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PNEUMATIC ORE SEPARATOR.

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To all whom it may concern:

Be it known that I, CHARLES E. S. BURCH, a citizen of the United States, residing at Devore, in the county of San Bernardino and State of California, have invented a new and useful improvement in pneumatic ore separators for separating metals of high specific gravity, such as gold, platinum, and kindred elements, from associated gangue matter by means of a current of air directed through a blast tube having mechanical means integral thereof and motion imparted thereto, all being designed to cooperate with the air blast, of which the following is a specification.

I attain these objects by the mechanism illustrated on the accompanying sheet of drawings, in which Figure 1 is a side elevation with a small portion cut away.

Figure 2 is a vertical section, longitudinal of the machine, with fan and driving gears removed, and a small portion of the fan case and hopper cut away.

Figure 3 is a perspective view of one of the blast tube sections showing the arrangement of the blades, or pockets, and the hub, by which the said section is mounted upon the tube shaft. Similar numerals refer to similar parts throughout the views. The blast tube, as mounted on the tube shaft, may be composed of any number of tube sections, such as may be found necessary for the particular material being handled.

To transmit motion to the blast tube in correct ratio with the speed of the fan 3, I prefer to employ a miter gear 2 engaging with a transverse shaft 21, which in turn will transmit motion through the encased worm gear 25, to the main tube shaft 8, and the blast tube assembled thereon.

The tube shaft 8 being journaled in the bearings 23 and 9, the driven end of the fan shaft is not shown and is not important in connection with this application, as it will be readily understood that motion can be transmitted thereto by means of a pulley and belt or by means of a direct connected motor. Referring to Figure 2, it will be noted that the blast tube is assembled on the main shaft 8 by means of the hub 18, and spokes 19, adjusted relative to the adjacent tube section, by the set screws 20, and are thus maintained in rigid driving connection with the main shaft. Interior of the blast tube, I employ a multiplicity of blades 17 forming a series of pockets 28 between the adjacent blades rigidly secured to the inner surface of the outer shell of the blast tube at spaced intervals and preferably slightly curved in the direction of rotation.

The function of these blades or pockets is to prevent packing or clogging of the blast tube by such material as may precipitate from the blast, and more particularly to augment the saving of the precious metal by repeated exposure of the gangue to the separating influence of the air blast.

Referring again to Figure 1, the blast tube is shown at a comparatively high angle of elevation, and there is provided a screw 26 operating through a nut 25, a toggle joint 12 acting between the major sill 14, and ground sill 16 co-operative with the hinge 15, and rotatable by the crank 11, to properly adjust and maintain the angle of elevation of the said blast tube as may be found most efficient with the particular matrix being worked.

The material to be separated will be fed into the hopper 4, and carried forward by the conduit 5, to the flat distributing plates 27, and thereby be distributed into the blast in thin flat layers corresponding numerically to the number of distributing plates 27 employed. The specific function of the distributing plates 27 is to make a complete and intimate mixture of the gangue with the air blast immediately, as the process of separation is initiated in the blast tube.

The material thus delivered into the air current is not carried forward any considerable distance within the tube, but descends through the air current in a modified parabolic line to the bottom of the blast tube, being there deposed in the midst of the blades 17, with those elements of lighter specific gravity advanced approximately twelve inches toward the muzzle of the tube; while those elements of higher specific gravity are not advanced to exceed three inches beyond the point of intake and those elements of intermediate specific gravity are progressively arranged between these two extremes, the blast tube being continuously rotated, picks up at once the material thus distributed and carries it to the inner top of the blast tube by medium of the blades or pockets 17 at or near which point said blades automatically unload themselves, redelivering the material to a repeated effort of the blast as before described. This continuously repeated effort,
which in each succeeding step finds the material more completely separated, finally accomplishes a very complete and net separation of those elements of extreme high gravity such as gold and platinum from the matrix of gangue. It will be noted that particles released by the blades or pockets, at or near the inner top of the blast tube (the blast not being in operation) would descend on a vertical line, which fact considered relative of the high angle of tube elevation, as shown in the drawings, would cause such particles to trend backward toward the breech of the blast tube to the distance of approximately one half the length of a tube section. Therefore, a quantity of material, such as sand, should it be placed within the muzzle of the blast tube, and said tube rotated (no air blast being present) it would reach the rear end or breech of said tube at the completion of the twelfth revolution thereof, whereas with the blast operative at proper adjusted tension only those elements of high gravity would trend backwards, while lower gravities (which are ordinarily carried forward a distance of twelve inches in each separate discharge of the blades) would ultimately be carried out at the muzzle of the blast tube and owing to the direction of the blast and the construction of the annular opening 7, wherein a dead air space is established immediately adjacent of the annular openings, the lighter material is successfully carried over and by said annular openings, while those elements of high gravity, which are trending backward toward the breech of the blast tube sections, would readily find the aforesaid dead air space and be thereby precipitated through the said annular opening into the catch basin 13.

Having thus described my invention, I claim as new and desire to secured by Letters Patent of the United States—

1. In a device of the class described, a main supporting and driving shaft, a blast tube composed of a series of tube units adjustably secured thereon, a frame embodying main bearings to rotatably support said main shaft in operative alignment with a blast fan, means to transmit motive power to the said main shaft and the blast tube assembly, a catch basin disposed longitudinally of and below said blast tube assembly substantially as shown.

2. In a device of the class described, a main supporting and driving shaft, a blast tube composed of units adjustably secured on the said main supporting driving shaft, means such as main bearings supporting said main shaft in operative alignment with the outlet of the blast fan, means to transmit motive power to the said main shaft and the blast tube assembly, a catch basin rigidly supported longitudinally of and adjacent to the bottom of said blast tube assembly, means to control the angle of elevation of the said blast tube, substantially as shown.

3. In a device of the class described, a main driving shaft, a blast tube assembly mounted in series thereon, means comprising a frame and bearings mounted thereon to rotatably support said main drive shaft in operative alignment with a blast fan, means co-operative with the said blast fan and said drive shaft to transmit motive power to the said blast tube assembly.

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