

(No Model.)

2 Sheets—Sheet 1.

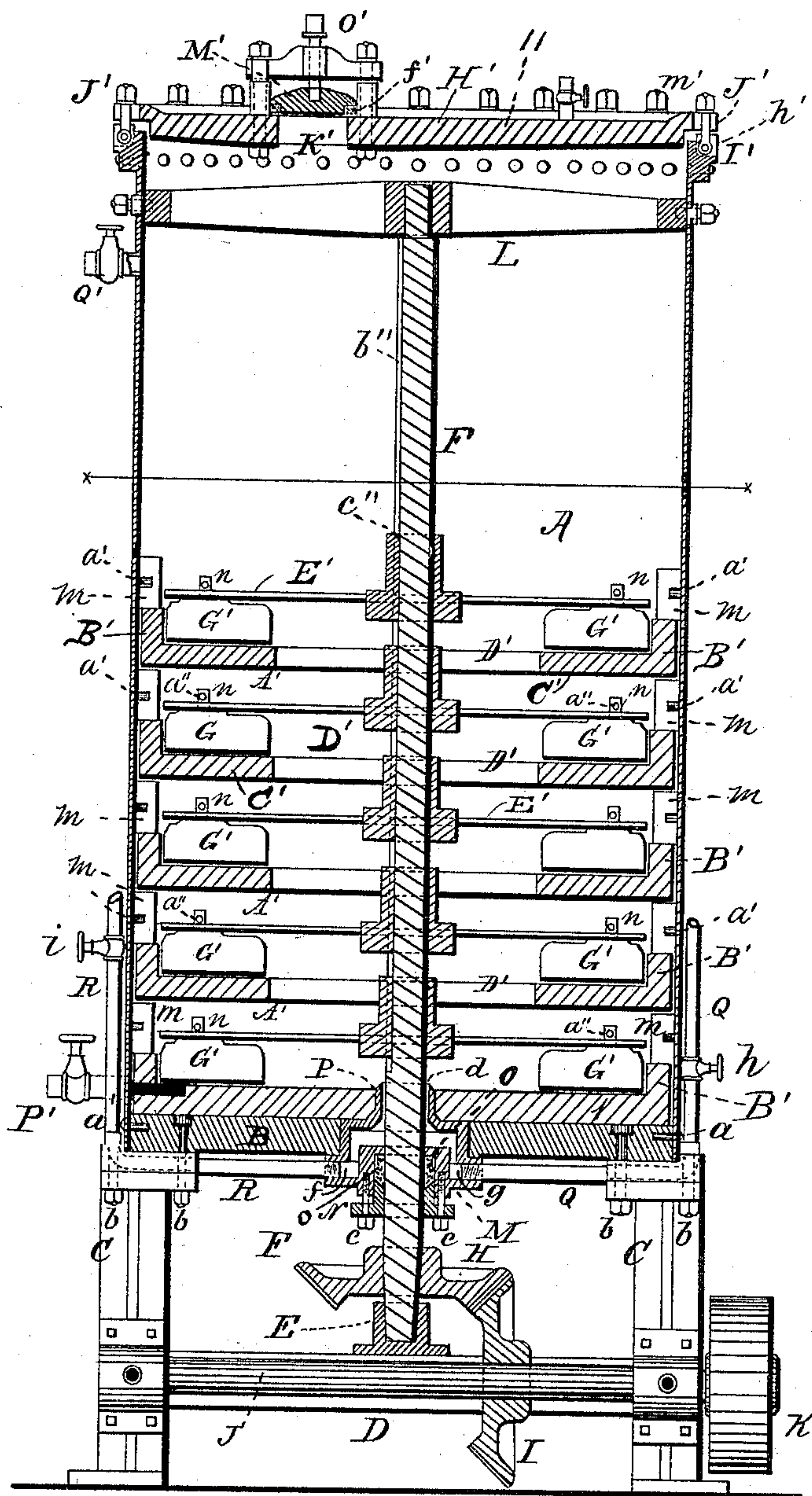
A. HIGLEY.

MACHINE FOR DISINTEGRATING ORES.

No. 330,115.

Patented Nov. 10, 1885.

Fig 1



Witnesses

J. H. Burridge.
G. J. Hardway.

Inventor

Aaron Higley
W. H. Burridge, atty.

A. HIGLEY.

MACHINE FOR DISINTEGRATING ORES.

No. 330,115.

Patented Nov. 10, 1885.

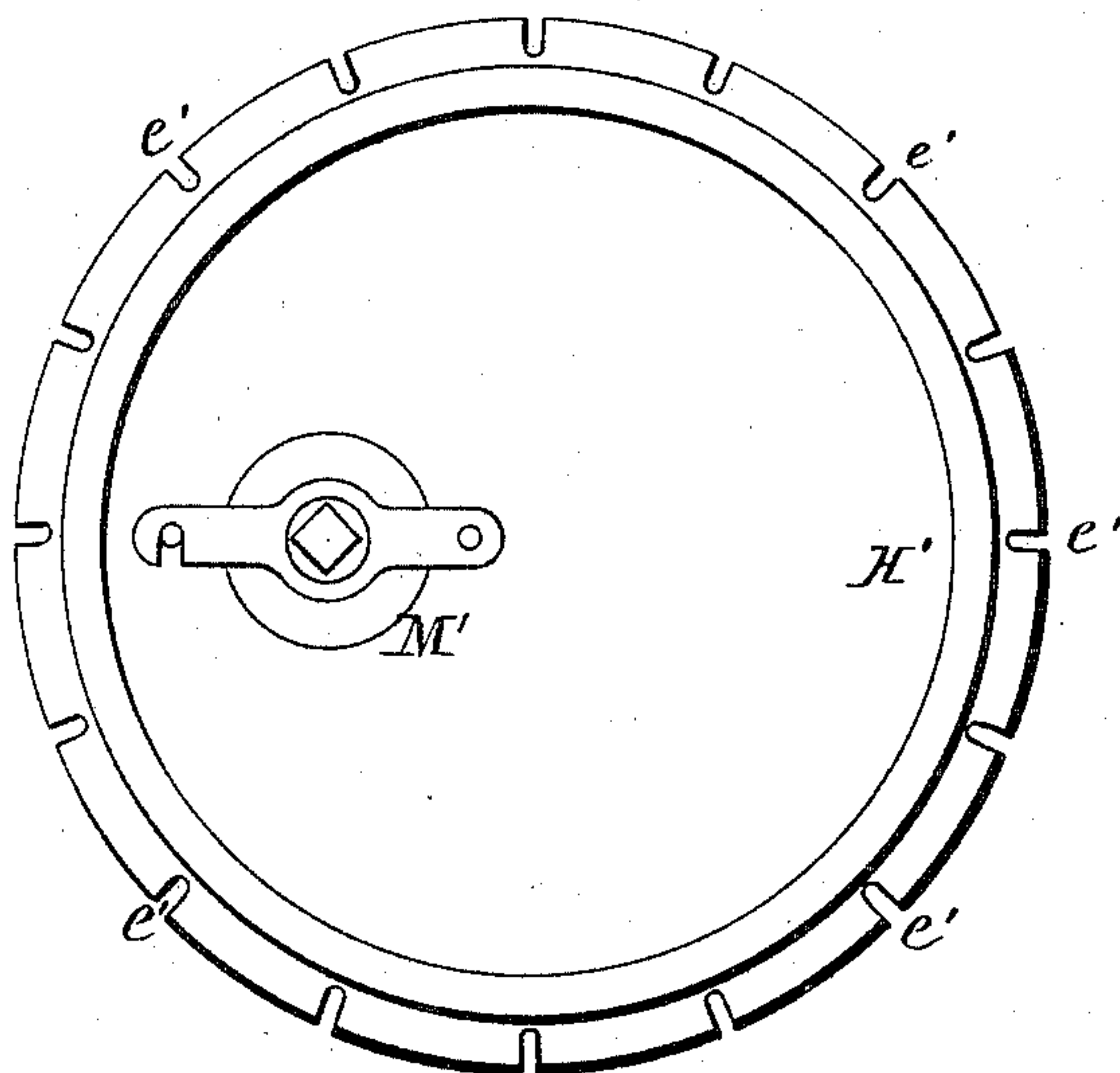


Fig 2

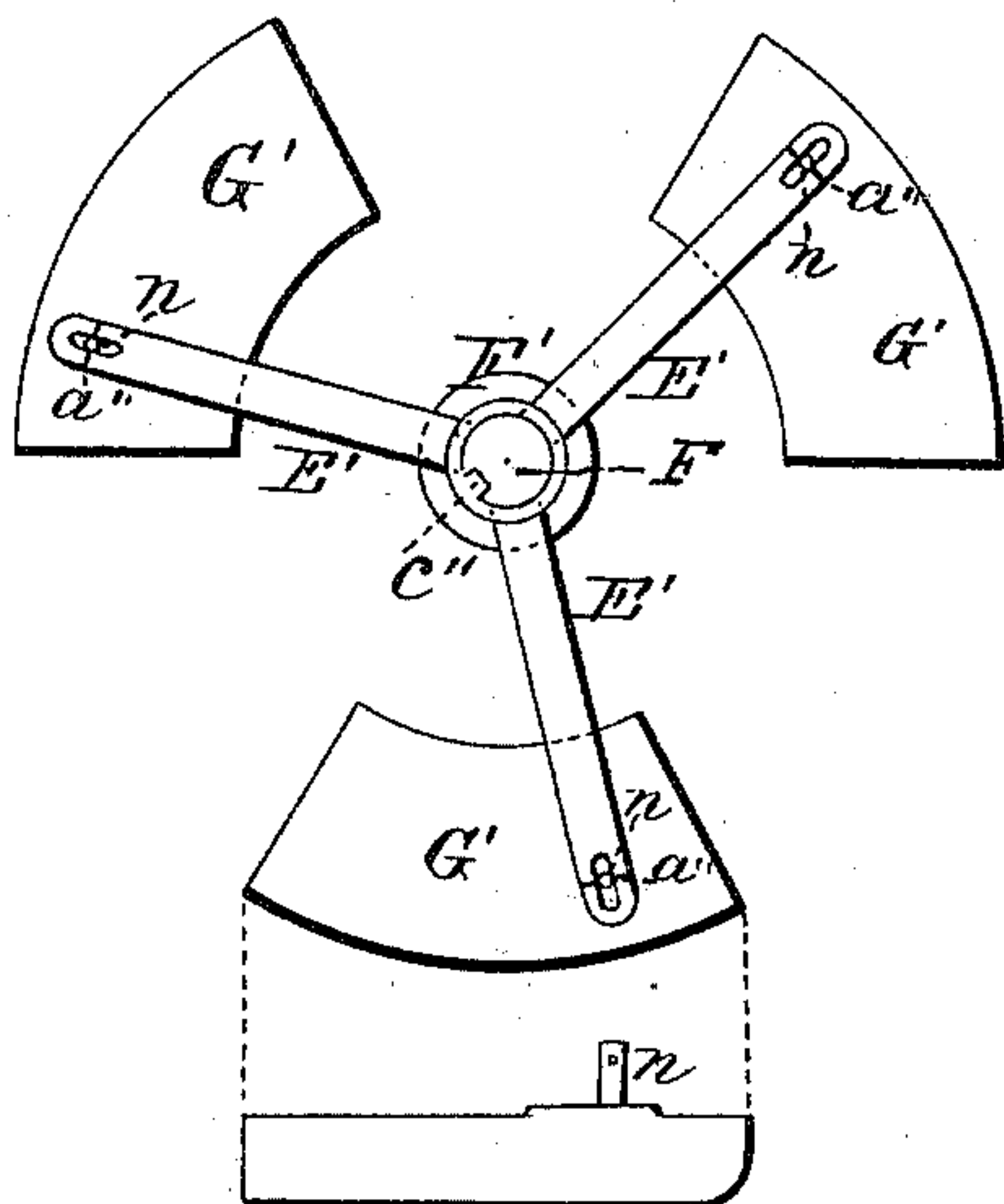


Fig 3

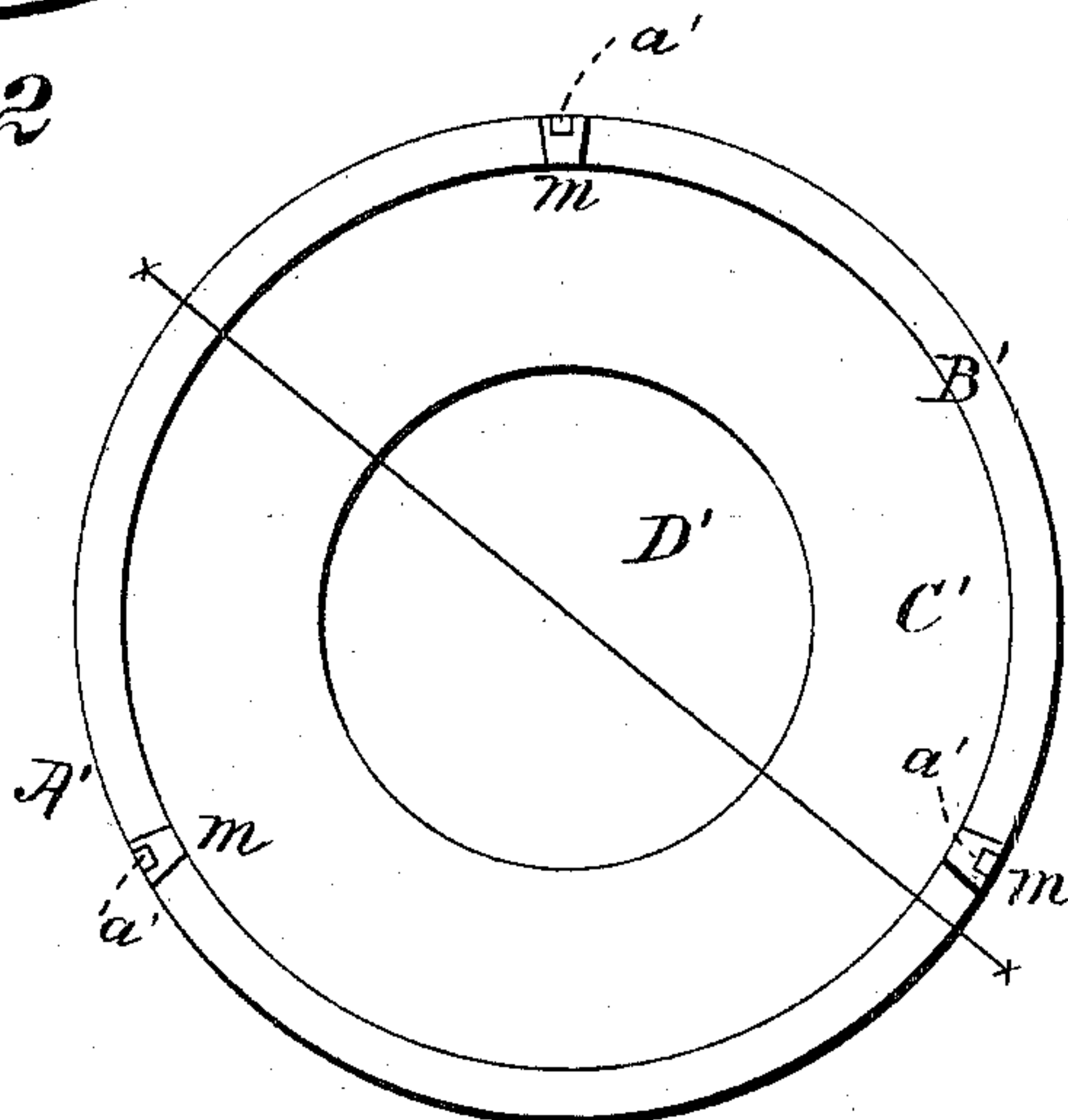


Fig 4

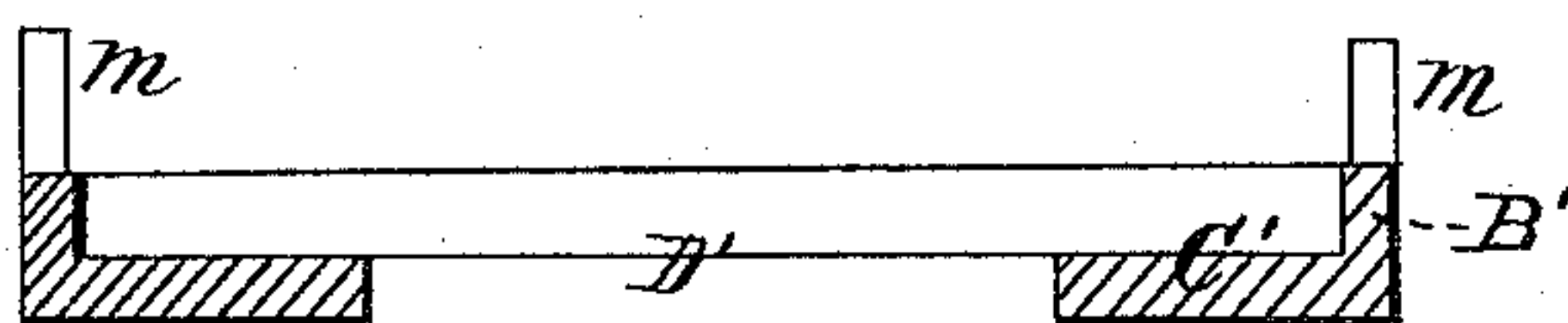


Fig 5

Witnesses

J. H. Burridge
G. J. Hardway.

Inventor

Aaron Higley
W. H. Burridge
Atty

UNITED STATES PATENT OFFICE.

AARON HIGLEY, OF CLEVELAND, OHIO.

MACHINE FOR DISINTEGRATING ORES.

SPECIFICATION forming part of Letters Patent No. 330,115, dated November 10, 1885.

Application filed June 17, 1885. Serial No. 168,936. (No model.)

To all whom it may concern:

Be it known that I, AARON HIGLEY, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Machines for Disintegrating Ores; and I do hereby declare the following to be a full and complete description thereof.

My invention relates especially to that class of reducing-machines wherein the previously-pulverized ore is ground in a receptacle charged with water, and in which the process of reducing the ore to a pulpy mass may be facilitated and more fully perfected by a high degree of heat, produced by steam of a high pressure inducted into the receptacle with or without the use of chemicals.

The special object of my invention is to provide an ore-reducing machine having a comparatively small diameter with a large working capacity, and which at the same time shall be an inexpensive structure, easy to adjust, light to handle, strong, and durable.

My invention also relates to a device for keeping the reduced pulverized ore or pulp from the driving-shaft at its junction with the stuffing-box, and thereby preventing undue wearing of the shaft at that particular place.

The construction of the machine and the practical working of the same are substantially as follows, reference being had to the accompanying drawings for illustration, and making a part of this specification, in which—

Figure 1 represents a vertical transverse section of the machine. Fig. 2 is a view of the top. Fig. 3 is a detached view of a set of mullers, and Fig. 4 is a detached view of a grinding-bed. Fig. 5 is a transverse detached sectional view through the line *xx*, Fig. 4.

Like letters of reference denote like parts in the several views.

The body of the machine consists of a metal cylinder, *A*, the bottom *B* of which is a thick metal plate, to which the end of the cylinder is firmly secured by an annular series of bolts or rivets, two of which are shown at *aa* in Fig. 1. Said cylinder is supported on a suitably-constructed frame, *C*, to which it is secured by bolts *b b*. On the cross-piece *D* is a step, *E*, in which the end of the shaft *F* stands. Said shaft is revolved by the gearing *H I*, on the shaft *F*, and counter-shaft *J*, the latter hav-

ing the driving-pulley *K*. The shaft *F* passes centrally through the bottom of the cylinder, and extends upward therein to the cross-piece *L*, in which the end is journaled in a suitable box, and thereby retained in a vertical position. Said shaft is made tight in its passage through the bottom of the cylinder by a stuffing-box, *M*, whereof *N* is the gland, *O* the packing, and *c* the bolts for securing the gland to the box. In connection with the stuffing-box is a chambered collar, *P*, through which the shaft passes, but not in contact therewith, there being a narrow space, *d*, between the shaft and the collar, whereby the chamber of the collar is put in communication with the interior of the cylinder for a purpose presently to be stated.

f and *g* are the induction-openings of the above-described chambered collar and stuffing-box combined. Into the opening *g* of said chamber is screwed one end of the pipe *Q*, which extends therefrom to the edge of the cylinder and upward along the side thereof, and is provided with a stop-cock, *h*, substantially as shown in the drawings. Into the opening *f* of the chambered collar is also screwed one end of a pipe, *R*, which extends therefrom to the edge of the cylinder and upward along the side, and is furnished with a stop-cock, *i*.

In the cylinder above alluded to is arranged a vertical series of grinding-beds having adapted thereto a corresponding series of revolving mullers. Each of the grinding-beds consists of a wide metal ring, *A'*, Fig. 1, provided with a circumferential flange, *B'*, a detached view of one of the beds being shown in Fig. 4, of which Fig. 5 is a transverse section. The space *C'*, between the flange *B'* and the central opening, *D'*, forms the grinding-surface on which the mullers revolve.

The several grinding-beds fit closely in the cylinder, but sufficiently free to admit of their being easily placed therein and as easily removed therefrom, and they are prevented from turning around in the cylinder by pins *a'*, projecting through the sides thereof into the studs *m* of the grinding-beds; but other suitable means may be used for that purpose. Said grinding-beds may be more or less in number, as the grinding capacity of the machine may require.

A plan view of one set of the series of mullers used in connection with the grinding-beds is shown in Fig. 3, in which it will be noticed that it consists of three radial arms, E', projecting from a hub, F', fitted loosely to the shaft F. In the eye of the hub is a feather, c'', adapted to slide in the groove b'' in the side of the shaft, so that the hub, arms, and the mullers G' G' G' attached thereto may be revolved, and at the same time be permitted a vertical movement in the cylinder.

The connection of the mullers to the arms is by means of studs n, projecting from the mullers through slots in the arms, and are secured therein by pins a''. Said studs are free to move in the slots, thereby allowing a radial movement of the mullers in their connection with their respective arms.

Three mullers are mentioned and shown in the drawings as forming a set; but more or less of them may be used in a set. It is preferred, however, to have but three in each set.

The grinding-beds, with their respective mullers, are arranged in the cylinder as shown in Fig. 1, and are introduced therein as follows: The grinding-bed 1 is lowered into the cylinder to the bottom thereof, on which it rests. Then a set of mullers is lowered therein onto the grinding-bed within the annular flange B'. Then a second grinding-bed is lowered into the cylinder onto the studs m, whereon the bed rests, and is supported thereby above the grinding-bed and the mullers previously introduced, and so on until all the grinding-beds, with their respective sets of mullers, are placed therein that may be required to complete the machine, and which, as above said, may contain more or less in number. The studs m, above alluded to, also serve as deflectors for throwing the ore toward the center of the cylinder while being ground.

By arranging the grinding-beds in the cylinder one above the other is obtained a large grinding-surface in a comparatively small cylinder, and as the arms or frames to which the mullers are attached are free to move downward on the driving-shaft, the mullers are continuously kept in contact with the grinding-beds as they may continuously wear away, and which, when worn out, are easily removed, to be replaced by new ones or for repairs.

The several grinding-beds and mullers being properly arranged in the cylinder, and the end of the shaft secured in the cross-piece L, the cylinder is then closed by the cover H', attached thereto, as follows: I', Fig. 1, is a collar around the end of the cylinder, secured thereto by rivets. In the edge of the collar is a series of notches corresponding to the notches e' in the edge of the cover H'. In the notches h' of the collar are pivoted the ends of the bolts J', Fig. 1, which project upward therefrom through the notches in the cover, which serve as holes for the bolts, and over which are screwed the nuts for bolting the cover down upon the cylinder. K' is a man-hole, through which access may be had to the inte-

rior of the cylinder. Said hole is covered by a plate, M', and secured thereto in any suitable way.

The operation of the machine is as follows: Through the pipe R the cylinder is so far charged with water as to cover the grinding-beds. The mullers are then put in motion, and a desired amount of pulverized ore thrown into the cylinder through the man-hole, and to which may be added chemicals, if so desired. If steam is used, the man-hole must be closed steam-tight, and the steam inducted into the cylinder through the pipe Q, connected to a steam-generator. (Not shown in the drawings.)

The amount of steam and the degree of pressure required will depend upon the nature of the ore being ground, which is held and the pressure continued until the ore is reduced to a pulp suitable for amalgamation. The whole mass is then drawn off through the cock P'.

As the mullers revolve in the operation of grinding, the centrifugal force impels them outward to the flanges B', thereby grinding the ore between the flanges and the ends of the mullers, as well as upon the main grinding-surface of the beds, and as the connection of the mullers with the arms is such as to allow them a radial movement, they are continued in contact with the flanges as they are worn away in the process of grinding.

During the operation of grinding the tendency of the mass of pulp is downward, and to prevent it from passing through the stuffing-box, and by that means avoid undue and rapid wearing of the shaft, is the use of the chambered collar, in combination with the stuffing-box above described. The force of the water and the pressure of the steam passing into the chamber, thence around the shaft into the cylinder, tend to drive the soft pulpy mass away from the stuffing-box, leaving it free and clean of the pulp; hence there is no undue wearing of the shaft in its connection with the stuffing-box. The amount of water and steam admitted into the cylinder will be more or less, as the condition of the ore being ground may demand, and which is regulated for that purpose by the cocks h and i.

It is not essential that the grinding-beds and the mullers be of the exact form and numbers shown and described, as they are susceptible of various modifications and of numbers. Nor is it material that the mullers be attached to the arms in the manner shown; and I do not confine myself to the exact shape and construction of the combined stuffing-box and chambered collar, as the same may be changed and modified without affecting its essential features.

That which distinguishes my machine from others of this class, and which I desire to secure by Letters Patent, is—

1. In a machine for disintegrating ores, the series of removable grinding-beds, each having a circumferential flange and projecting

studs, in combination with a central shaft, a series of removable mullers fastened thereon and corresponding with the series of grinding-beds, and an inclosing-cylinder, constructed
5 substantially as and for the purpose described.

2. In a machine for disintegrating ores, a steam-tight cylinder and a central shaft arranged to pass through the bottom thereof, in combination with the packing-box M, the
10 chambered collar P, water-pipe R with water-

passage *f*, and the steam-pipe Q with the steam-passage *g*, all constructed substantially as and for the purpose described.

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

AARON HIGLEY.

Witnesses:

J. H. BURRIDGE,

G. J. HARDWAY.