

No. 881,207.

PATENTED MAR. 10, 1908.

C. B. C. STOREY.

DISINTEGRATING, WASHING, AND SCREENING MACHINE.

APPLICATION FILED JULY 2, 1906.

3 SHEETS—SHEET 1.

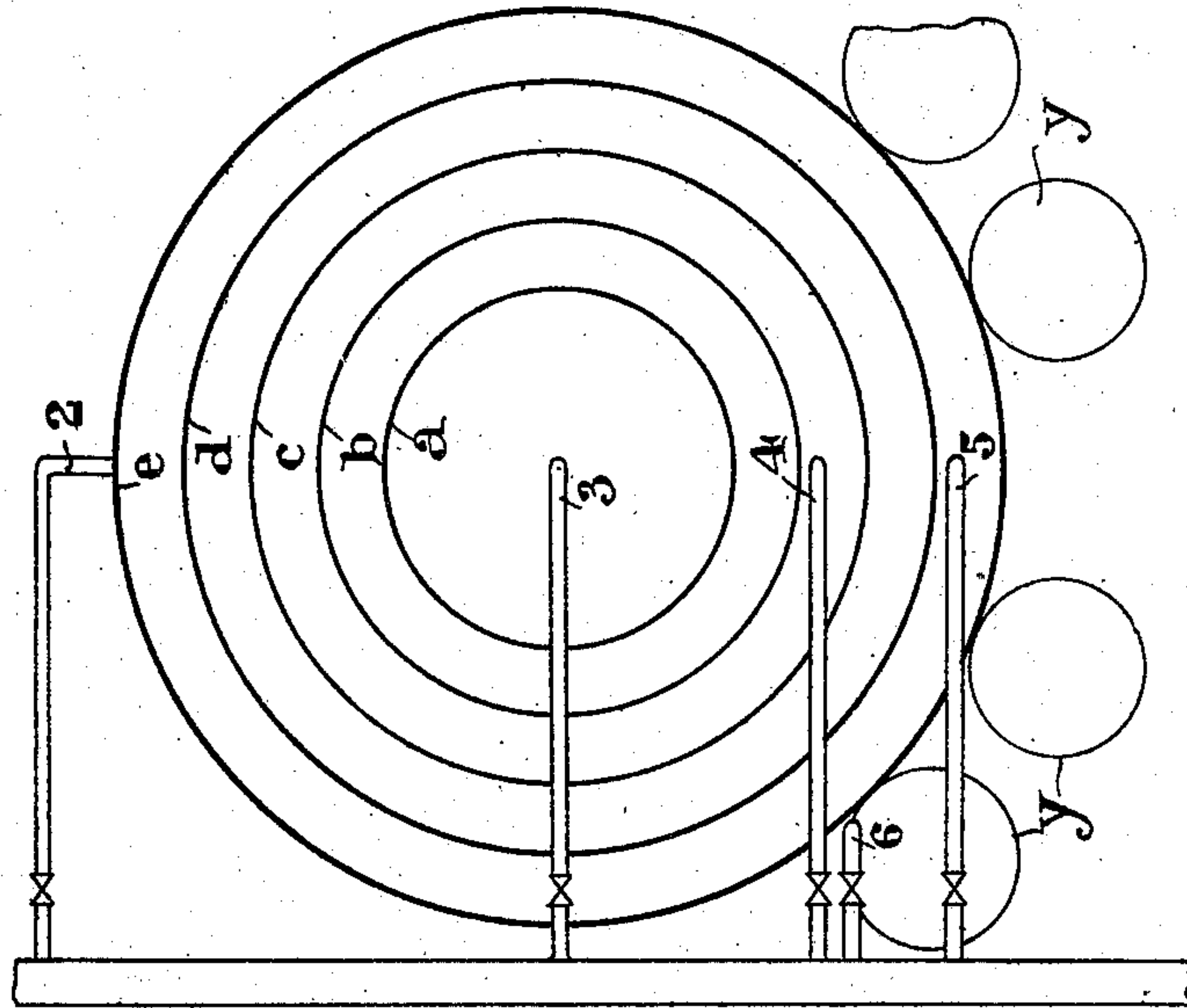


Fig. 1a.

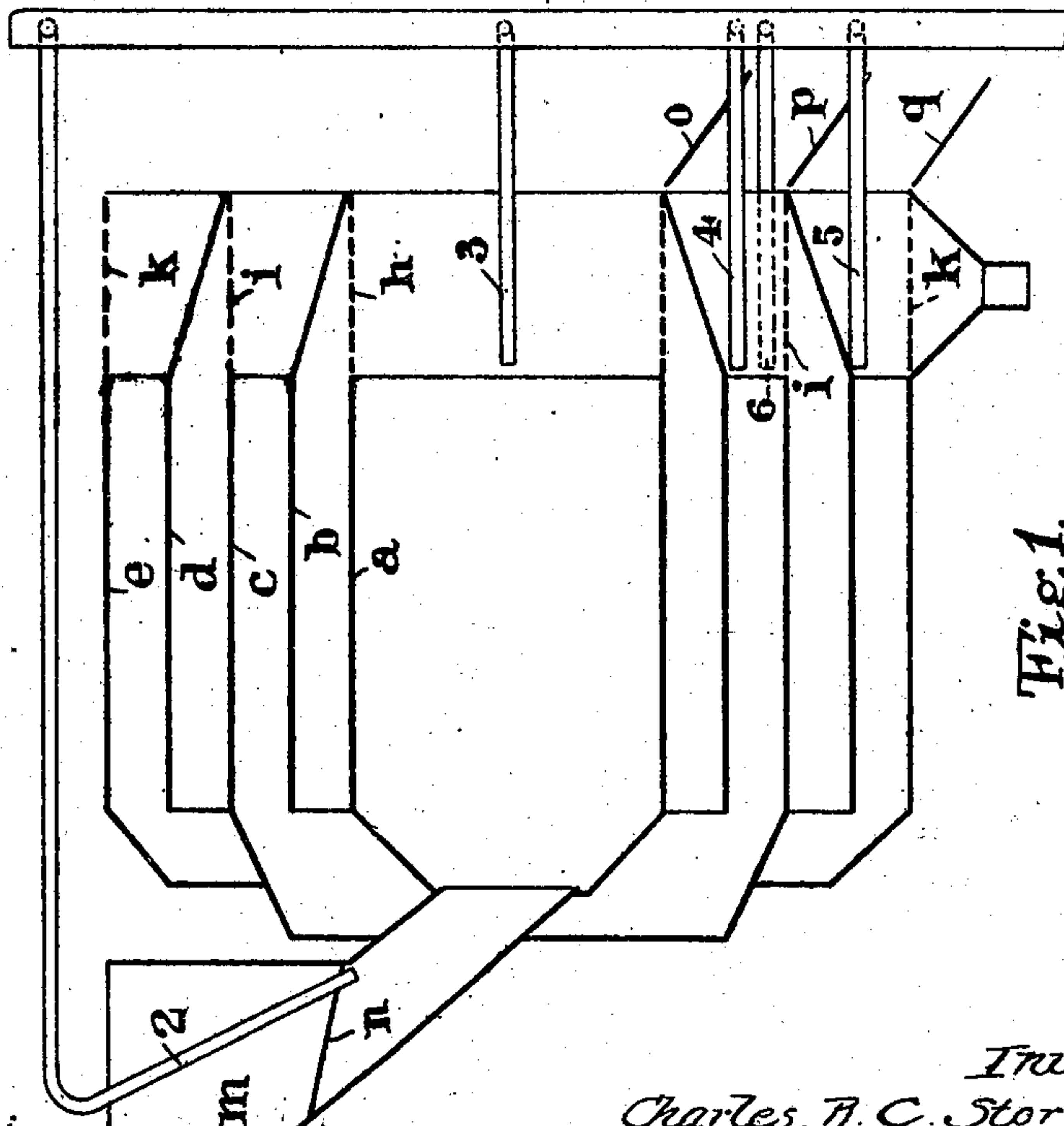


Fig. 1.

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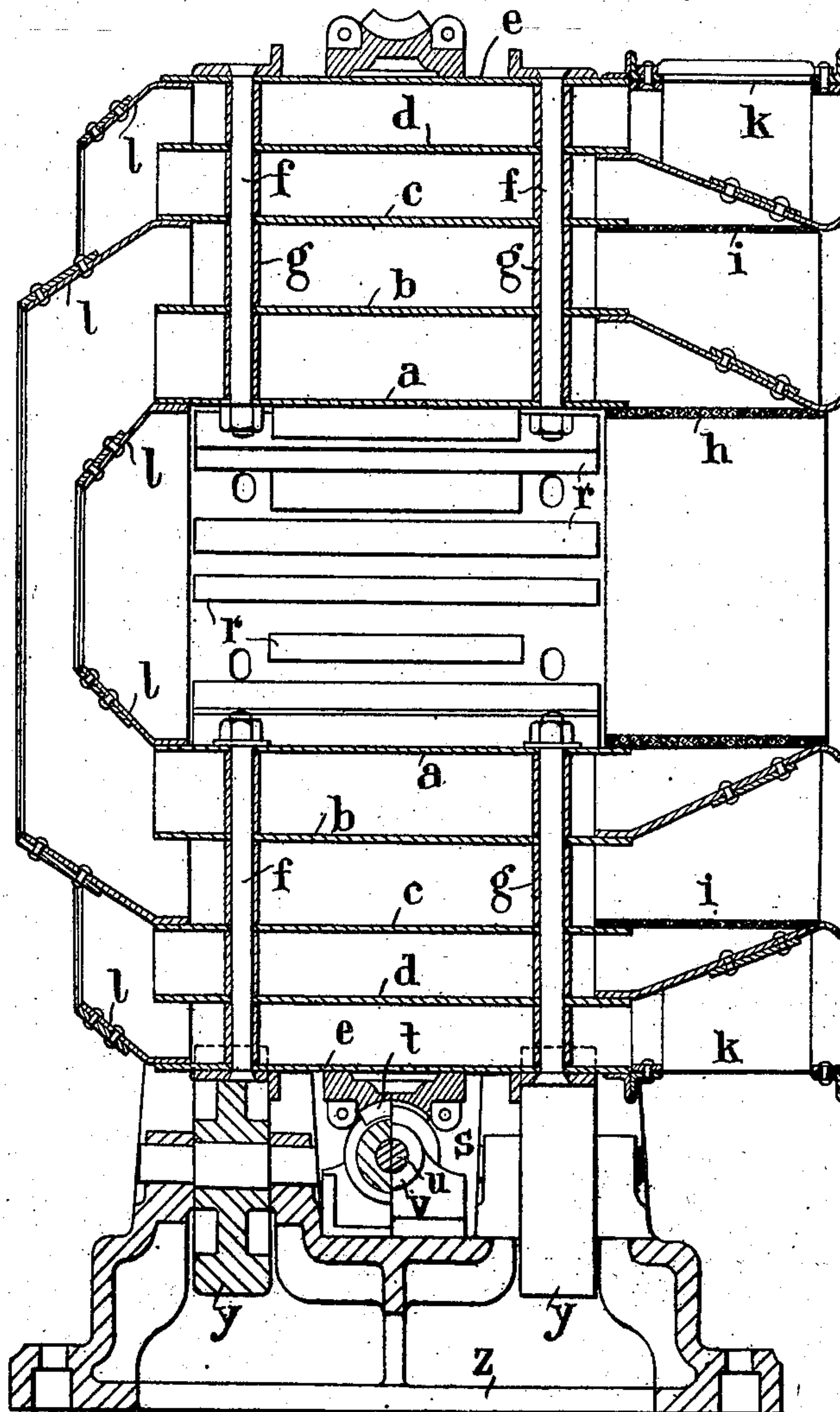


Fig. 2.

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3 SHEETS—SHEET 3.

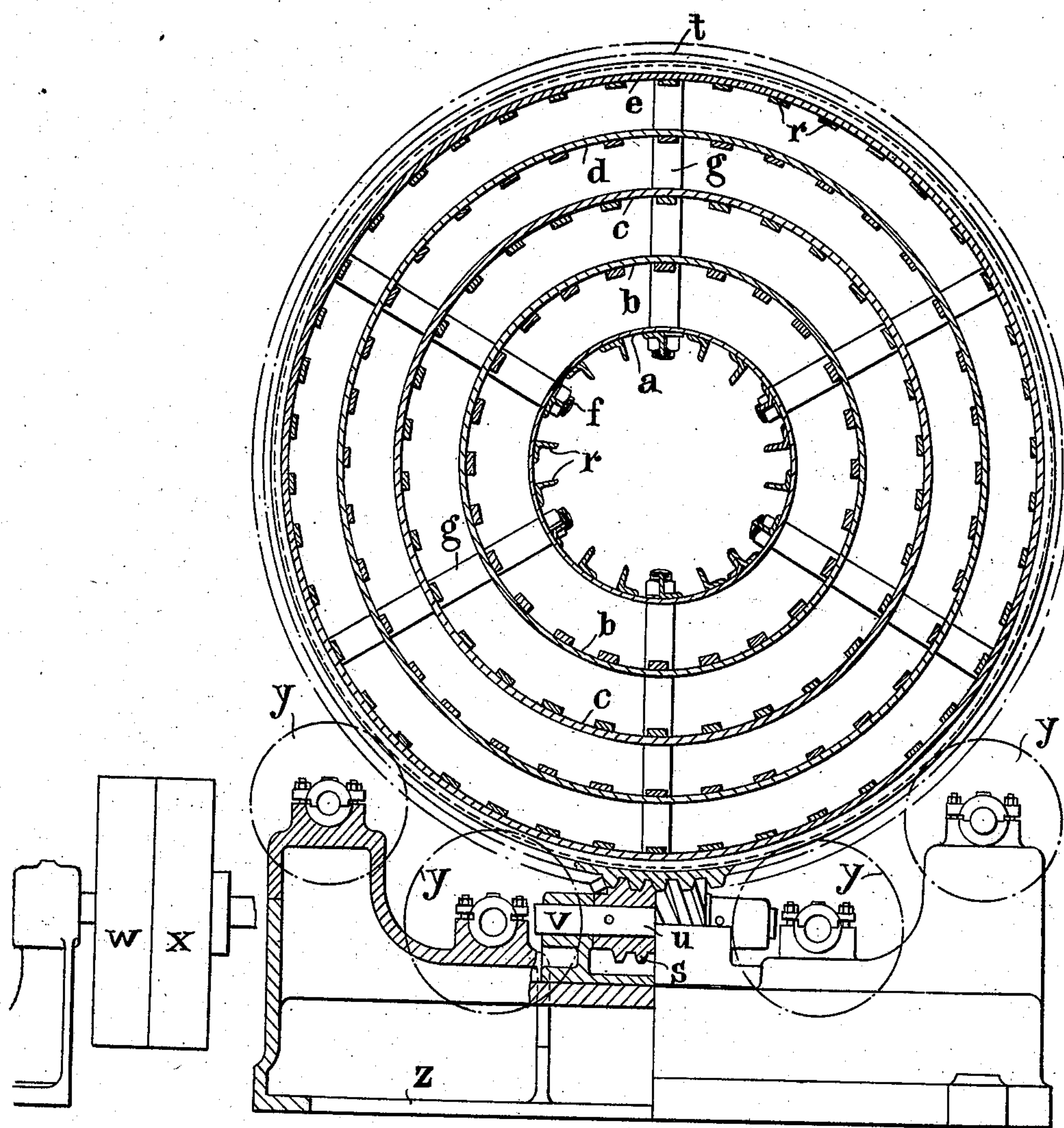


Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES BLADES COVERDALE STOREY, OF LANCASTER, ENGLAND.

DISINTEGRATING, WASHING, AND SCREENING MACHINE.

No. 881,207.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed July 2, 1906. Serial No. 324,464.

To all whom it may concern:

Be it known that I, CHARLES BLADES COVERDALE STOREY, a subject of the King of Great Britain and Ireland, residing at Lancaster, in the county of Lancaster, England, have invented certain new and useful Improvements in Connection with Disintegrating, Washing, and Screening Machines, of which the following is a specification.

This invention relates to mixing, disintegrating washing, classifying and chemically treating solid substances containing a considerable proportion of soft or small particles such as rocks, ores, mineral earths, alluvials, gravels, sands, clays, shales, schists and the like, for the purpose of extracting or separating their valuable contents, such as gold and other precious metals or minerals; gems or precious stones and the like.

The object of the invention is to provide means whereby the following functions may be effectively carried out:—(a) the contact of the whole or greater bulk of the liquid matter with the solid matter remaining until the final classification takes place or the action is completed; (b) the grinding or abrasion of the softer particles by the harder particles of similar size successively; (c) the very complete and continued aeration of all the particles, especially the smaller particles, or of the liquid attached to them, and of the rest of the liquid being acted upon; (d) the thorough abrasion of the solid particles by mutual contact.

The invention consists more specifically in feeding the materials to be treated into the first of a series of revolving nested cylinders each or each alternate cylinder being provided with a screen so arranged that the material passed by each screen is fed to the next succeeding cylinder, and caused to traverse the length of the same, each screen cylinder independently discharging the material not passed by its screen, and all the cylinders being provided with means for agitating, aerating and conveying forward the material.

The invention also comprises the introduction of solids, liquids, gases or chemicals for mixing, washing, disintegrating or otherwise treating the materials.

The accompanying drawings illustrate one mode of carrying out the invention, Figures 1 and 1^a are diagrammatic longitudinal sectional and end views respectively. Figs. 2

and 3 are sectional side and end views of one form of apparatus.

In carrying out the invention according to one mode a number of cylinders *a, b, c, d, e*, are nested within one another and spaced apart by any suitable means, such as by bolts *f* (Figs. 2 and 3) and distance sleeves, *g*. The cylinders, *a, c*, and *e*, are fitted with wire or other screens, *h, i, k*, of decreasing or otherwise varying mesh according to the desired classification. These cylinders are also preferably conically formed at their inlet ends, *l*, so as to retain or collect the material fed into them at these ends and thereby prevent accidental discharge at those ends.

The alternate cylinders, *b* and *d*, are not fitted with screens but are sloped up to and connected to the other cylinders beneath the screens so that material falling through the screens is discharged into the cylinders *b* and *d*, and after traveling along the same and being subjected to further agitation is discharged into the receiving ends of the other cylinders, passing along the latter until it reaches the next screen and so on.

From the above it will be clearly understood that the material under treatment passes in a zigzag manner through the successive cylinders, being subjected to an alternate abrading and screening action. This is an improvement upon screening apparatus comprising a number of graduated screens concentrically arranged, the material and water when used passing radially outward. The material which is too large to pass through its respective screen, is discharged from each screen by a chute.

The material may be initially fed into the first screen by a hopper, *m*, (Fig. 1) fitted with a discharge door, *n*, the material being fed from a bin or other source. The material then passes through the series and is discharged at the chute, *q'*, except that which is successively rejected by the screens and which is discharged over corresponding chutes, *o, p, q*.

The material from the last screen may be discharged into any suitable chute, hopper, conveyer or the like; in the drawings the material is discharged into the chute *q'*.

All the cylinders are provided with baffles, *r*, for the purpose of agitating the material as is usual in screening machines, the baffles lifting the material and allowing it to fall again so as to increase the abrasion between

the particles and also thoroughly aerating the material and any liquid which may be introduced.

The baffles are preferably arranged sufficiently close together and of sufficient depth in the first cylinder as to prevent the larger particles falling into contact with the cylinder, the latter being thereby protected against abrasion. The baffles are riveted or otherwise secured to the cylinders or they may be removable or carried by liners. They may be helically arranged or the cylinders may be corrugated either longitudinally or otherwise; or pockets may be formed in the cylinders. The rotary motion is imparted to the cylinders by a worm *s*, (Figs. 2 and 3) gearing into a worm-wheel, *t*, on the outermost cylinder, but spur gearing chain driving or other means may be used instead. The worm, *s*, in the example shown is mounted on a shaft, *u*, journaled in bearings, *v*, and fitted with fast and loose pulleys, *w*, *x*.

The outermost cylinder is supported on runners, *y*, and the whole apparatus is carried by a base, *z*, or it may be suspended on chains or the like and similarly driven especially in small sizes.

When it is desired to introduce liquid, gases or chemicals for washing or otherwise treating the materials as is usual in screening machines, jets may be arranged as indicated in the diagram Fig. 1. A single jet, 2, may be directed on to the lower edge of the feed spout of the hopper, a row of small jets, 3, onto the top of the coarse screen, *h*; a row of small jets, 4, onto the top of the medium screen, *i*; a row, 5, onto the top of the small screen, *k*, and a similar row, 6, onto the lower side of the latter screen at a point sufficiently high up on the rotating side so as to clear the screen of particles which will not pass through it and which will tend to close the apertures in it. This arrangement may obviously be varied to suit the nature of the material and the required treatment, as also may the liquids or gases introduced. The materials may be fed to the first cylinder in a combined liquid and solid form and chemicals may be added at any point either in liquid, solid or gaseous form and for this purpose the jet, 2, may be conveniently employed. The other jets and all the screens or grids may be dispensed with, or where it is desired to separate out the larger grains or particles of solid matter for the purpose of a further grinding or reduction a fine screen or grid with suitably sized apertures with or without jets above or below, may be employed.

In the chemical treatment of solid particles which have already been graded and are of a comparatively small size, two or more machines, or series of tubes may be employed in conjunction. The liquid par-

cles or the bulk of them, issuing from the last tube of the first series of tubes may be separated from the solid particles or the bulk of them issuing from the last tube of the first series and fresh liquid may be added to the solid particles, or the bulk of them, which have issued from the last tube of the first series, when feeding them to the first tube of the second series of tubes, and so on. This method is especially applicable to the chemical treatment of small solid particles containing gold by the aid of cyanid or similar chemical, and to kindred chemical methods.

It is to be understood that the dimensions or proportions of the cylinders and screens and the materials from which they are constructed may be varied to suit the materials to be treated and the method of treatment.

The screens may form part of or be separate from the cylinders; the cylinders may be sloped or be made conical in the same or opposite directions so as to facilitate or retard the flow of the materials, or the cylinders or the screens alone may be sloped or conical.

It will be understood that according to the invention the particles of material under treatment are constantly being raised and dropped again so that when liquids or gases or both are being introduced the damp particles are dropped through a stratum of air or gases, thereby causing increased aeration or chemical action; the apparatus is also practically self-feeding the natural angle of rest of the ore being continuously reduced by the rotation of the baffles.

In the above description the word "cylinder" is intended to include tubes or casings of any suitable cross section and not necessarily only those of true circular cross section.

The apparatus may be used in conjunction with other ordinary forms of apparatus for operating upon or treating any particular kind of ore or material that could not be so readily or conveniently treated by one process or one type of machine.

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

Apparatus for treating ores or the like comprising a series of nested cylinders, conical ends on the alternate cylinders, screens at the opposite ends of said cylinders, conical ends on the other cylinders immediately below said screens, baffles in all the cylinders, radial bolts and distance sleeves for rigidly connecting all the cylinders, means for supporting the outermost cylinder and means for rotating the same.

In testimony whereof, I affix my signature in presence of two witnesses.

CHARLES BLADES COVERDALE STOREY.

Witnesses:

ALBERT E. PARKER,

BERTRAM H. MATTHEWS.