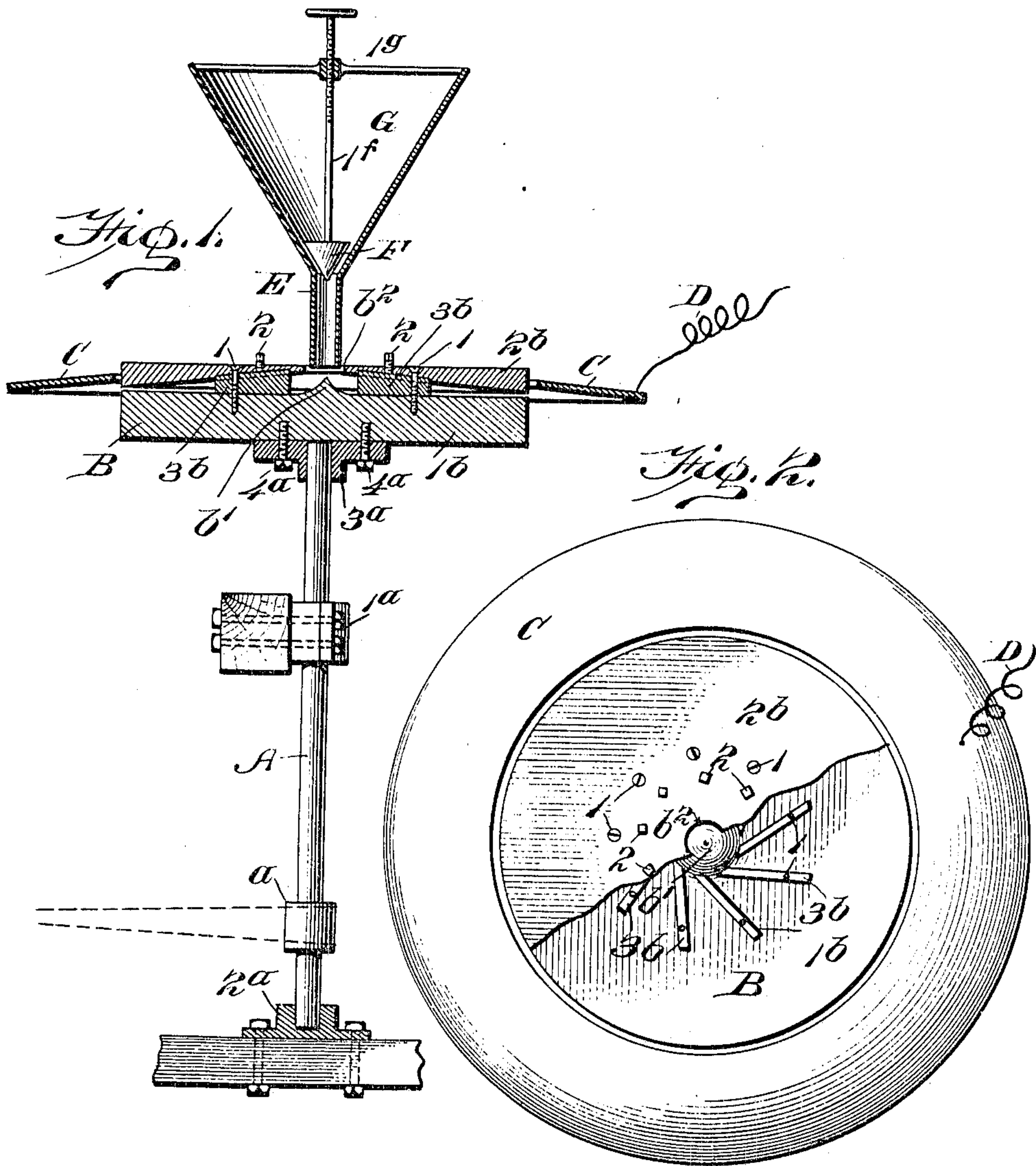


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PATENTED MAY 1, 1906.

E. A. SPERRY.
ORE SEPARATOR.
APPLICATION FILED JAN. 9, 1905.



WITNESSES:
H. G. Richter
G. F. Ritter

INVENTOR
Edwin A. Sperry
BY *F. H. Ritter, Jr.*
Attorney

UNITED STATES PATENT OFFICE.

EDWIN A. SPERRY, OF DENVER, COLORADO, ASSIGNOR OF ONE-THIRD TO
WYLIE G. WILSON, OF DENVER, COLORADO.

ORE-SEPARATOR.

No. 819,093.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWIN A. SPERRY, a citizen of the United States, residing at Denver, county of Denver, State of Colorado, have invented certain new and useful Improvements in Ore-Separators; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical central section of an ore-separator embodying my invention. Fig. 2 is a plan view, the feed-hopper removed and a portion of the centrifugal distributor broken away to disclose the vanes thereof.

Like symbols refer to like parts wherever they occur.

My invention relates particularly to the separation of ores into their constituents and to their separation from gangue, and has for its object to provide a simple and efficient device which shall effect such separation by a dry process.

To this end my invention, generally stated, consists in pulverizing the ore to be operated upon and in such condition distributing it to an electrostatically-charged or otherwise properly-energized body by means of a rotary or centrifugal distributor, the trajectory of at least some of the centrifugally-projected particles being influenced by the charged or energized body according to their different compositions.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings chosen for the purpose of illustrating my invention, the scope whereof is pointed out in the claims, A is a vertical shaft secured in position by the bracket-bearing 1^a and step-bearing 2^a or in other suitable manner, said shaft being provided with a driving-pulley *a* or other desired means for causing a rotation thereof. Attached to the upper end of the vertical shaft A in any suitable manner, as by being secured by bolts 4^a 4^a to a collar or sleeve 3^a, carried by said shaft, is the centrifugal distributor B, by means of which the pulverized or finely-comminuted ore is fed or projected over and through the field of the electrostatically-charged body, as will hereinafter appear.

The rotary centrifugal distributor B is preferably constructed of a lower disk or ta-

ble 1^b and an upper or cover-disk 2^b, said members 1^b and 2^b being attached to each other and secured in the desired spaced or separated relation by means of bolts or screws passing through the interposed vanes 3^b or in any other suitable manner.

The lower disk or table member 1^b of the centrifugal distributor B is preferably a plane surface of circular form, having a centrally-located ore-spreading projection *b'*, which when the device is assembled lies beneath the mouth of the feed-pipe E of the hopper G. The upper or cover disk 2^b of the distributor B is circular in form and is provided with a central opening or feed-aperture *b''* in vertical alinement with the ore-spreading projection *b'* of the lower disk, said upper disk having its interior or inner face coned or dished, so that the distance or space between such upper and lower disks gradually contracts from the central feed to the peripheral discharge, thus obviating any crowding or packing of the ore within the distributor.

As a means of centrifugally projecting or propelling the finely-comminuted ore which is fed to the distributor B, as well as to provide a means whereby the said upper and lower disks may be adjusted relatively to vary the size of the peripheral opening between them, the vanes 3^b are interposed between the said upper and lower disks, said vanes being arranged substantially tangential to the circle on which their inner ends terminate and fitting into corresponding grooves in the adjacent conical face of the upper disk 2^b. The vanes and disks are secured in fixed position with respect to each other by means of the bolts or screws 1 1 and the set-screws 2 2, the latter having threaded engagement with the upper disk 2^b and bearing upon the upper surfaces of their respective vanes, whereby the peripheral discharge-opening of the centrifugal distributor B may be adjusted and secured in such adjusted position; but, if desired, any other suitable means of adjusting the said disks may be employed, or other means of securing the said disks in position may be substituted.

In lieu of the form of centrifugal distributor heretofore described other means of centrifugally distributing the pulverized ore may be employed—as, for example, a single bowl-shaped member having a centrally-located spreading projection on the bottom

thereof and having conical upwardly-diverging sides, the comminuted ore being fed into the bowl from a feed-pipe above such spreading projection and being delivered
5 over the upper edge thereof when such bowl is rotated.

Surrounding the centrifugal distributor B is, preferably, the electrostatically-charged body or member C, said member C being
10 preferably in the form of a ring or annulus of soft iron or other suitable material located adjacent to and slightly above the discharge slit or opening in the periphery of such centrifugal distributor, said ring or annulus C
15 also preferably having a slight inclination downward from its inner to its outer circumference. The annular plate C is preferably statically electrified by being connected with a source of static electricity—as, for exam-
20 ple, through the wire D.

Located above the centrifugal distributor B is the feed-hopper G, which is preferably conical or pyramidal in form and to which at its apex is attached the feed-pipe E, the lower
25 end of which is in juxtaposition to the feed-opening b^2 in the upper or cover disk 2^b of the centrifugal distributor B; but, if desired, the feed-pipe E may be omitted and the comminuted ore fed to the distributor directly
30 from the apex of such hopper G. The hopper G is also provided with means for regulating the amount of ore delivered to the centrifugal distributor B, said means comprising a plug member F similar in form to the hop-
35 per adjacent to its apex and a rod 1^f , the latter being attached to said member F and having threaded engagement with a bracket 1^g of the hopper G, whereby the cone-plug F used in conjunction with the particular hop-
40 per shown may be raised or lowered to control the area of the opening of the hopper into the feed-pipe E.

The construction being substantially such as hereinbefore pointed out, the cone-plug F
45 will be raised or lowered to regulate the supply of ore to be fed to the centrifugal distributor B and the upper and lower disks of the latter will be relatively adjusted by means of the bolts 1 1 and set-screws 2 2 to properly
50 graduate the width of the peripheral discharge opening or slit between said disks. The centrifugal distributor B having been caused to revolve by means of power applied to the vertical shaft A through the pulley a
55 thereon or in other suitable manner, the pulverized or comminuted ore supplied to the hopper G is fed from the attached feed-pipe E through the feed-aperture b^2 in the upper or cover disk 2^b and deposited upon the ore-
60 spreading projection b' of the lower disk or table 1^b of the said centrifugal distributor. As the distributor B revolves the material fed thereto upon the ore-spreading projection b' is projected or propelled centrifugally and
65 discharged through the peripheral discharge-

opening of the said distributor in a thin sheet or stratum. The particles of the comminuted ore as they are projected from the center of the centrifugal distributor toward the periph-
ery are electrified by induction from the
70 statically-charged annular plate C, so that as they are projected from the discharge-slit in a sheet or stratum they are at once attracted to the electrified member C, along the surface of which the centrifugal force impels them
75 until such time as the electrical charge upon the particles is reversed, when an active repulsion of said particles from such statically-charged member C is produced, and as the
80 periods between such attraction and repulsion vary with the different composition of the particles acted upon said particles are repulsed or thrown in different lines and a separation of the different materials is effected
85 according to their varying composition.

It is obvious that many modifications may be made in the form and arrangement of the parts of my device and that the same may be employed in the separation of mixtures other than ore without departing from the
90 scope of my invention as defined in the claims.

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

1. In an ore-separator, the combination with an electrostatically-charged member adapted to alternately attract and repel the material operated upon, of a centrifugal distributor, substantially as and for the purposes
95 100 specified.

2. In an ore-separator, the combination with an electrostatically-charged annular member adapted to alternately attract and repel the material operated upon, of a cen-
105 trifugal distributor, substantially as and for the purposes specified.

3. In an ore-separator, the combination with an electrostatically-charged annular member having an inclination from its inner
110 to its outer circumference and adapted to alternately attract and repel the material operated upon, of a centrifugal distributor, substantially as and for the purposes specified.

4. In an ore-separator, the combination
115 with an electrostatically-charged member adapted to alternately attract and repel the material operated upon, of a centrifugal distributor comprised of a plurality of disks the distance between which gradually contracts
120 from their centers to their peripheries, substantially as and for the purposes specified.

5. In an ore-separator, the combination with an electrostatically-charged member adapted to alternately attract and repel the
125 material operated upon, of a centrifugal distributor having a peripheral discharge-opening, and means for varying the area of such discharge-opening, substantially as and for the purposes specified.
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6. In an ore-separator, the combination with an electrostatically-charged member adapted to alternately attract and repel the material operated upon, of a centrifugal distributor comprised of a plurality of disks and vanes interposed between said disks, substantially as and for the purposes specified.

7. In an ore-separator, the combination with an electrostatically-charged member adapted to alternately attract and repel the material operated upon, of a centrifugal distributor comprised of a lower disk and an upper disk having a feed-aperture located centrally thereof and having its inner face coned, substantially as and for the purposes specified.

8. In an ore-separator, the combination with an electrostatically-charged member adapted to alternately attract and repel the material operated upon, of a centrifugal distributor comprised of a lower disk and an upper disk having a feed-aperture located centrally thereof and having its inner face coned, and means for adjusting the distance between the said disks, substantially as and for the purposes specified.

9. In an ore-separator, the combination with an electrostatically-charged member adapted to alternately attract and repel the material operated upon, of a centrifugal distributor comprised of a lower disk having an ore-spreading projection and an upper disk having a feed-aperture located centrally thereof and having its inner face coned, and means for regulating the quantity of material

fed to the said distributor, substantially as and for the purposes specified.

10. In an ore-separator, the combination with an annular member adapted to be electrostatically charged to alternately attract and repel the material operated upon, of a centrifugal distributor comprised of a lower disk, an upper disk and vanes interposed between said disks, substantially as and for the purposes specified.

11. In an ore-separator, the combination with an annular member located adjacent to and circumscribing a centrifugal distributor, of a centrifugal distributor having a peripheral discharge-opening, and means for varying the area of such discharge-opening, substantially as and for the purposes specified.

12. In an ore-separator, the combination with an annular member located adjacent to and circumscribing a centrifugal distributor, of a centrifugal distributor comprised of a lower disk having an ore-spreading projection and an upper disk having a feed-aperture located centrally thereof and having its inner face coned, said upper disk and said lower disk having vanes interposed between them, substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 4th day of January, 1905.

EDWIN A. SPERRY.

Witnesses:

FRANK S. CARD,
WILLIAM L. CARD.