lower end of the table into which the discharge is received.

6. A concentrator consisting of an inclined table having the surface formed in successive

overlying steps of coarse cement, horizontal bars projecting from the upper end, journaled rollers upon which said bars are supported and movable, and an adjustable suspending device from which the lower end is hung and the incline regulated, a receiving-trough connected and movable with the lower end, said trough having a vertical diaphragm in line with its apex with a space beneath the diaphragm, openings made through the table to discharge into the trough at one side of the diaphragm, and pegs for closing said openings, a discharge at the end of the table by which the surplus material passes into the trough upon the opposite side of the diaphragm, an overflow from the outer edge of said trough and passages through which material is drawn from the bottom of the trough.

7. A concentrator consisting of an inclined table having the bottom formed in successive overlapping steps of coarse cement, a horizontally-slidable support for the upper end of the table and an adjustable suspending device for the lower end, a transversely-divided trough carried by the discharge end of the table, with holes and means for regulating them, said holes discharging upon one side of the dividing-partition, and the overflow from the end of the table falling upon the other side, an overflow from the outer edge of the trough, a screen carried below the overflow upon which the coarser material is received and passages by which it is continuously discharged from the screen, and a receiving table or apron beneath the screen.

8. A concentrator consisting of a longitudinally-oscillating inclined table, with horizontally-slidable supports for the upper end, and an adjustable suspending device for the lower end, a transversely-divided receiving-trough carried by the lower end of the table, means for separating the flow to be discharged from the table upon opposite sides of the partition, an overflow at the outer edge of the trough, a receiving and separating screen carried below said overflow, an apron upon which the material passing through the screen is delivered, a circular oscillating vertically-journaled pan, a chute by which the material is transferred from the apron to the pan.

9. A concentrator consisting of the inclined longitudinally-reciprocating table supported and suspended as shown, a receiving-trough at the end of the table with an overflow, a screen situated below the overflow, an apron and a conducting-chute therefrom, a vertically-journaled pan into which the chute discharges, eccentrics mounted upon a shaft and connections with the opposite sides of the pan whereby the latter is oscillated, and a central discharge for material concentrated therein.

10. A concentrator consisting of an inclined adjustably suspended and supported table, with the bottom composed of steps or offsets, and mechanism by which said table is given a longitudinal and concussive movement, a subdivided trough carried by the lower end of the table, with means for discharging the material reaching that point upon opposite sides of the partition of the trough, fixed arms projecting into the trough whereby the material therein is agitated and loosened, a discharge pipe or pipes upon the bottom of the trough, an overflow from the outer edge of said trough, a screen into which said overflow is received, with passages by which the material arrested thereon is delivered from either side, a fixed apron upon which the material passing through the screen is received, a chute delivering said material into a vertically-journaled pan, means by which said pan is oscillated about its shaft, a supporting-plate beneath the pan and rollers upon which the plate rests, a central discharge-pipe from the pan, and stationary fingers projecting into the pan to agitate the contents thereof.

In witness whereof I have hereunto set my hand.

SAMUEL THOMAS CURTIS.

Witnesses:

OTTO W. BIROTL,

L. OLSEN.