

(No Model.)

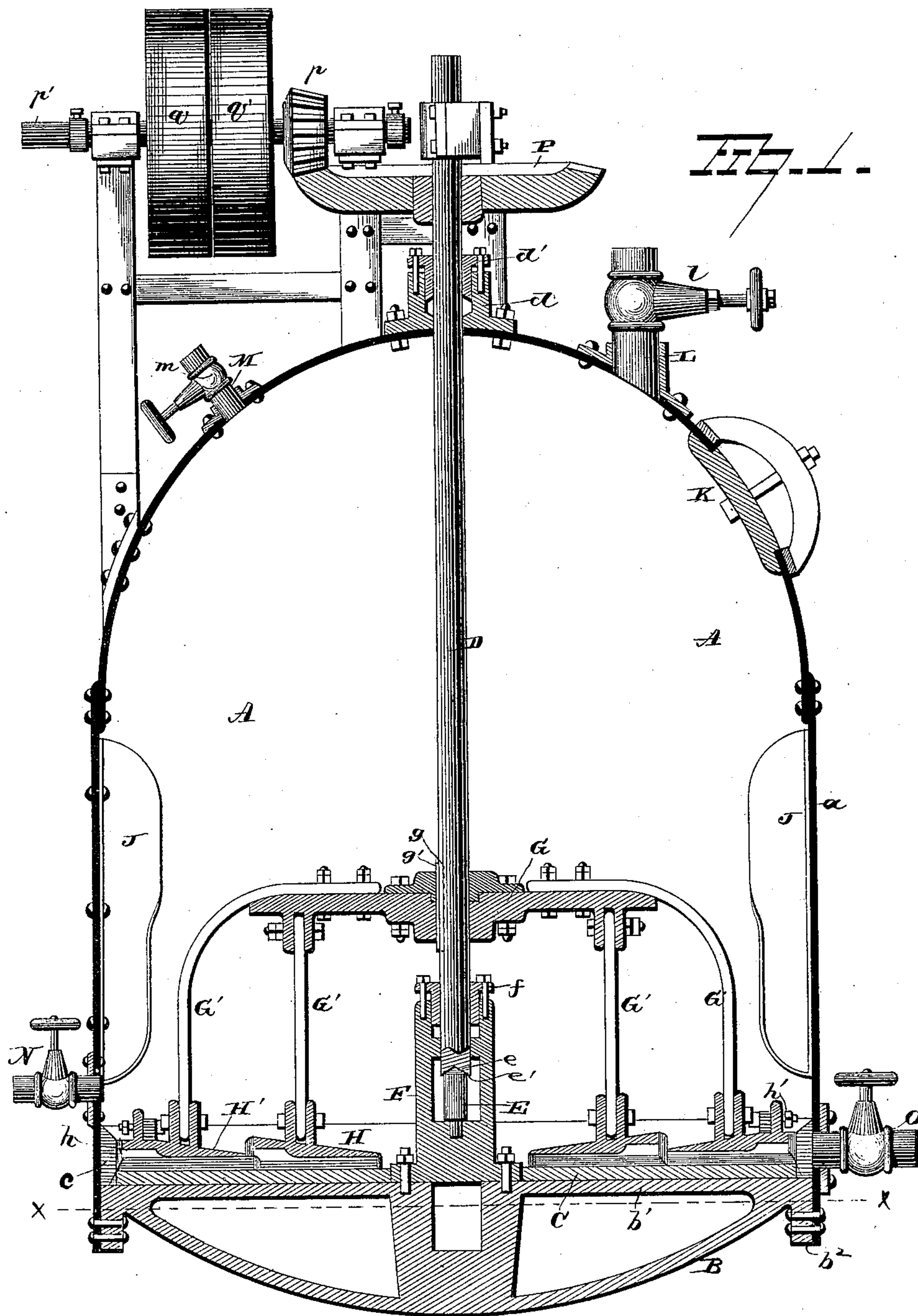
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H. B. MEECH.

APPARATUS FOR DISINTEGRATING ORES.

No. 308,510.

Patented Nov. 25, 1884.



WITNESSES

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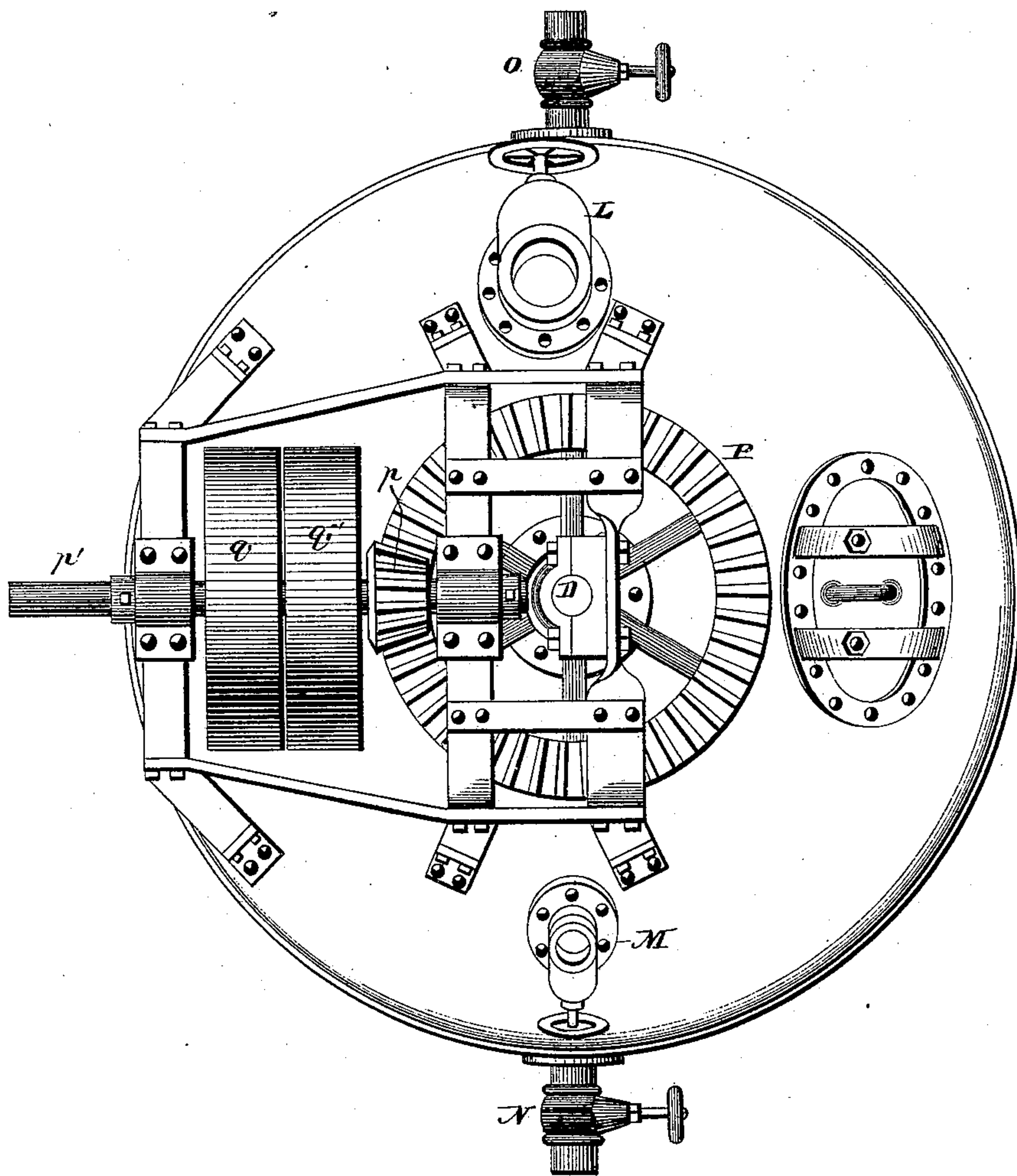
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Fig. 2.



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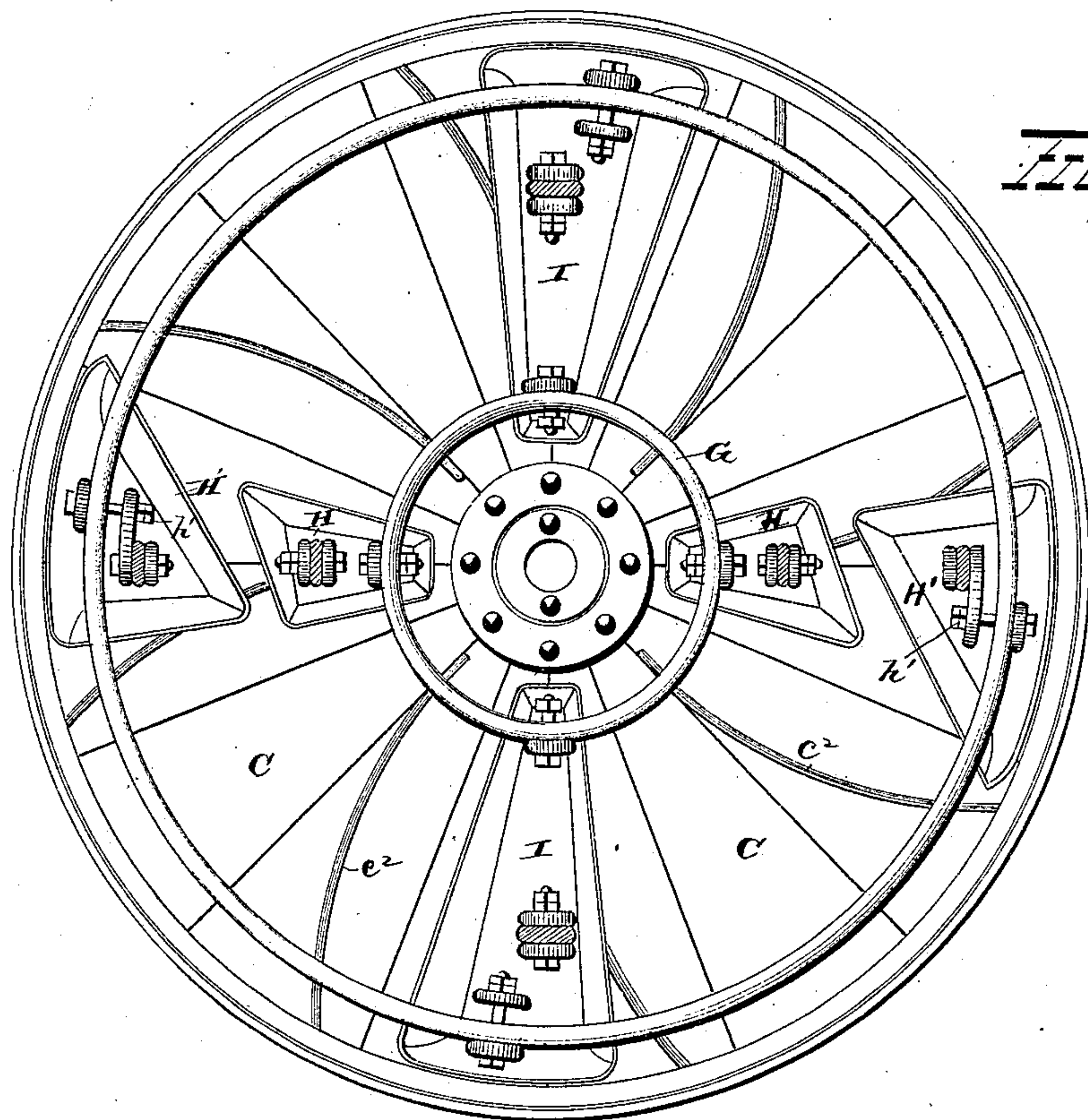
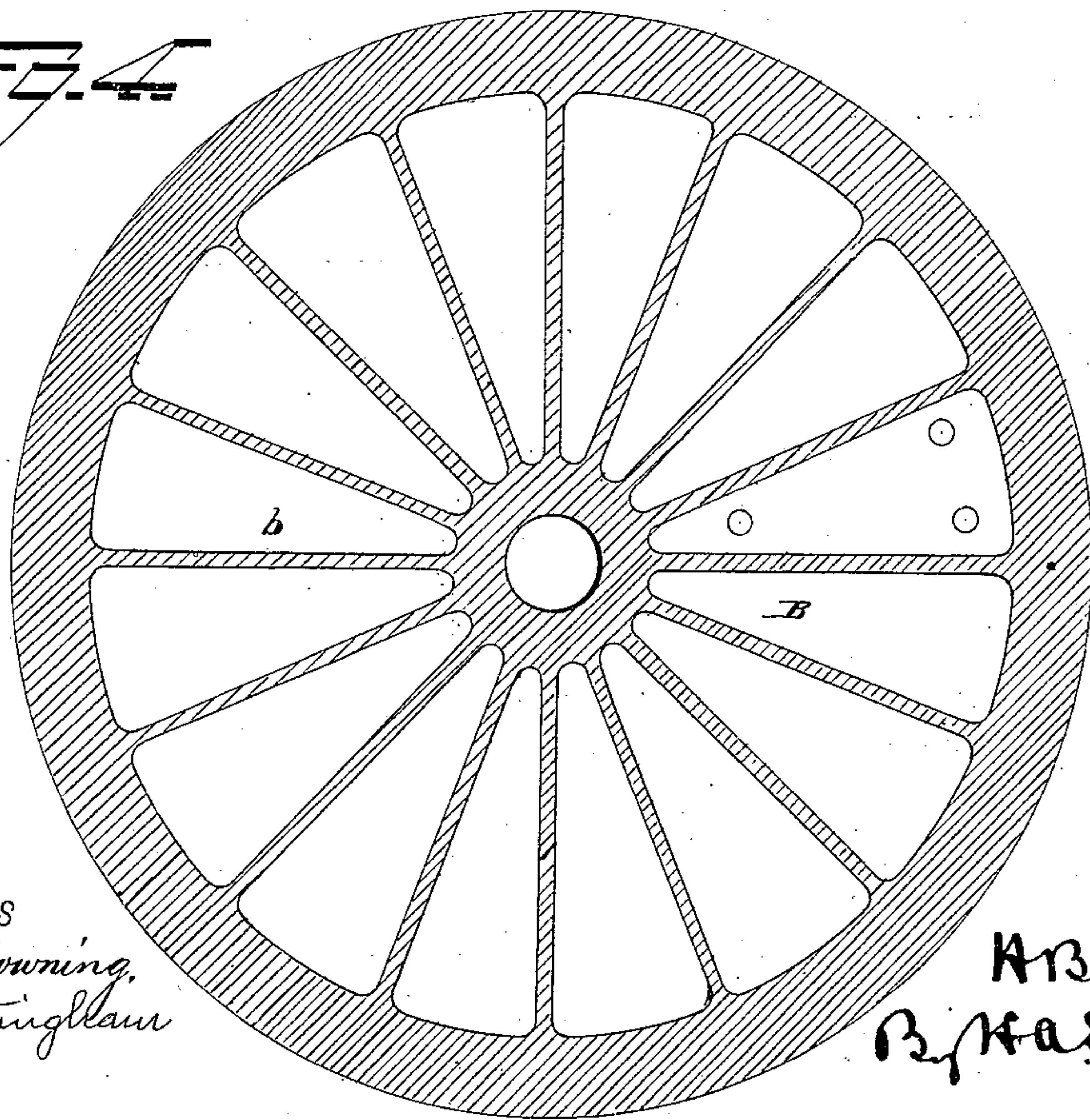


FIG. 3

FIG. 4



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UNITED STATES PATENT OFFICE.

HARRISON B. MEECH, OF CHATHAM VILLAGE, NEW YORK.

APPARATUS FOR DISINTEGRATING ORES.

SPECIFICATION forming part of Letters Patent No. 308,510, dated November 25, 1884.

Application filed January 8, 1884. (No model.)

To all whom it may concern:

Be it known that I, HARRISON B. MEECH, of Chatham Village, in the county of Columbia and State of New York, have invented certain new and useful Improvements in Apparatus for Disintegrating Ores; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in apparatus for disintegrating ore, and especially to an apparatus for carrying into effect my improved process for disintegrating ores as disclosed in Letters Patent No. 250,377, granted to me December 6, 1881.

The object of my invention is to provide an apparatus of such construction that it shall be capable of withstanding high pressure and of receiving a large charge of ore for disintegration at a single operation. A further object is to insure an even and uniform grinding or disintegration of the ore. A further object is to provide an improved construction of apparatus to insure sufficient strength with a minimum amount of metal in the parts thereof.

With these ends in view, my invention consists in certain features of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical section of my invention. Fig. 2 is a plan view of the same. Fig. 3 is a plan view of the rotary mullers and grinding-bed, and Fig. 4 is a transverse section taken through the line *x x* of Fig. 1.

A represents the receptacle in which the ore is ground or disintegrated. This receptacle is composed of the shell *a*, made of iron or steel, and preferably in the form of a dome with an arched top.

B is the bottom or lower head of the ore-receptacle, and consists of a circular cast-iron head, cored out and made of greater thickness at its center than at its periphery. This head is cored out, as represented in Fig. 4, forming radial strengthening-ribs *b*, which insures maximum strength and minimum weight of material. The upper face, *b'*, of the head is imperforate, and constitutes a bed or support for the stationary grinding-surface C, which

consists of removable plates, preferably made of cast-iron with chilled upper or wearing surface. This grinding-surface C is provided with any desired number of curved grooves *c'*, extending from the center to the outer edge of said surface. By reason of the curved form of these grooves the mullers are caused to effect a shearing grinding action in passing over them, and not only subject the ores to a more perfect grinding action, but the grinding-surfaces of the mullers are kept scraped and clean, and hence are maintained in proper condition for effective action on the ore. At the outer edge of the head are supported the removable vertical grinding-plates *c*, which are curved to fit the interior of the shell. The periphery of the head B is constructed with a flange, *b'*, to which is securely riveted the lower end of the shell or body A.

The above-described form and construction of parts insures a receptacle capable of admitting and having treated therein a large quantity of ore at a single operation, and of having a high pressure exerted therein without danger of impairing the efficiency of the apparatus.

D is a revolving shaft extending downwardly into the receptacle A, and supported at its upper end in a bearing, *d*, bolted to the top of the receptacle, said bearing being provided with a stuffing-box, *d'*, to prevent the escape of steam past the shaft. The lower end of the shaft is formed with a conical recess, *e*, within which is received the conical end *e'* of the separate step E, the latter being supported in the bearing F, which is bolted to the center of the lower head, B, and extends upwardly into the receptacle to a height sufficient to prevent the ore from entering its upper end. The upper end of the bearing F is provided with a stuffing-box, *f*. The two stuffing-boxes *d'* and *f* are filled or partially filled with quicksilver, which serves to insure a tight joint and effectually exclude the finely-pulverized ore from coming into contact with the shaft-bearings.

To the shaft D is secured the spider or frame G by means of a spline and groove, *g g'*, whereby the frame G is caused to rotate with the shaft, but is allowed a vertical movement relative thereto.

From the frame G are suspended the large and small mullers by the links G'. The small mullers H H' are constructed with their adjacent edges formed diagonally to their length, and arranged so that the outer edge of the inner muller, H, will slightly overlap the track of the outer muller, H'. By having the inner mullers cover only part of the radius of the stationary grinding-bed they are made to freely adjust themselves to their work, and further enable the outer mullers, H', to operate on a double grinding-surface—viz., the outer portion of the grinding-surface C and against the vertical grinding-surface c. The mullers H' gradually increase in thickness from their inner to their outer ends, and the latter are constructed with chilled grinding-surfaces h, which operate in conjunction with the correspondingly-chilled grinding-surface c. Mullers H' are each pivoted on a bolt, h', which is of sufficient length to allow the muller to be thrown outward by centrifugal force and subject the ore to a grinding or disintegrating action not only beneath its lower face, but also between its end and the vertical grinding-surface c. Every alternate muller may be made in a single piece, substantially as shown at I; or all of the mullers may be constructed and arranged like those shown at H H'.

To the inner surface of the shell or receptacle are secured any desired number of spirally-inclined wings or deflectors, J, which serve to deflect the ore toward the center of the receptacle and cause it to be subjected to a continuous and uniform grinding action. The receptacle A is provided near its upper end with a man-hole, K, of sufficient size to admit a workman for renewing or repairing any of the inclosed parts of the apparatus. Pipe L, provided with a stop-cock, l, is located at the upper portion of the receptacle, for the admission of the crushed ore. A pipe, M, provided with a stop-cock, m, communicates with the upper portion of the receptacle or shell, for the admission of water or chemicals. Pipe N, located slightly above the bottom of the apparatus, is for admitting steam, and pipe O is provided for blowing off the contents of the apparatus.

To the upper end of the shaft D is secured a bevel-gear, P, with which engages a bevel-pinion, p, on the driving-shaft p', the latter being provided with tight and loose band-pulleys q q'. The steam admitted into the apparatus assists in the disintegration by penetrating the pores of the rock and expanding the same, and also by its tendency to decompose the rock or elements that make up the bulk of ore deposits.

Having described the construction and relative arrangement of the different parts of my improved apparatus, I will simply describe its operation. The ore to be disintegrated is first crushed or pulverized in any suitable crushing-machine and reduced to a proper degree of fineness—say about forty mesh.

Water or any liquid chemical solution is then mixed with the ore, and the mixture is then admitted to the receptacle through pipe L. Steam, either live or superheated, is then admitted through pipe N, the latter being located above the bottom of the receptacle, thereby causing the steam to penetrate and agitate the mass of crushed ore situated in the lower portion of the apparatus. The steam, which materially assists the disintegration, is continued to be admitted until an internal steam-pressure is obtained of one hundred pounds (more or less) to the square inch, and this pressure may be kept practically constant throughout the operation or it may be varied, as desired. The shaft D is then rotated and imparts a rotary motion to the mullers, which subject the contained ore to the grinding and disintegrating action while under high pressure and heat. The mullers are free to adjust themselves to the stationary grinding-surface, and are self-adjusting to compensate for wear. The deflectors attached to the sides of the apparatus serve to deflect the ore inwardly, and thus maintain a circulation of the ore while being ground, and thereby insure a uniform treatment thereof. After the ore has been ground a sufficient length of time, it is blown off through the pipe O into suitable receptacles, and by precipitation and amalgamation the precious metal mixed therewith is extracted.

I do not restrict myself to the exact construction and arrangement of parts shown and described, as it is evident that changes may be made in the construction of the apparatus without departing from the spirit and scope of my invention.

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

1. In an apparatus for disintegrating ores, the combination, with a steam-tight receptacle and a rotating shaft, of a frame secured to the shaft and adapted to move vertically thereon independently of the shaft, arms or links secured at one end to the frame, and mullers secured to the lower ends of the arms or links.

2. In an apparatus for disintegrating ore, the combination, with a closed receptacle and a revolving shaft journaled therein, of a vertically-movable frame secured to said shaft, arms or links secured to the frame, and mullers hinged to the lower ends of said arms or links.

3. In an apparatus for disintegrating ore, the combination, with a closed receptacle and a revolving shaft, of the mullers H H', the adjacent edges of which are formed diagonally to their lengths, and so arranged that the outer edge of the inner muller, H, will slightly overlap the track of the outer muller, substantially as set forth.

4. An apparatus for disintegrating ore, consisting, essentially, of a closed or steam-tight shell having an arched top and a cast-metal bottom, constructed substantially as described

and rigidly secured to the shell, removable grinding-plates secured to said bottom, a revolving shaft, a vertically-movable frame secured on said shaft, arms or links depending from the frame, and mullers hinged to the lower ends of the arms or links, all of the above parts combined and adapted to operate substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HARRISON B. MEECH.

Witnesses:

S. G. NOTTINGHAM,
GEORGE F. DOWNING.