No. 873,326. PATENTED DEC. 10, 1907.

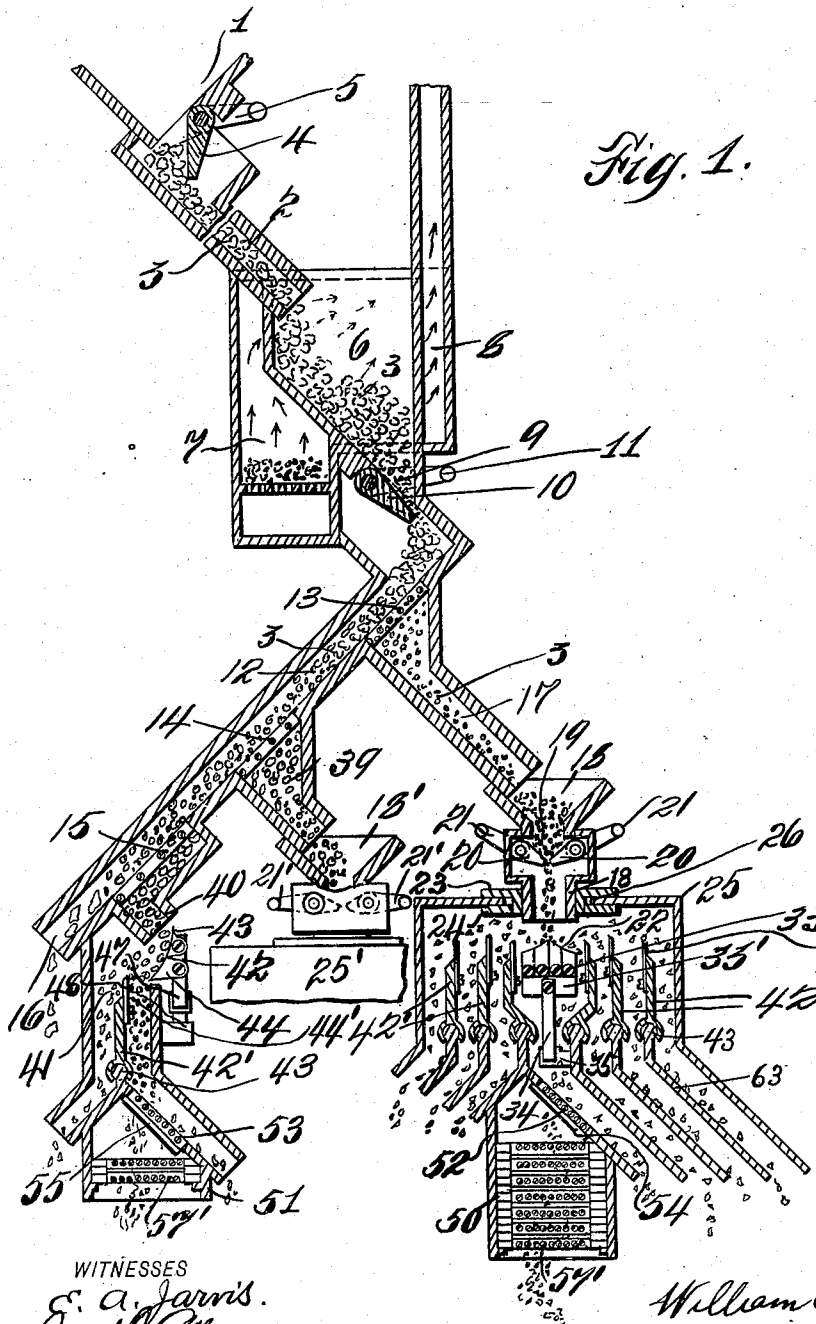
W. E. PEARSE.

SEPARATING PROCESS AND APPARATUS.

APPLICATION FILED JUNE 16, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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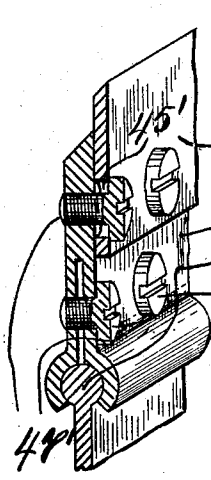

Fig. 2.

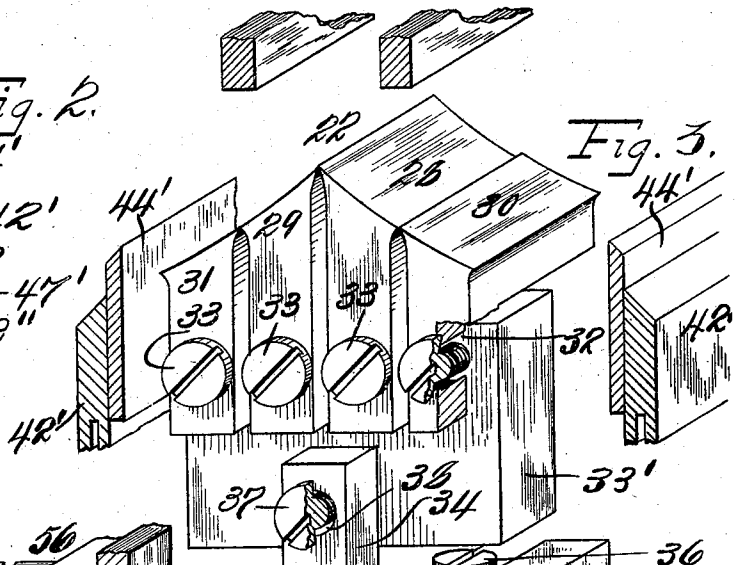

Fig. 3.

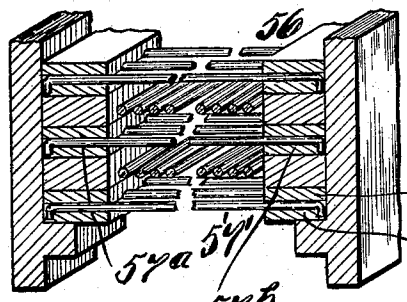

Fig. 4.

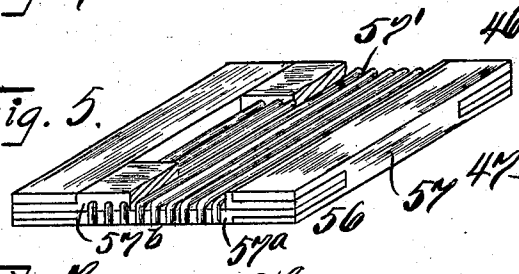

Fig. 5.

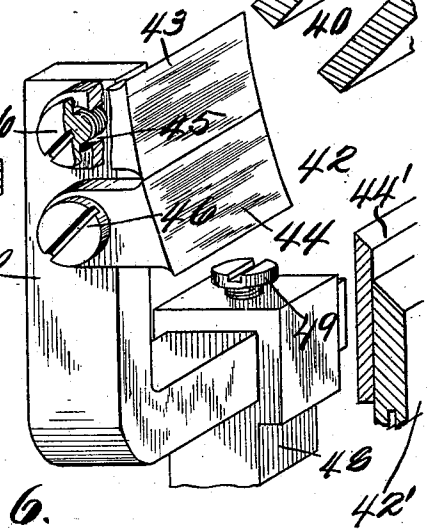

Fig. 6.

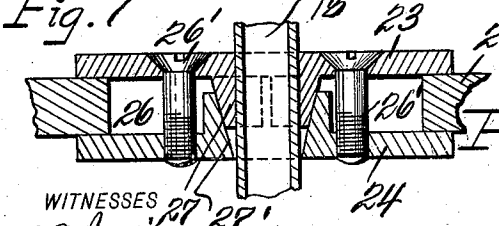

Fig. 7.

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SEPARATING PROCESS AND APPARATUS.

No. 873,326. Specification of Letters Patent. Patented Dec. 10, 1907.

Application filed June 16, 1906. Serial No. 321,977.

To all whom it may concern:

Be it known that I, WILLIAM E. PEARSE, a citizen of the United States, and resident of the borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Separating Processes and Apparatus, of which the following is a specification, taken in connection with the accompanying drawings.

This invention relates to separating processes and apparatus, and relates especially to the process and apparatus for separating ore or similar granular substances, by projecting particles of material of substantially uniform size against an angularly disposed impact surface, and then separating the particles according to their different trajectories, as they rebound from such surface.

In the accompanying drawings, showing somewhat diagrammatically an illustrative embodiment of apparatus for carrying out such a process, Figure 1, is a vertical section, Fig. 2, is a partial perspective of a divider, Fig. 3 is a similar view of the target or sectional impact member. Fig. 4, is a perspective view of amalgamator racks, Fig. 5 is a similar view of one rack; Fig. 6 is a perspective view of another form of impact member, and Fig. 7 shows a sectional detail of the hopper mounting.

The bin 1, which contains the crushed or otherwise disintegrated material, may be provided with the pivoted supply gate 4, controlled by the lever 5, so as to regulate the supply of the material 3, to the chute 2. This material as indicated in Fig. 1, is fed into a suitable kiln 6, of any desired construction, and dried to the proper extent, a furnace, 7, being indicated for this purpose and connecting with a suitable chimney 8. The passage 9, at the lower end of this kiln, may be provided with the control gate 10, which is suitably pivoted as indicated and operated by the lever 11, so as to control the amount of disintegrated material 3, admitted to the screening run-way 12. The screen 13, at the upper end of this run-way is of relatively fine mesh and may have any desired construction, while the lower screens, 14 and 15 may have progressively larger mesh, so as to properly size the particles in a well known manner, the large particles being discharged if desired from the discharge passage 16.

The particles 3, passing through the screen 13, and into the spout 17, are of substantially the same size, although of course, any other desired means of properly sizing the particles, may be employed. From the spout 17, this material is fed into the hopper, 18, which may be adjustably mounted on the top of the bin 25, by the two adjustable clamps 23 and 24, which as is indicated in detail in Fig. 7, are adapted to clamp the top of this bin 25, and firmly hold the hopper in position when the screws 26′ are tightened. This action also forces the wedge shaped clamps 27, 27′ together, so that the inner split clamp 27 is wedged inward, firmly engaging and clamping the hopper mouth, 18. This allows a very desirable vertical and horizontal adjustment of the hopper, which serves to regulate its position with respect to the target or impact member below. The throat 19 of this hopper is controlled by the symmetrically arranged pivoted feed gates 20, which are operated by the levers 21, and when simultaneously operated to the same extent have a self centering action, so that the opening is always located in the same vertical plane. In this manner, the amount of material fed past the gates may be adjusted, while the line of feed is maintained constant.

The target or sectional impact member, 22, may be adjustably mounted below the hopper, and as indicated in Fig. 3, the target may be generally wedge-shaped with curved working faces. In that figure, the target is shown as composed of a plurality of members, 28, 29, 30 and 31, each of which is independently adjustable and may be separately secured to and adjusted with relation to the support 33′, by means of the screws 33, which loosely engage the enlarged holes, 32, in the target sections. The support 33′ is separately adjustable with respect to the bracket 34, to which it is held in position by the screw 37, which passes through the enlarged hole 38, the bracket is also slidingly mounted in the block 35, and secured thereto by the set screw 36. The target sections are preferably each formed with a curved working face of elastic material, so as to make the particles impinging upon the target rebound to the desired extent. Steel, glass and in some cases softer and more yielding substances, such as india rubber of various degrees of vulcanization may be used, according to the particular kind of ore or other material operated upon. The stream of par-

ticles, when projected substantially symmetrically towards the advance edge of the wedge-shaped target is deflected laterally in both directions, and also since the working faces of the target are curved, the degree of concavity being even greater than indicated in Fig. 3. with some classes of material, the particles which are deflected laterally from the axis of the stream before striking the target impinge upon a less inclined surface, and thus are deflected after rebounding to practically the same extent. They thus fall into the same compartment with the other materials of the same composition and degree of elasticity, which fell closer to the advance edge of the wedge-shaped target.

Suitable adjustable dividers of any description may be employed to separate the particles having the same trajectories after leaving the target. In Fig. 1, the partitions 63, are indicated within the bin and a series of adjustable dividers, 42′ are swivelingly mounted on the enlarged ribs, 43 on the upper ends of these partitions. As is seen in Fig. 2, these dividers 42′ may consist of a metallic plate, split at the lower end to the desired extent, so as to form the clamping jaws, 42″. The screws, 47′ are provided and operate to close these jaws, and hold the dividers in the desired adjusted position with respect to the ribs 43. The blades, 44′ may be adjustably mounted at the upper ends of the dividers by the screws 47′, engaging the enlarged apertures 45′ indicated. In this way, the dividers may be moved angularly into any desired position, so as to be as close to the target or impact member as desired, and also the blades may be moved vertically to a considerable extent as to give further adjustment to separate and collect the particular class of particles desired.

The somewhat larger particles, passing through the screen 14 and into the spout 39, may be treated in a similar manner, passing through the hopper 18′ where similar feed gates are operated by the levers 21′, and a similar impact separator is located within the bin 25′. In some instances, especially where larger particles are operated upon, it is desirable to have the target formed with a single curved working face, and arranged at a less angle to the path of the particles, so as to decrease the wear and other objectionable action of larger particles striking it. This arrangement is indicated in connection with the larger particles passing through the screen 15 and into the spout 40. This spout as is indicated, is so shaped as to somewhat decrease the velocity of the particles, and the target or sectional impact member 42 is arranged at one side, so as to make only a slight angle with the path of the particles. The target sections 43, 44, as shown in Fig. 6 may each be formed with a curved working face, and adjustably mounted on the bracket 47 by the screws 46, which engage the enlarged holes 45 in each section. This bracket is slidably mounted in the block 48 and held by the screw 49. In this instance, of course, any desired number of adjustable dividers 42′ may be used to separate the particles after they rebound from the target.

A suitable amalgamator may be arranged to treat the particles issuing from any one or more of the discharge chutes. For instance, in Fig. 1, the amalgamator 50 is arranged to treat the particles falling between the two dividers adjacent the target, such particles preferably passing through a suitable screen 52, and into the amalgamator when the slide 54 is open. A similar screen 53, and slide 55, is shown in connection with an amalgamator to act upon the relatively non-resilient particles discharged from the target 42. These amalgamators may have any desired construction, and in Fig. 4, the amalgamator racks, 56, are shown as arranged with the amalgamated rods, 57′, located in a transverse manner within the casing. Each rack, as is indicated in Fig. 5, may be formed of the side frames 57 and the split end frames 57^a and 57^b, which when forced into position, clamp the rods 57′ in an obvious manner.

In using this apparatus on auriferous material, the finer particles, after the preliminary drying and sizing operation, fall in a thin sheet through the centering feed gates 20, and impinge with the desired degree of force upon the target or sectional impact member, adjacent its advance edge. The quartz particles, by reason of their superior resiliency, are projected farther, as they rebound from the target, and having the flatter trajectory and the higher angle of flight, pass over the first divider and fall into the outer guideways formed by the partitions. Softer metallic particles, such as gold platinum or copper, if copper bearing material is treated, are not so resilient, and are not thrown so far by their impact upon the target, and so fall into the discharge chutes closely adjacent it. As has been explained, the curved working face of the target, tends to counteract to a considerable extent the accidental deviation of particles from the proper line or path of projection against the target, and it is of course, apparent, that the particles may be projected against the target in other ways than by gravity, and the force of impingement upon the target may in such cases be regulated to the desired extent. Of course, by laterally adjusting the target and hopper, the entire stream may fall to one side of the advance edge of the wedge shaped target, and only one working face would operate in such case, the material all being thrown to one side, but to different extents. With the adjustable hoppers indicated, the raising of the hopper regulates the extent of free fall of the particles from the feed gates to the

target, and thus adjusts the force of impact and the resulting trajectory of the various particles.

Having described this invention in connection with an illustrative embodiment, to the details of which it is not limited, what is claimed as new, and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. In separators, means to dry and size particles, a bin having a receiving hopper for such particles mounted upon it, means to vertically and horizontally adjust said hopper, a pair of symmetrical centering feed gates in said hopper, a sectional wedge-shaped target mounted below said gates, and having adjustable curved working faces, and a series of dividers to coöperate with said target and separate the material rebounding therefrom.

2. In separators, a bin, a hopper adjustably mounted on said bin, means to feed material from said hopper in a substantially uniformly located stream, a substantially wedge-shaped target, having an advance edge substantially in the path of said stream, said target being provided with adjustable curved working faces of resilient material and adjustable dividers to separate particles rebounding from said target.

3. In separators, means to feed a stream of particles, a substantially wedge-shaped target having an advance edge substantially in the path of said stream of particles, and provided with curved working faces, and means to separate the diversely rebounding particles.

4. The process of separating ore from its gangue which consists in sizing the ore particles, in feeding particles of substantially the same size in a thin flat stream, and in separating the ore particles from the gangue by means of the different resiliencies of the ore particles and gangue.

5. The process of separating finely comminuted ore from its gangue which consists in segregating from the mass of ore particles of substantially the same size, dropping said ore particles and gangue of substantially the same size, and separating the ore particles from the gangue by means of the different resiliencies of said ore particles and gangue.

6. The process of separating ore from its gangue which consists in drying and sizing the ore particles and gangue, projecting by gravity ore particles and gangue of substantially the same size upon a curved surface, and separating the particles of ore from the gangue by means of their different resiliencies.

7. The process of separating ore from its gangue which consists in drying and sizing the gangue and ore particles into a plurality of streams of different sized particles, projecting a thin stream of substantially uniform size particles from the plurality of streams upon different receiving surfaces and in separating the ore particles from the gangue in each stream by means of the different resiliencies of the gangue and ore particles.

8. In ore separators, a target having a curved working face, said face being formed in a plurality of parts, each part being separately adjustable, means for projecting material upon the target and means for selectively collecting the material as it rebounds from the target.

9. In ore separators, a target having a double curved working face, said working face being formed in a plurality of parts, each part being separately adjustable, means for projecting material upon the target and means for selectively collecting the material as it rebounds from the target.

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JOSEPH J. COLLINS.