

(No Model.)

2 Sheets—Sheet 1.

G. B. MAYNADIER.
GRINDING MILL.

No. 284,648.

Patented Sept. 11, 1883.

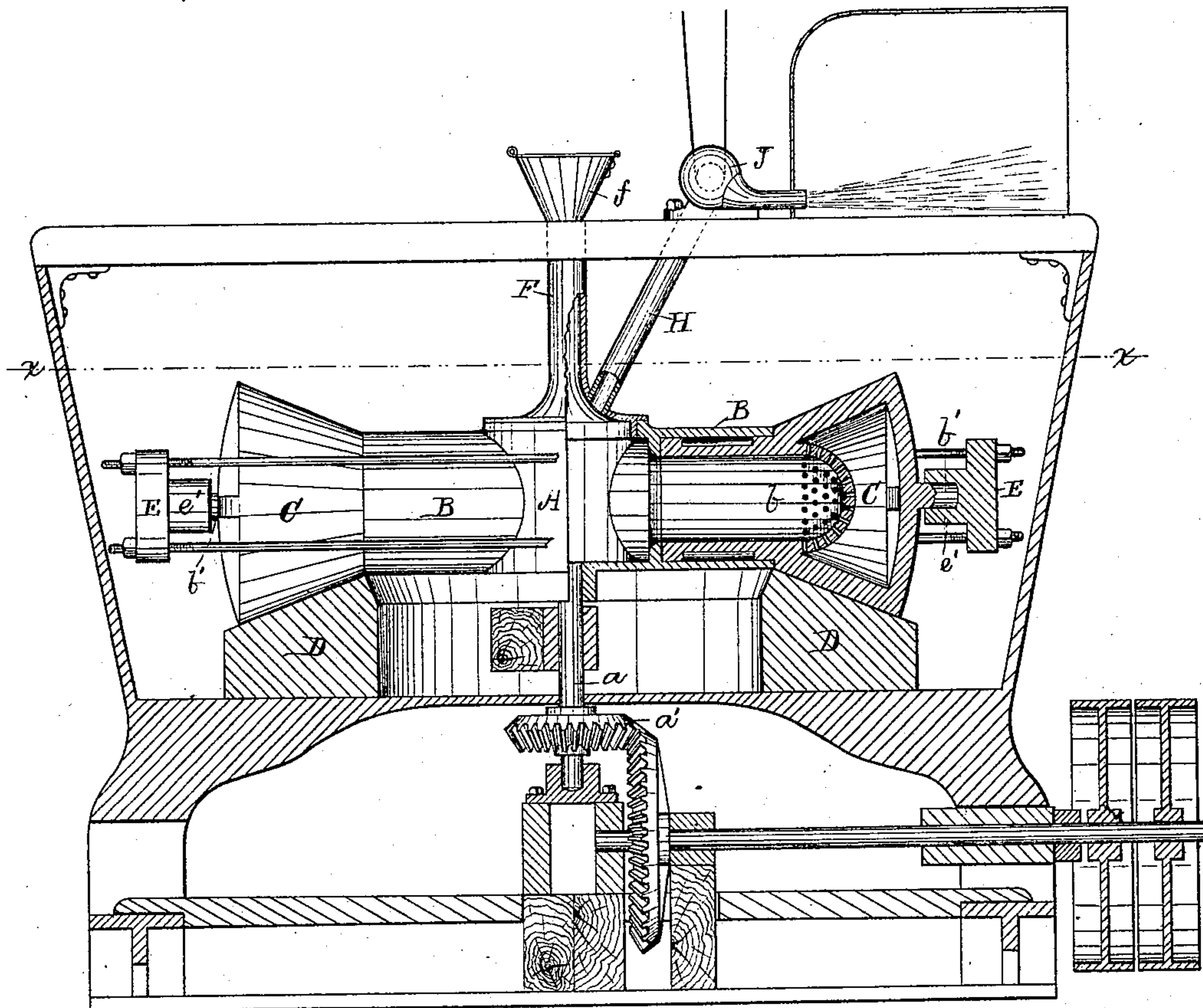


Fig. 1.

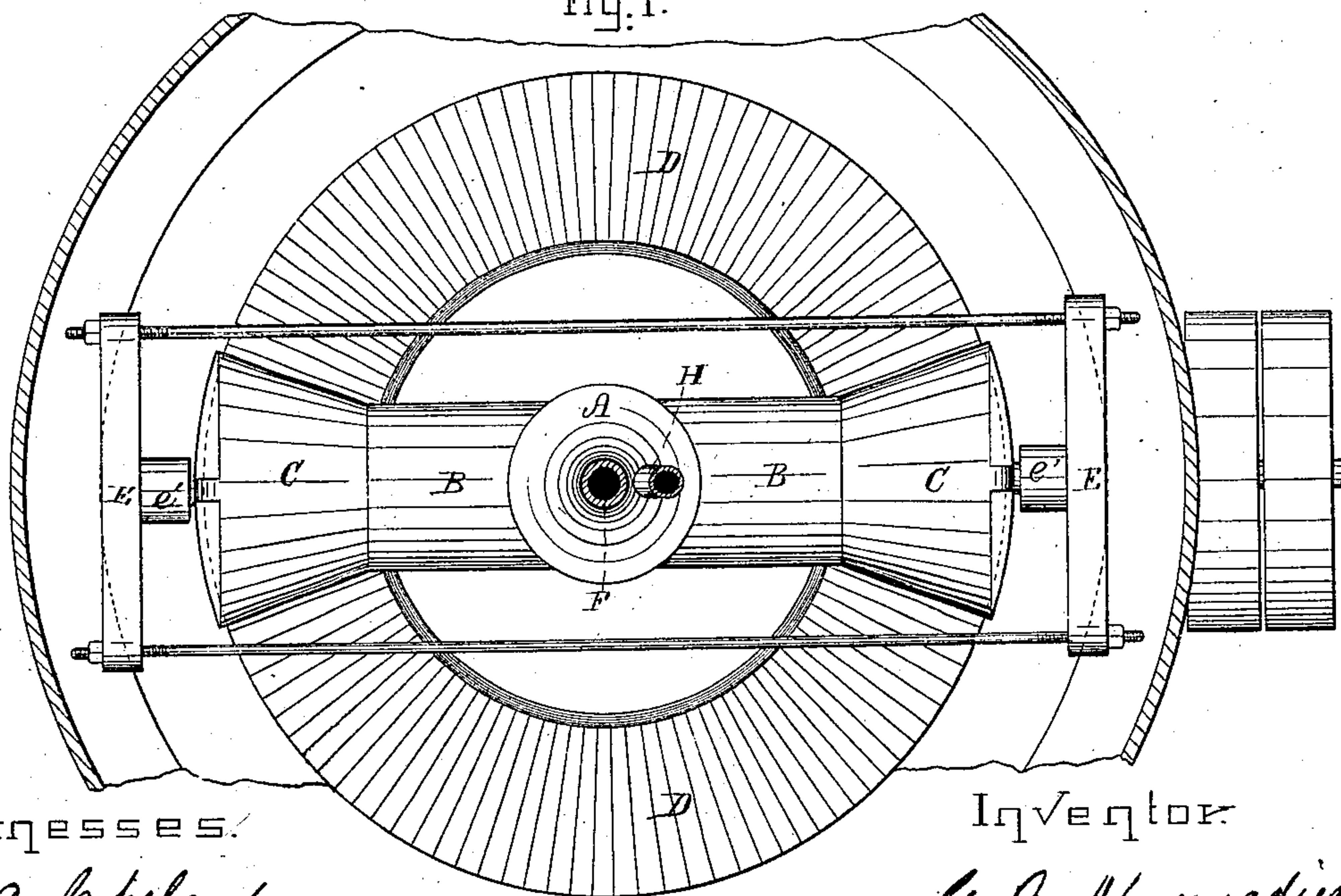


Fig. 2.

Witnesses:

Wm. A. Copeland.
John R. Snow.

Inventor:

G. B. Maynardier.

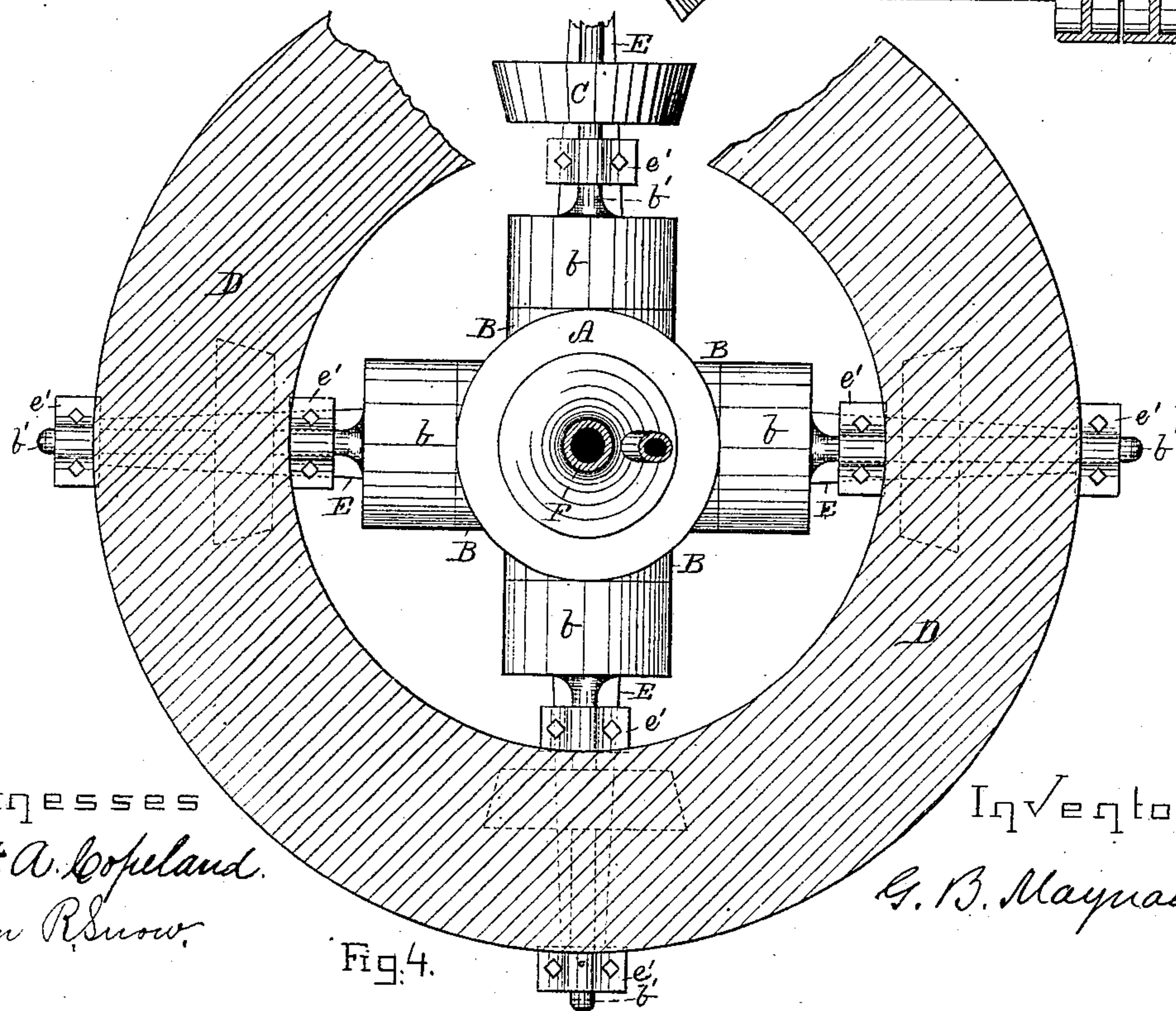
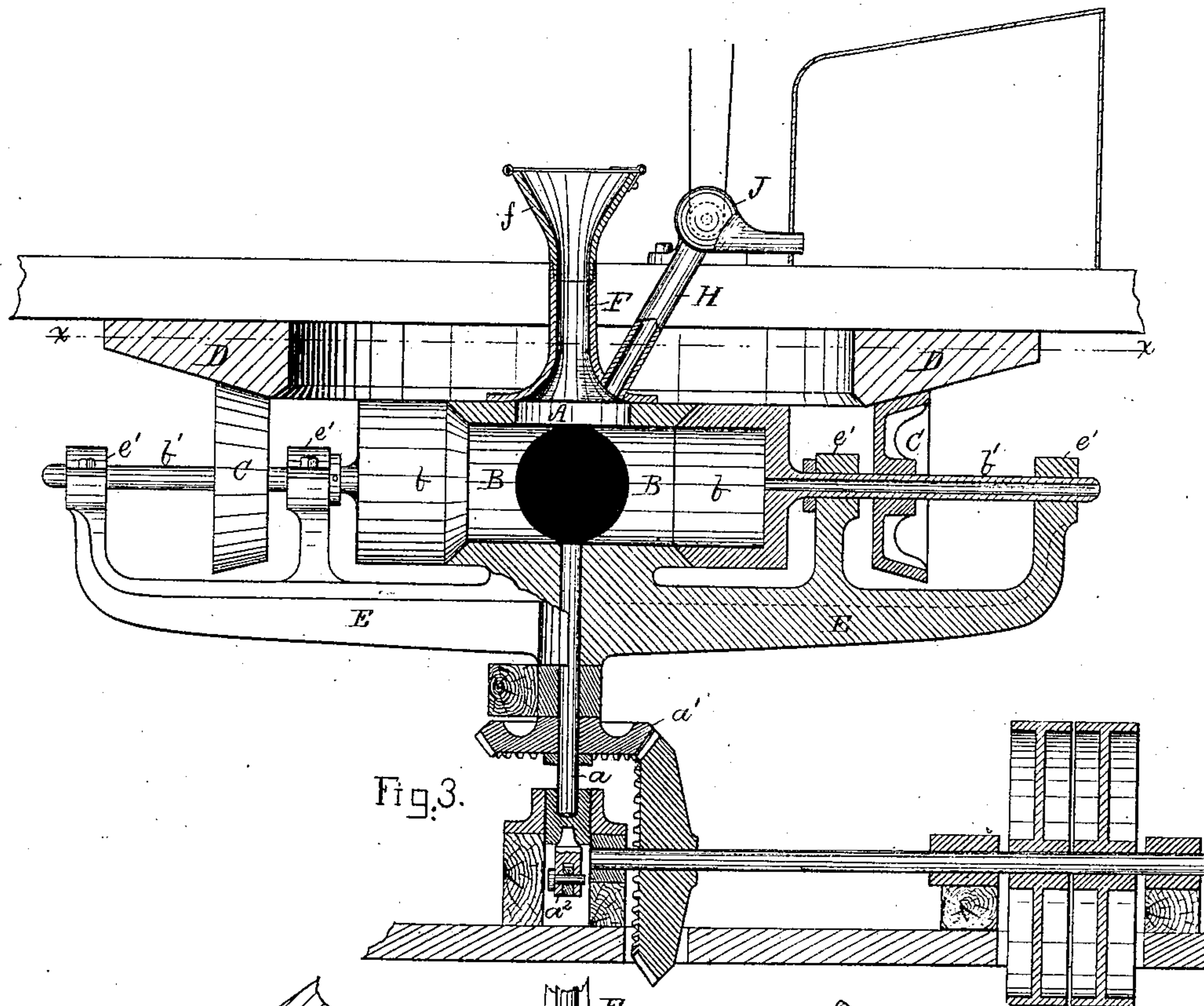
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John R. Snow.

Inventor
G. B. Maynardier.

UNITED STATES PATENT OFFICE.

GUSTAVUS B. MAYNADIER, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF
ONE-HALF TO WILLIAM H. CILLEY, OF SAME PLACE.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 284,648, dated September 11, 1883.

Application filed January 15, 1883. (No model.)

To all whom it may concern:

Be it known that I, G. B. MAYNADIER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

My invention consists, first, in the method of grinding, pulverizing, or disintegrating ores and other substances, which method consists in revolving the entire mass of the material on one axis, and in revolving portions of the material farthest from the center of revolution of the entire mass on other axes, and against the central portion of the entire mass; second, in a machine for grinding by such method, which machine consists of a hollow hub attached to and communicating with hollow arms, each hollow arm having an outer loosely-mounted end, forming a hollow head, and means for revolving the hollow hub and the loosely-mounted portions of the hollow arms.

In the accompanying drawings, which illustrate grinding-mills embodying my invention, Figure 1 is an elevation, partly in section, and Fig. 2 a plan below line *xx* of Fig. 1, of a mill having two hollow arms. Figs. 3 and 4 show a mill with four arms, Fig. 3 being an elevation, partly in section, and Fig. 4 a plan below line *xx* of Fig. 3.

It is obvious that the number of arms could be increased and arranged around the hub like the spokes of a wheel; but for general purposes the arrangements shown in the drawings are deemed preferable.

A is a hollow hub, provided with a shaft or axle, *a*, suitably mounted in boxes, and provided with a gear or pulley, *a'*, by means of which it may be rotated.

B are hollow radial arms attached to the hub A. These arms, instead of being at right angles to the shaft *a*, as shown in the drawings, may be set at a greater or less angle, so as to bring their outer extremities above or below the hub, like the dish of a wheel, so that the weight of the material might act with or against the centrifugal force; but the arrangement shown in the drawings is deemed the best, and better adapted for the average hardness of the different materials.

A loosely-mounted outer portion, *b*, of each of the hollow radial arms B fits either inside or outside of its hollow arm B. In order to revolve the loosely-mounted portions *b*, I have shown in the drawings a friction-gear consisting of a bevel-wheel, C, secured to each of the loosely-mounted portions *b*, and a larger fixed bevel-wheel, D. The wheel D acts upon the wheels C by the adhesion of its surface; but it is evident that toothed gears may be substituted for the friction-gear. To support and prevent the outer loosely-mounted portions *b* from flying off, arms or abutments E, provided with boxes *e'* to receive the shafts or spindles *b'* on each of the outer loosely-mounted portions *b*, are secured by rods, as in Figs. 1 and 2, or by being fixed to the hollow hub, as in Figs. 3 and 4.

A fixed spout, F, provided at its upper end with a hopper, *f*, serves to convey the material to the hollow hub A. A pipe, H, is connected to the lower end of the spout F, and leads to an exhaust-fan, J, which maintains a strong current of air through openings in the bottom of the hub A, the joints and interior of the machine. This air-current carries away the dust or flour as fast as it is produced by the grinding action of the particles against each other, and also from the joints between the arms and their loosely-mounted portions.

The spindles may be made hollow to admit air, or the air-inlets may be provided by openings through the head of each of the loosely-mounted portions *b*, as shown in Fig. 1.

In operation the hollow hub, with its radial arms, is caused to revolve. The material to be ground is introduced through the spout to the interior of the hollow hub, and is carried by centrifugal force to the outer loosely-mounted portions of the hollow arms until they as well as the hollow arms are filled. These outer portions are rapidly revolved by contact with the larger bevel-wheel, and communicate motion to the material within them, which acts against the material in the hollow arms (which is held out by centrifugal action) and rapidly disintegrates or pulverizes it.

I am aware that it is not new with me to utilize the material to be ground for the grinding-surfaces; and I am also aware that a mass

of the material has been revolved in a circular recessed head against another stationary compact mass. This latter arrangement is shown in Patents No. 255,550, March 28, 1882, and No. 269,481, December 19, 1882, to T. L. Sturtevant. In the mills shown in these patents the open end of the recessed head is entirely covered by a compact body of material, which prevents the centrifugal force of the revolving recessed head from properly throwing out the material and impedes the extraction of the dust. In my mill, hereinbefore described, the central body of the material, being rapidly rotated, rises at the sides and sinks at its center, owing to the centrifugal force with which the pieces or parts are driven from the center, and therefore tends to present only a layer of material to the open ends of the outer revolving heads, and allows the centrifugal action of these heads to throw out the material as rapidly as it is thrown into them by the centrifugal action of the revolving hub. By my method a more intimate mingling of and more rapid impact among the pieces or parts of the whole of the material are secured than is possible where one mass revolves against another stationary mass.

The whole mass being kept in a state of constant agitation, a free circulation is afforded for the air-blast to carry off the dust or flour, and no elevators nor other devices for carrying the dust to an exhaust-outlet are required.

I claim as my invention—

1. The method of grinding substances hereinbefore described, consisting in revolving the entire mass of the material on one axis, and in imparting a rapid additional revolving motion to portions of the material farthest from the center of revolution and against the central portion of the entire mass, substantially as set forth.

2. The improved grinding-mill hereinbefore described, consisting of a hollow hub attached to and communicating with hollow arms, an outer portion loosely mounted at the end of each of these hollow arms, and means, substantially as described, for causing the hub and the outer loosely-mounted portions of the arms to revolve, substantially as set forth.

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Witnesses:

JOHN R. SNOW,
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