

(No Model.)

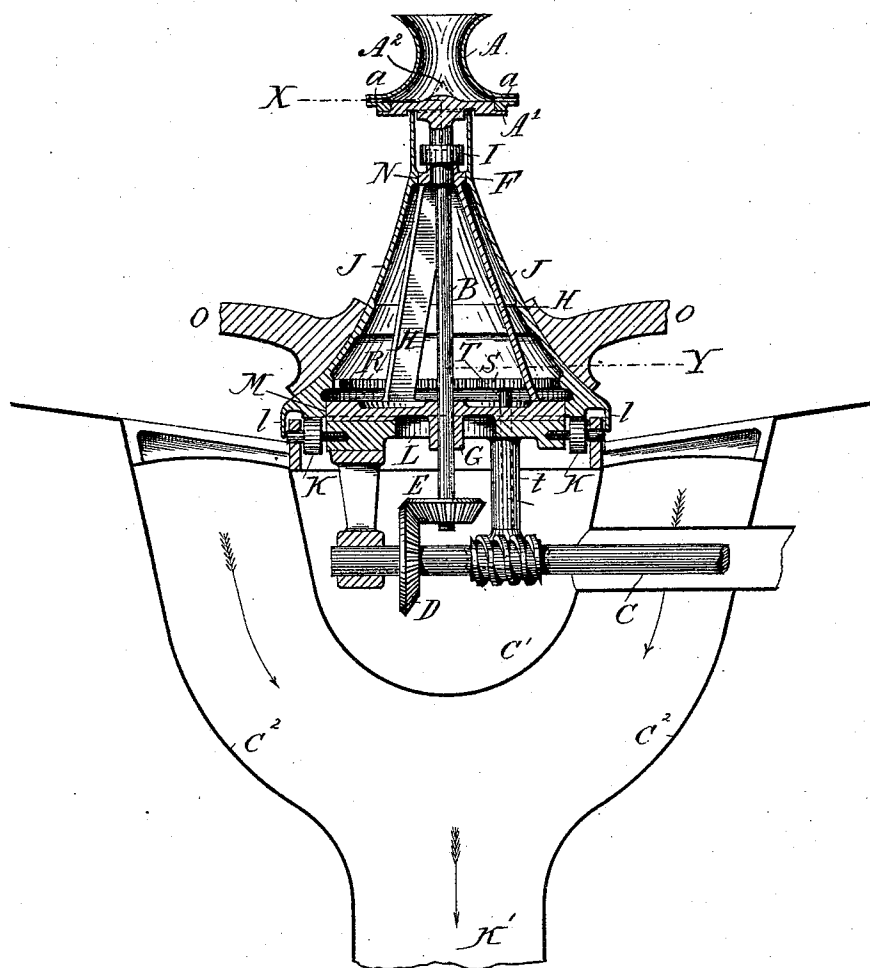
2 Sheets—Sheet 1.

R. STANFIELD & T. CLARKSON.
CENTRIFUGAL SEPARATING MACHINE.

No. 459,315.

Patented Sept. 8, 1891.

Fig. 1.



Witnesses:

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Geo. W. Rea.

Inventors:

Richard Stanfield and
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Attorney

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

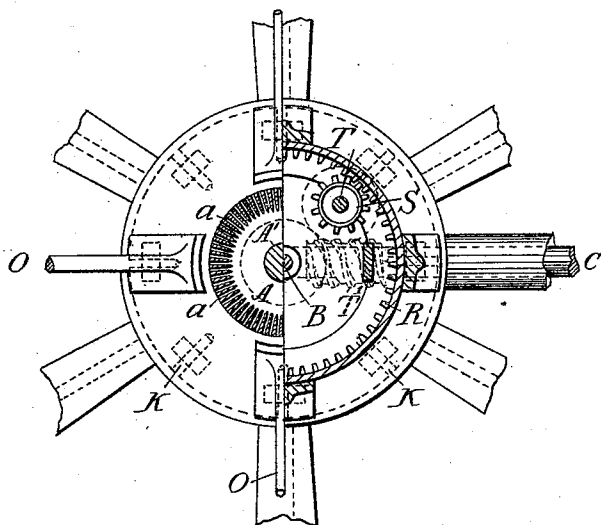


Fig. 4.

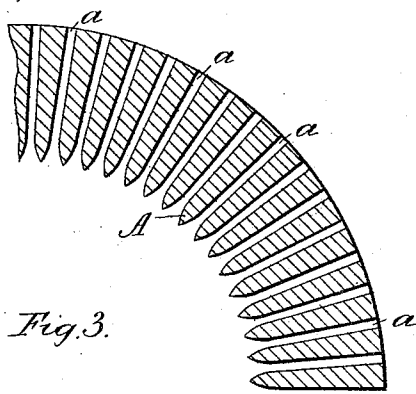
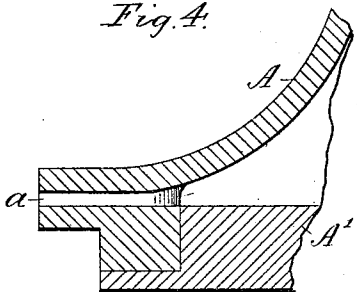


Fig. 3.

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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL SEPARATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 459,315, dated September 8, 1891.

Application filed May 27, 1890. Serial No. 353,355. (No model.) Patented in England January 17, 1889, No. 890.

To all whom it may concern:

Be it known that we, RICHARD STANFIELD, of Heriot Watt College, Edinburgh, Scotland, and THOMAS CLARKSON, of King's College, London, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Centrifugal Separating-Machines, (for which we have obtained a patent in Great Britain, No. 890, dated January 17, 1889,) of which the following is a full, clear, and exact specification.

This invention has for its object to provide a novel, simple, and efficient machine for separating metals, heavy minerals, and other dense bodies from their lighter associated ores or materials.

Our improved apparatus comprises a centrally-mounted centrifugal vessel of special shape for the purposes hereinafter set forth and adapted to receive the materials to be treated. It is provided with a number of specially-constructed long, narrow, parallel-sided radial apertures, each of sectional area only slightly larger than the particles to be treated, so as to allow free passage, and extending from the interior to the exterior of the vessel, and through which the material is ejected by centrifugal force and by which its velocity of projection is maintained practically constant. The improved centrifugal vessel is provided with means for driving it, and is combined with a dust-excluding cover for working parts, which may be rotary or not.

Our improved apparatus is also applicable for classifying according to size those materials the particles of which are of the same specific gravity, the larger particles flying farthest away because of their greater mass; but where the particles of any material are not of the same specific gravity they may first be classified according to size by the usual screening processes and then passed through the machine, when they will be separated according to specific gravity.

The improvements will be hereinafter described in detail and specifically set forth in the claims, reference being made to the accompanying drawings, in which—

Figure 1 is a sectional elevation of the ma-

chine, showing driving-gear in elevation. 50
Fig. 2 is a sectional plan on line X Y, Fig. 1. Fig. 3 is a part sectional plan of the specially-formed radial apertures, and Fig. 4 is an enlarged part section thereof.

In the drawings, the letter A indicates the 55
centrifugal vessel into which the pulverized material is fed, and it is of the form shown in Fig. 1—that is, expanded at both its upper and lower ends and contracted about the center. The expanded lower end is provided 60
with a number of long narrow radial apertures *a*, through which the material is ejected. Referring to Figs. 3 and 4, these apertures *a* are made long in proportion to the diameter or sectional area. They are illustrated as 65
straight and horizontal; but they may be curved and disposed to project the material horizontally or upward or downward at any desired angle. In cross-section they may be square, rectangular, or round; but although 70
radially arranged they are parallel-sided for the whole of their length, except the inner ends, where the walls between them are beveled off both vertically and horizontally, as shown, to facilitate entry of material. The 75
vessel A may have one or more rows of such apertures *a*, and is made in two parts fixed together, the lower part being a solid disk A', fixed centrally to the head of the spindle B and constructed with a central swell A², Fig. 80
1. The joint is made as shown, or it may be horizontally through the apertures to facilitate the attachment of duplicate vessels suitable for the particular material to be treated and the cleaning of the apertures. Thus a 85
number of upper parts A, with apertures of different size, form, or number, may form part of each machine.

The object of this peculiar form of vessel 90
described is as follows: Since the feed of granulated materials is vertical and the direction of their projection horizontal, or thereabout, and since it is undesirable to further break up the materials by violent concussions, it is necessary to make the change of 95
direction of motion as gradual as possible. Hence the curved and expanded form of the lower end of vessel A and the swell A² on the

center of the solid base-disk A'. The expansion of the lower end also enables a greater number of radial apertures to be employed, thus increasing the efficiency of the apparatus. The object of contracting the middle part, as illustrated in Fig. 1, is to inclose the vessel as completely as possible and prevent the materials flying out at the top. The shaft B may be driven from a shaft C by bevel-wheels D and E or by ordinary belt or rope gearing. The spindle B is mounted in bearings F and G in the main frame H. The bearing F is protected from dust by the cap I and by an external conical cover J. The cover J may be fixed; but in cases where it is required to use the well-known revolving brushes and annular receiver it is made to revolve, and this may be done according to the improved means illustrated. The cover J rests on rollers K, centered in the main frame L. Lateral displacement of the cover J is prevented by bearings M N, and to exclude dust from the cover its top is sunk a little way into the flange A' and overlaps the frame L at l. The cover J may be rotated by an internally-toothed wheel R and pinion S, fixed to a short spindle carried in a sleeve t, which is driven through worm-gearing T' by the main driving-shaft C; but we find it advantageous to drive said cover independently of the spindle B by suitable gearing.

O O indicate radial arms fixed to cover J for carrying brushes when required.

In operation the material to be treated having been pulverized is introduced in a continuous stream with or without water (preferably without water) into the vessel A, either directly or by feed-pipe X from hopper X', and the vessel is rotated at a speed as nearly constant as practicable, any suitable speed-regulating apparatus being applied, if required. The particles fall onto the swelled or curved disk A' of the centrifugal vessel A, and thus their direction of motion is gradually changed and they are directed into and ejected through the apparatus a.

Apparatus constructed as above set forth is applicable to the treatment of ores of gold, silver, tin, lead, copper, or any other metal. It may be used for sizing purposes, or in conjunction with other sizing appliances for the purpose of separating metals and minerals from ores.

We would state that we are aware that

centrifugal apparatus for ore-separating and analogous purposes is known; but the rotary part has, so far as we know, always consisted of a dish-shaped receiver or cup or distributing-disk with simple lateral apertures or narrow slots or continuous circumferential vents in its sides; also, that arms horizontally projecting from a feed-tube have been tried; but

What we claim is—

1. In an ore separator or classifier, the combination of the rotary spindle B, having at its upper end the attached solid disk A', provided at its center with the upwardly-projecting swell A², with the vessel A rigidly secured to the disk and formed with the contracted upper portion and the expanded lower end having long narrow radial apertures, the bottom walls of which are formed by the solid disk, substantially as described.

2. In an ore separator or classifier, the combination, with a centrally-mounted centrifugal vessel having apertures a and the driving-shaft B, of a rotary inclosing cover J, having dust-excluding devices, an internal gear-ring R, a pinion S, and a shaft C for rotating the pinion, substantially as described.

3. In an ore separator or classifier, the combination of the revolving vessel A, formed with the expanded lower end provided with radial parallel-sided apertures a, a rotary shaft B, having an attached solid disk A', provided with the raised or swelled center A², which forms the bottom wall of the vessel, and the inclosing cover J, provided with the dust-cap I, extending to the under side of the solid disk, substantially as described.

In testimony whereof we affix our signatures in the presence of two witnesses.

RICHARD STANFIELD.

THOMAS CLARKSON.

Witnesses to the signature of Richard Stanfield:

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Clerk, U. S. Consulate, No. 8 York Buildings,
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Witnesses to the signature of Thomas Clarkson:

JOSEPH C. CHAPMAN,
Patent Agent.

HORACE J. BODDINGTON.