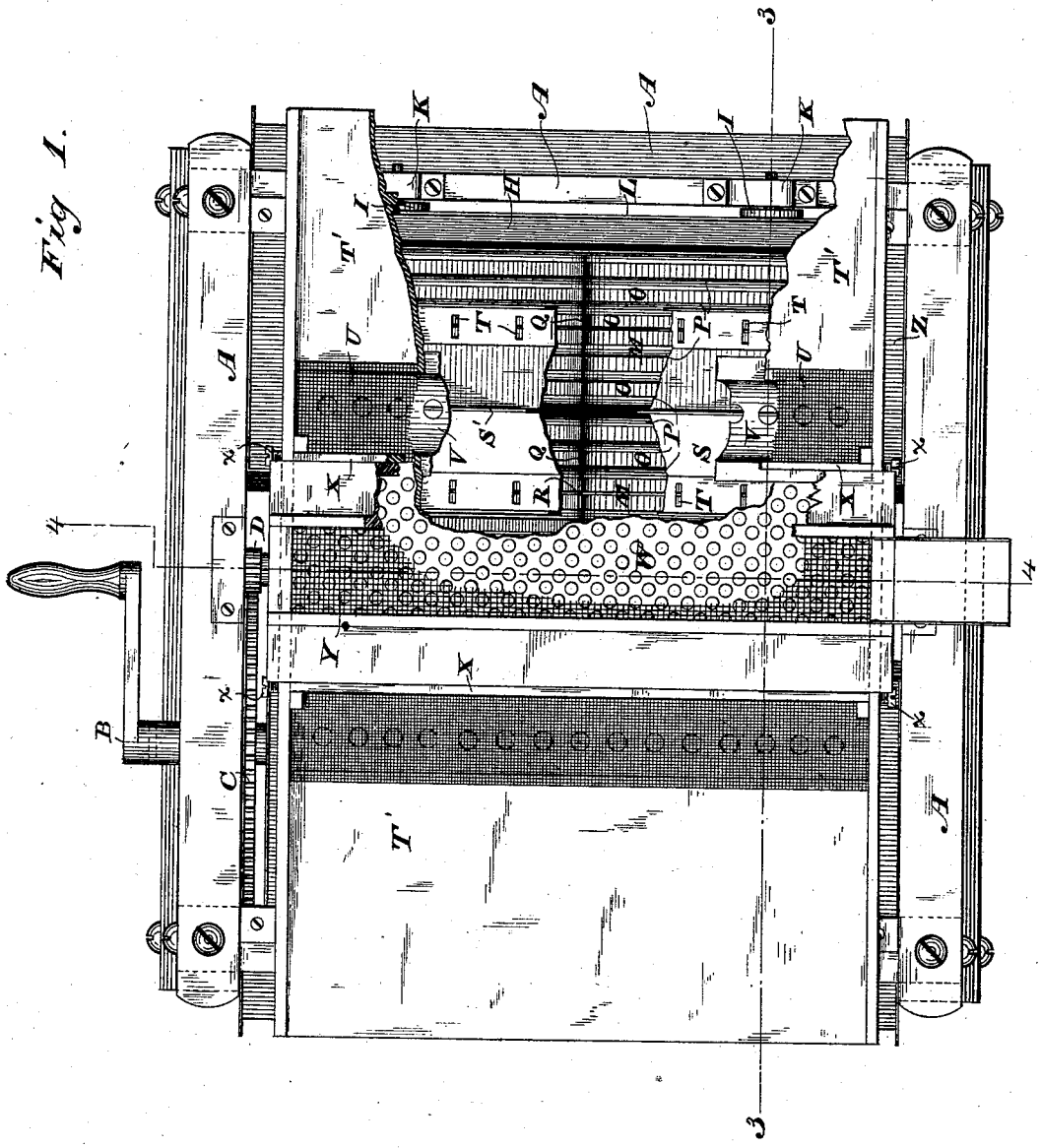
6 Sheets—Sheet 1.

P. PLANT.

Apparatus for Dry Separating Precious Metals from their Ores.

No. 215,292. **Patented May 13, 1879.**

Fig 1.



WITNESSES

Wm A Skinkle

Geo N Breck

INVENTOR

Paschal Plant.

By his Attorneys

Baldwin, Hopkins, & Peyton.

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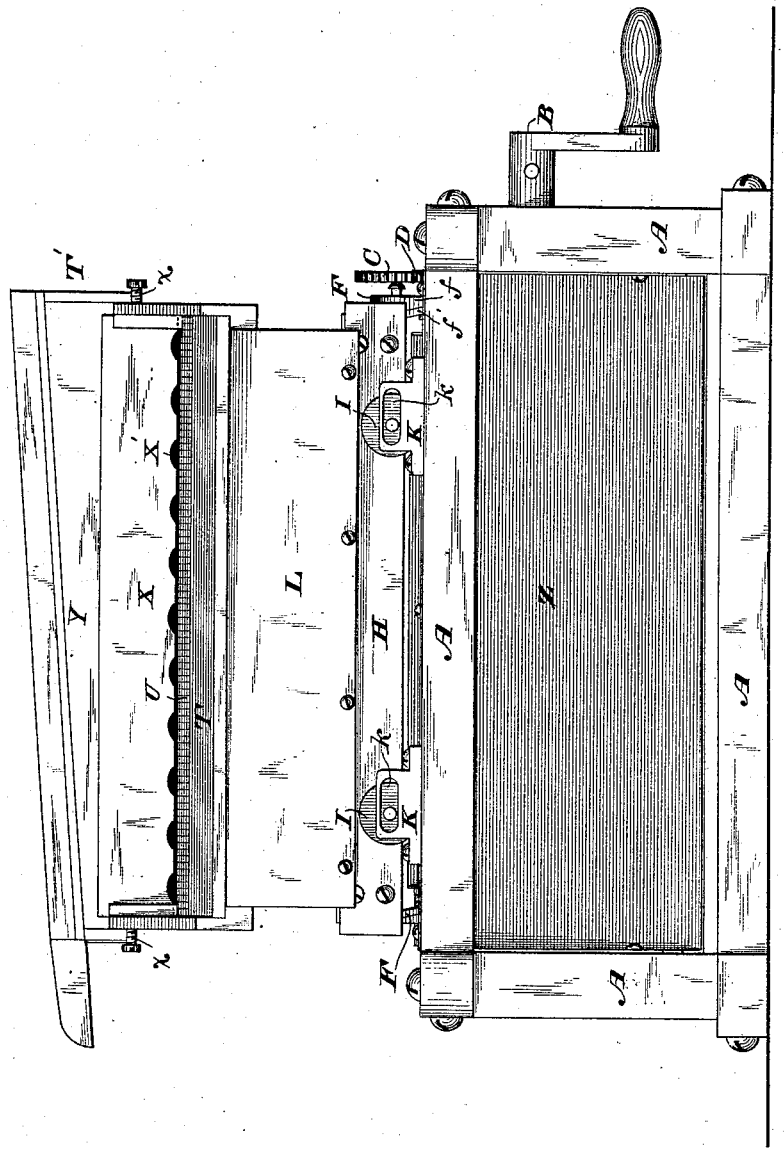
Fig 2



WITNESSES

Wm A Skinkle

Geo N Buck

INVENTOR

Paschal Plant.

By his Attorneys

Baldwin, Hopkins, & Peyton

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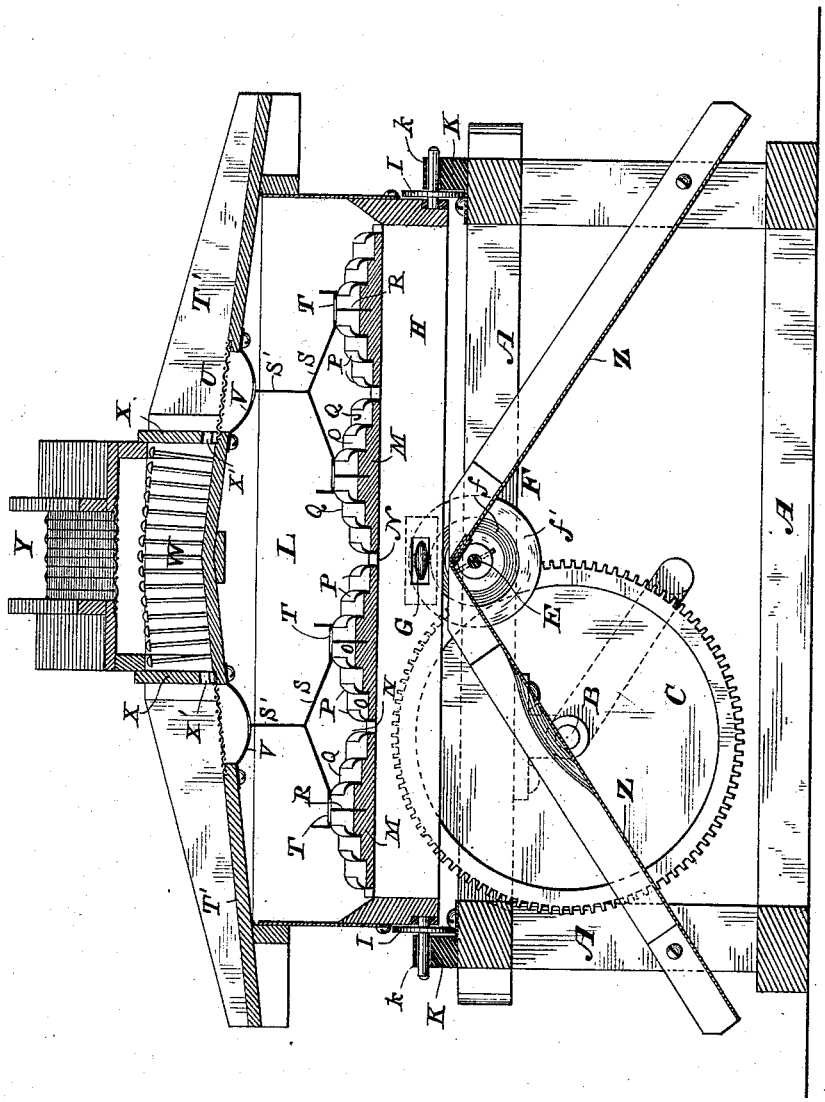
Fig 3.



WITNESSES

Wm A Skinkle

Geo W Breck

INVENTOR

Paschal Plant

By his Attorneys

Baldwin. Hopkins. & Peyton.

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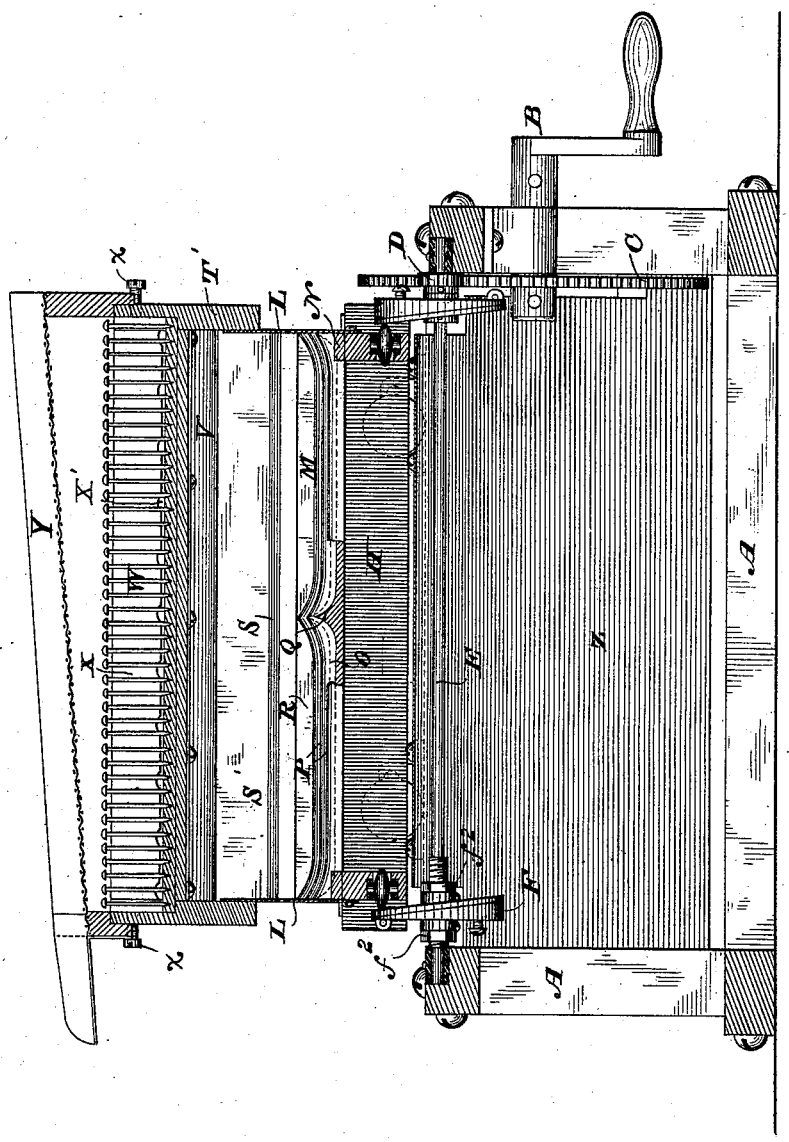
Fig 4



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Wm A Skinkle

Geo N Breck

INVENTOR

Paschal Plant

By his Attorneys

Baldwin, Hopkins & Peyton.

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Fig 7

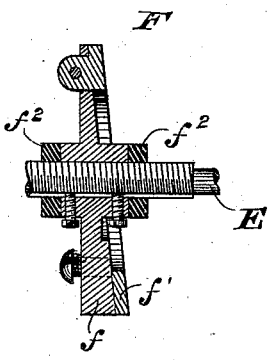


Fig 6.

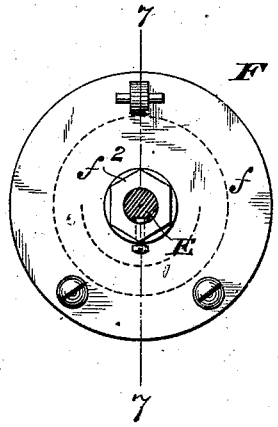


Fig 8.

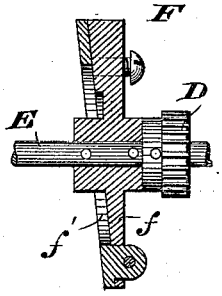
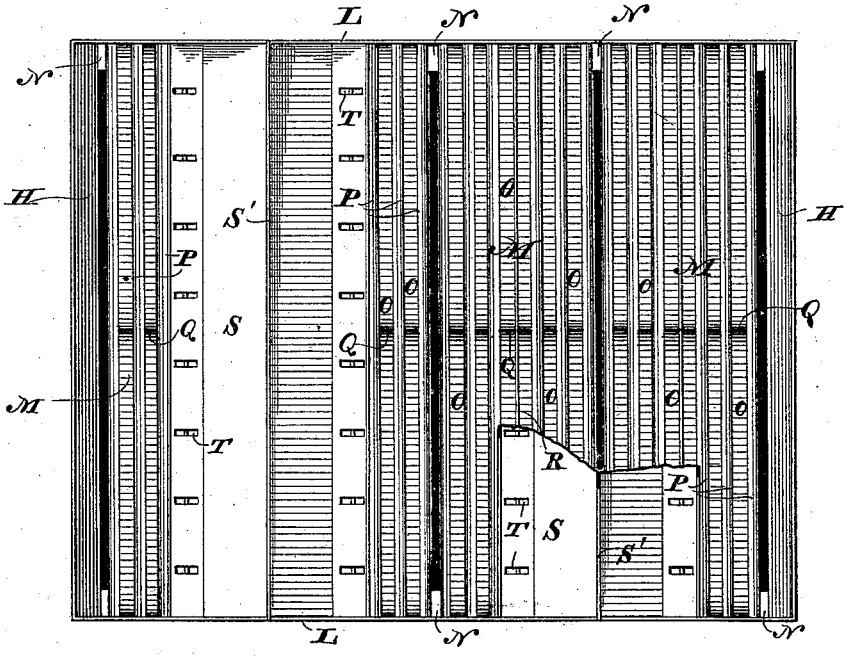


Fig 5.



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Geo W Breck.

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Fig 9.

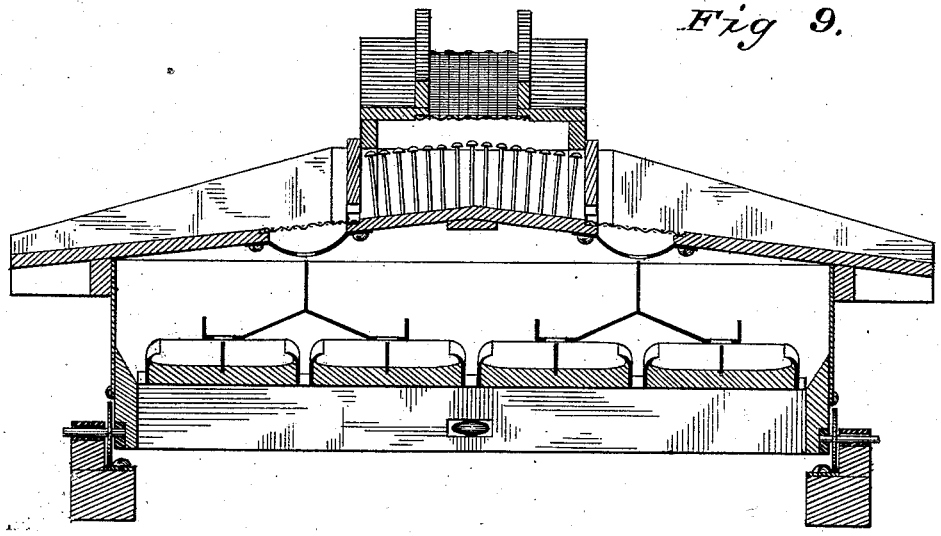
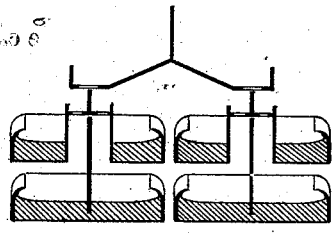


Fig 10.



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Geo H Breck

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Paschal Plant.

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UNITED STATES PATENT OFFICE.

PASCHAL PLANT, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN APPARATUS FOR DRY-SEPARATING PRECIOUS METALS FROM THEIR ORES.

Specification forming part of Letters Patent No. **215,292**, dated May 13, 1879; application filed January 30, 1879.

To all whom it may concern:

Be it known that I, PASCHAL PLANT, of Washington, in the District of Columbia, have invented an Improved Apparatus for Dry-Separating Precious Metals from their Ores, of which the following is a specification.

The principle of my apparatus is, in general, the same as that for which I filed my application for Letters Patent of the United States January 24, 1879—that is to say, I deposit pulverized ore, ground quartz, or auriferous sand in thin layers in shallow receptacles or separators provided with sharp-edged partitions, and then agitate these substances there by rapid tremulous vibrations, and cause them to be delivered over the edged partitions, thus effecting the separation of the precious metal from the earthy matter, and the final delivery over of the latter upon waste-plates beneath, which conduct it out of the way.

The object of this apparatus is to improve upon the mechanism disclosed in the aforesaid application, whereby I may, with greater simplicity and economy, secure the treatment of the ore in a vast number of separators simultaneously, and thus obtain a very great working capacity, so that a great number of cubic yards of ore may be operated upon daily.

In the accompanying drawings, Figure 1 is a plan or top view with portions broken away to show more clearly the parts lying beneath them. Fig. 2 is an end elevation. Fig. 3 is a vertical longitudinal section on the line 3 3 of Fig. 1. Fig. 4 is a vertical transverse section on the line 4 4 of Fig. 1. Fig. 5 is a plan view of the separator-frame detached, showing the distributing-plates, one of which is partly broken away, and the separators proper lying beneath them. Fig. 6 is a side elevation of one of the agitating-cams. Fig. 7 is a section of the same on the line 7 7 of Fig. 6. Fig. 8 is a similar section of the other cam. Fig. 9 shows a modified form of the separator-plate. Fig. 10 shows a modification in the way of arranging the separator-plates, so as to admit of using two tiers of them instead of one.

Referring to the letters on the drawings in aid of a description in detail of my apparatus, A indicates the main frame, having mounted upon it in suitable bearings a driving-shaft, B, and main driving-wheel C. This wheel gears into a pinion, D, fixed on a cam-shaft, E, also supported in bearings in the main frame. The cams F F, fixed on the cam-shaft, are each composed of two parts, the first being a disk, *f*, of unequal thickness, its surfaces being on different planes, such as if the disk were formed by cutting off a section of a solid cylinder at an angle other than a right angle with its axis, and the second being a flat annular disk or ring, f^1, secured adjustably on the inner inclined face of the first by means of a lug or pin or any equivalent fastening on one side and set-screws on the other side, so as to render the ring adjustable, whereby the stroke or push of the cam can be increased or diminished at will.

The inner inclined surfaces of both of the cams thus formed bear against friction-wheels G, projecting sufficiently from the opposite sides of the agitator-frame H.

It is obvious that if the parts *f* of the cams were always to remain rigidly fixed to the cam-shaft, and at the same distances apart as when first set, it would be impossible to effect their adjustment to increase or diminish their push materially, because the inner surfaces of the rings *f*, being, whether in motion or at rest, constantly in contact with the friction-wheels, there would be no room for adjustment so as to do more than increase or diminish the force of pressure upon the friction-wheels at different points in the revolution of the cams; therefore I have provided that one of the cams F may be shifted in its position on the shaft by means of nuts f^2, to give room for the adjustment of the rings f^1 by means of the set-screws, as above stated.

The agitator-frame is mounted on caster-wheels I, which rest on a smooth metallic plate on the main frame, and have the outer ends of their axles in guide-slots *k* of brackets or journal-boxes K. This frame has secured to its upper side an open-bottomed inclosure or receptacle, L, surrounding the separator-plates M, which rest on the frame, and are maintained in position apart from one another by suitable lugs N. These plates are inclined or rather stepped from their centers outward to their opposite sides, their upper surfaces forming the bottoms of ore receptacles or sep-

arators O, which are formed by the edged partitions P and the inclined or curvilinear-sided partitions Q, and are on different levels. In the center of each separator-plate or nest of oppositely-stepped separators is a vertical partition-plate, R. Above the separators, centrally over the division-space between them, and supported by the sides of the inclosure L, are double distributing cap-plates S, provided with a central partition, S′, and with slots T in their bottoms, which slots are directly over the partition-plates R, so that as the ore falls from the hopper through these slots it will be divided, one-half of it falling upon one side of the partition R, and the other upon the other.

Resting upon the receptacle L is a light frame, T′, with double inclined bottom, provided with sieves U and perforated plates V. The perforations in these plates are directly over the partition S′, so that as the ore falls it will be divided by the partition. The frame T′ also has between the sieves a disintegrator, W, consisting of a great number of teeth inclosed on each side by vertically-adjustable plates X, to be set in position so as to leave side openings, X′, for the passage of the disintegrating-ore by set-screws *x*. Resting on the frame T, immediately over the disintegrator, is the feed-hopper Y, provided with an inclined sieve in its bottom coarser than those just referred to and a spout at one end.

Besides being able to increase or diminish the push of the cams, and consequently the length of the reciprocations or vibrations effected thereby, as above set forth, it is important to state that the adjustment by the set-screws, even without the alteration of the position of the cam F by means of the nuts f^2, will have some appreciable effect upon the regularity of the strokes or impulses given by the cams by making the contact of one side more forcible or giving it greater pressure through the set-screws than the other, and the effect of this is to regulate and maintain the ore upon a level in the separators, where it sometimes exhibits a tendency to flow to one side or the other under agitation, and render the layers uneven in depth in the separators, and hence the necessity of some provision of this kind.

The length of the vibrations for tremulous agitation bears an important relation to the depth of the layers of ore in the separators, as the thicker the layers the greater should be the vibrations; but as the operation of separating is exceedingly delicate, and the variations as to depth of layers exceedingly limited for successful working, it requires experience in the operator to secure the exact adjustments, and it is impossible to state them in a way to suit all cases.

From the foregoing description of the construction and relations of the parts of my apparatus, it will be understood that when motion is communicated to the main driving shaft and wheel the cams working against the friction-wheels of the agitator-frame will cause it and the superposed parts it bears to be vibrated or agitated rapidly with a tremulous motion that can be varied by adjusting the nuts f^2 and the set-screws of the cams.

It will also be understood that, as the fine ore, during the operation of the machine, is continually supplied into the hopper, it will be delivered through the hopper-sieve at the bottom to the disintegrator, except such portions as may be too coarse, which will pass away through the hopper-spout. The disintegrator will still further pulverize the ore, and it will pass out under the plates X onto the sieves U and through them to the perforated plates V, except such parts as are too coarse, which will pass over the inclined bottom of the frame T′ to the ground. From the perforated plates V the ore will fall on either side of the partitions S′ onto the distributing-plates having slots in their bottoms, and thence, being divided by the plates R, onto the centers of each two adjacent nests of separators. The separation, under agitation, will begin in the inner separator of each nest, and the ore will pass from that to the next lower separator, and so on to the last, when the separation will be completely effected, and the earthy matter will flow over through the opening between the separator-plates down onto the inclined waste-plate Z.

It is obvious that the separator-frame may be as extended as desired—that is to say, the nest of separators may be extended longitudinally, being divided by a great number of inclined-sided partitions, and they may be increased in number and provided with feed-hoppers indefinitely, one agitating-frame, main frame, and set of agitating mechanism serving for the whole.

It is possible also to arrange one series of separator-plates and separators below another, as indicated in Fig. 10, where, as in Fig. 9, only one separator is shown on each side of the central dividing-partition R. In this modification, Fig. 10, the upper series of separators must be so constructed, as illustrated, that the ore may be fed through suitable apertures 1 2 to the lower series of separators. This is only an illustration showing an arrangement of the parts by which increased working capacity can readily be obtained without departing from the substance of my invention.

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

1. The combination, with the agitating-frame, of the adjustable composite cams F F and the nuts f^2, whereby the distance between the cams may be changed, to give greater range of adjustment of the parts *f*, substantially as set forth.

2. The double-stepped separator-plate provided with central ore-dividing partition R and with shallow ore-separating recesses, substantially as described.

3. The combination, with the double-stepped separator-plates having ore-dividing partitions R, and arranged in pairs with delivery-

spaces between them, of the superposed slotted cap-plates S, arranged centrally over the spaces between the pairs of plates, substantially as described.

4. The combination, with the ore-hopper having a sieved bottom, of the disintegrator provided with adjustable side plates and the sieves and perforated plates of the double inclined-bottomed frame T′, substantially as described.

5. The combination of the separator-plates, with their central partitions, the superposed cap-plates, with their central partitions, and the frame T′, with its perforated plates, sieves, disintegrator, and hopper, whereby the ore is delivered to the nests of separators, substantially as described.

In testimony whereof I have hereunto subscribed my name.

PASCHAL PLANT.

Witnesses:
D. DAVIDSON,
G. H. MAYNADIER.