

(No Model.)

W. H. COWARD.

APPARATUS FOR CONCENTRATING, GRADING, OR CLASSIFYING
CRUSHED ORES, &c.

No. 574,241.

Patented Dec. 29, 1896.

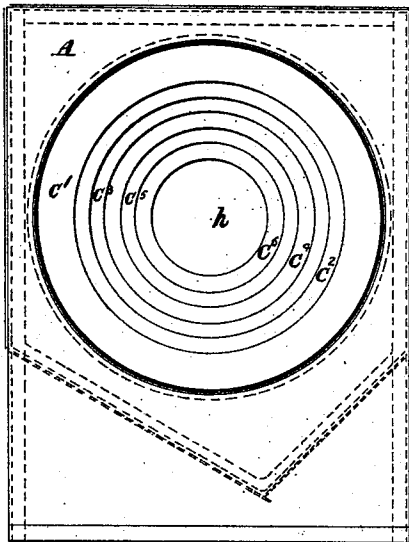


Fig. 2.

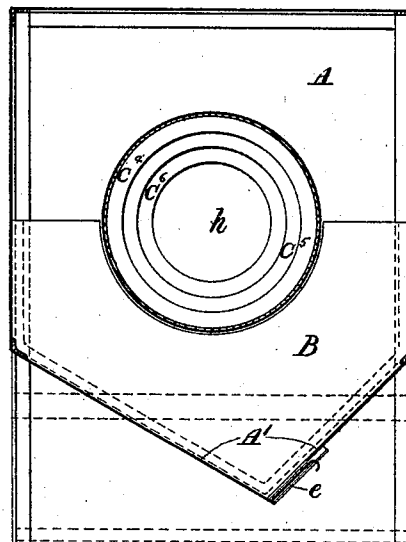


Fig. 3.

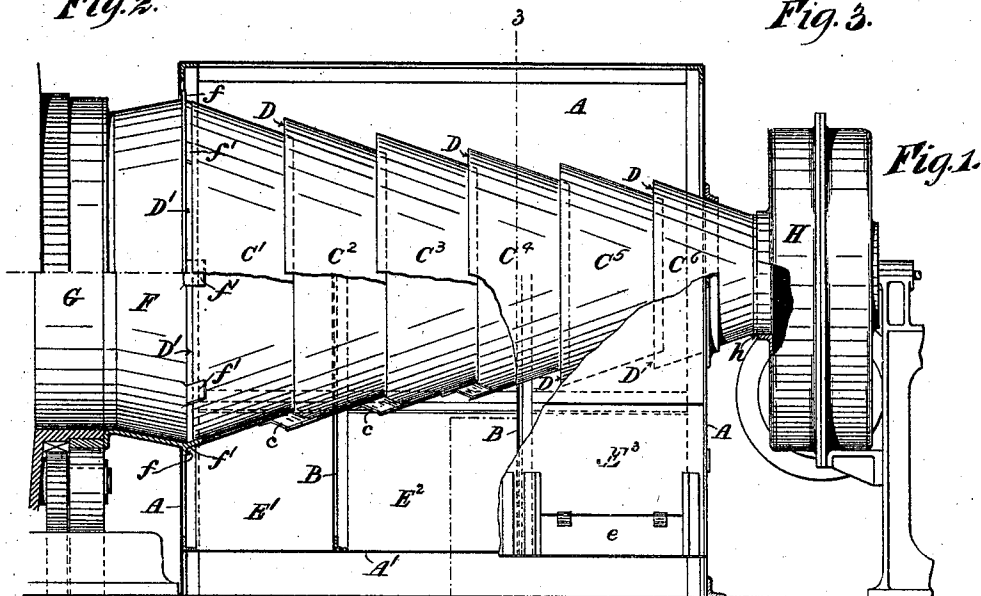
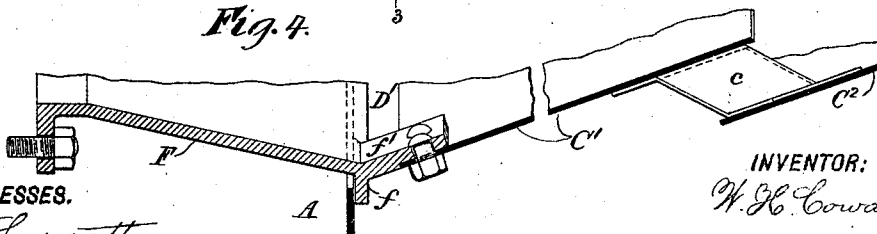


Fig. 4.



WITNESSES.

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APPARATUS FOR CONCENTRATING, GRADING, OR CLASSIFYING CRUSHED ORES, &c.

SPECIFICATION forming part of Letters Patent No. 574,241, dated December 29, 1896.

Application filed February 10, 1896. Serial No. 578,741. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY COWARD, engineer, of Hastings Villa, Bexley Road, Erith, London, in the county of Kent, England, have invented new and useful Improvements in Apparatus for Concentrating, Grading, or Classifying Crushed Ore and other Matters, of which the following is a full, clear, and exact description.

10 This invention relates to an improved apparatus for concentrating, grading, or classifying crushed ore and other matters, and is particularly intended for use in connection with a revolving grinding-mill of the well-known roller type, in which the crushing and grinding action is produced by a heavy roller running in a hollow cylinder revolving on a horizontal axis.

15 The concentrator is illustrated in the accompanying drawings, forming part of this specification, wherein—

20 Figure 1 is a side elevation partly in section. Fig. 2 is an end elevation. Fig. 3 is a cross-section on line 3 3, Fig. 1, while Fig. 4 shows details of certain parts.

25 The same letters of reference denote like parts in all the figures.

30 The concentrator comprises an air-tight chamber or casing A, divided by cross-partitions B and inclosing a series of sheet-iron cones C' C² C³ C⁴ C⁵ C⁶, preferably of successively-decreasing diameter, mounted to rotate together as one about a horizontal axis, the smaller end of each cone entering the larger end of the next succeeding cone, so as to leave an annular aperture D intervening between them. The cross-partitions B of the casing conform approximately to the circumference of the cones and divide the casing into any number of compartments E' E² E³, in which are received the matters passing out at the annular apertures D between the cones, the matters thus collected in the different compartments being classified according to their specific gravity or their grade of fineness, as the case may be. The larger end of the first cone C' of the series is connected to a coned ring F, whose conicality is reversed in direction to the cone C'. This cone F may have internal shelves or ribs (not shown) to lift the material deposited in the cone and shower it down in the path of the air-current. The cone F is

connected by its smaller end to the outlet-mouth of the grinding-mill casing G, so as to revolve therewith, or the concentrator-cones may be otherwise revolved if used in connection with any other kind of grinding-mill. The larger end of the cone F passes through an aperture in the end of the concentrator-casing A, a sufficiently air-tight fit being made by means of a flange *f* on the ring. The cone C' is connected by horns *f'* to the ring F, so that an annular aperture D' is left between F and C', through which any matters deposited either in the cone F or the cone C' will be delivered to the first compartment E'. The cones C' C² C³, &c., are connected together by tubular distance-pieces and bolts, or by connecting-fins *c*, to which the cones are riveted, the fins being set radially edgewise, so as to obstruct the outlets D as little as possible. The last cone of the series passes out through a flanged opening in the rear end of the casing A, and its smaller end is made parallel to fit and turn easily within the inlet-aperture of the casing H of an exhaust-fan between which and the grinding-mill G the concentrator is interposed.

For the purpose of concentrating crushed or ground ore according to the specific gravity of the particles, which is the operation for which the concentrator is primarily designed, the outlet-mouth of the grinding-mill casing G may be covered internally with a perforated gage-plate, so as to insure as far as possible only material of one grade of fineness entering the concentrator. The particles of ground ore exhausted from the grinding-mill G are carried along by the air-current toward the fan, the particles which fall out of the air-current at different points in their passage through the cones falling onto the inclined lower surfaces of the cones and running out through the apertures D into the different compartments E' E² E³. The heaviest particles, which fall in the cones F C' C², are received in E'; the next heaviest, which fall in cones C³ C⁴, pass into compartment E²; the next heaviest, which fall on cones C⁵ C⁶, are received in compartment E³, while the lightest of all pass onto the fan.

The bottom A' of the casing is made hopper-shaped, as shown in Fig. 3, and is fitted with sliding doors *e*, at which the contents of each

compartment may be periodically withdrawn; or a worm-conveyer may be mounted in the hopper-shaped bottom, by which the contents of the compartments may be continuously discharged at a spout or spouts properly trapped against the influx of air to the casing.

The operation is similar when grading or classifying crushed ore or other substances according to size of the particles.

10 The cone or ring F, being reversed with relation to the other cones, permits the current of air to spread or dissipate upon entering the opening G. This reduces the velocity of the current and permits the heavier particles of the ore to fall upon the cones F and C and subsequently pass through the orifice D. Were the cone F disposed as the other cones this operation would not be so complete and effective.

20 Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. An apparatus for grading ores, the apparatus having a casing with openings in two opposite sides and with interior partitions forming compartments, a series of conical shells of varying sizes, the shells being rigidly connected with each other and having spaces between them and one shell being projected through one opening at the side of the casing and an additional shell of conicality opposite to that of the first-named shells, the said additional shell being connected to the shell contiguous to the remaining opening and being passed through said opening, substantially as described.

2. An apparatus for grading ores, the apparatus having a casing provided with openings in opposite sides and having interior partitions forming compartments, a series of conical shells rigidly joined to each other and having spaces between them, one end shell being projected through one opening and the remaining end shell being contiguous to the remaining opening, and an additional shell of conicality reversed to that of the first-named shells and passed through the said remaining opening, the said additional shell having an annular flange forming a closure for the said remaining opening and having lugs by which it may be connected to the contiguous conical shell, substantially as described.

3. An apparatus for grading ores, the apparatus having a casing forming a receiver and having two oppositely-arranged openings in its side, a series of conical shells arranged in line and connected to each other, the shells having spaces between them, one end shell being passed through one opening and the remaining end shell being located adjacent to the remaining opening, and an additional shell of conicality reversed to that of the first-named shell, the said additional shell being connected to the said remaining end shell and passed through the said remaining opening, substantially as described.

4. An apparatus for grading ore, the apparatus having a series of tapering shells rigidly connected to each other and having intervening spaces, an additional shell forming the inlet to the series of shells, said additional shell being tapered oppositely to the taper of the remaining shells and being joined to the large end of one of the end shells with a space between the two, substantially as described.

5. An apparatus for grading ore, the apparatus having a casing with two oppositely-disposed openings, a series of tapering shells arranged in longitudinal alinement and in rigid connection with each other, the shells having spaces intervening between each other and the end shells being revolutely fitted within the openings in the casing, a fan at one end of the series of shells, and means for turning the series of shells, substantially as described.

6. An apparatus for grading ores, the apparatus having a casing with openings in two opposite sides, and a series of tapering shells longitudinally alined with each other and rigidly connected with spaces intervening between each other, the shells being located within the casing and the end shells being respectively fitted within the openings thereof, the shells being adapted to have a current of air passed through them and to engage particles of ore carried in the current of air whereby to cause said particles to drop through the spaces between the shells, substantially as described.

WILLIAM HENRY COWARD.

In presence of—

T. W. KENNARD,
C. G. CLARK.