

No. 631,291.

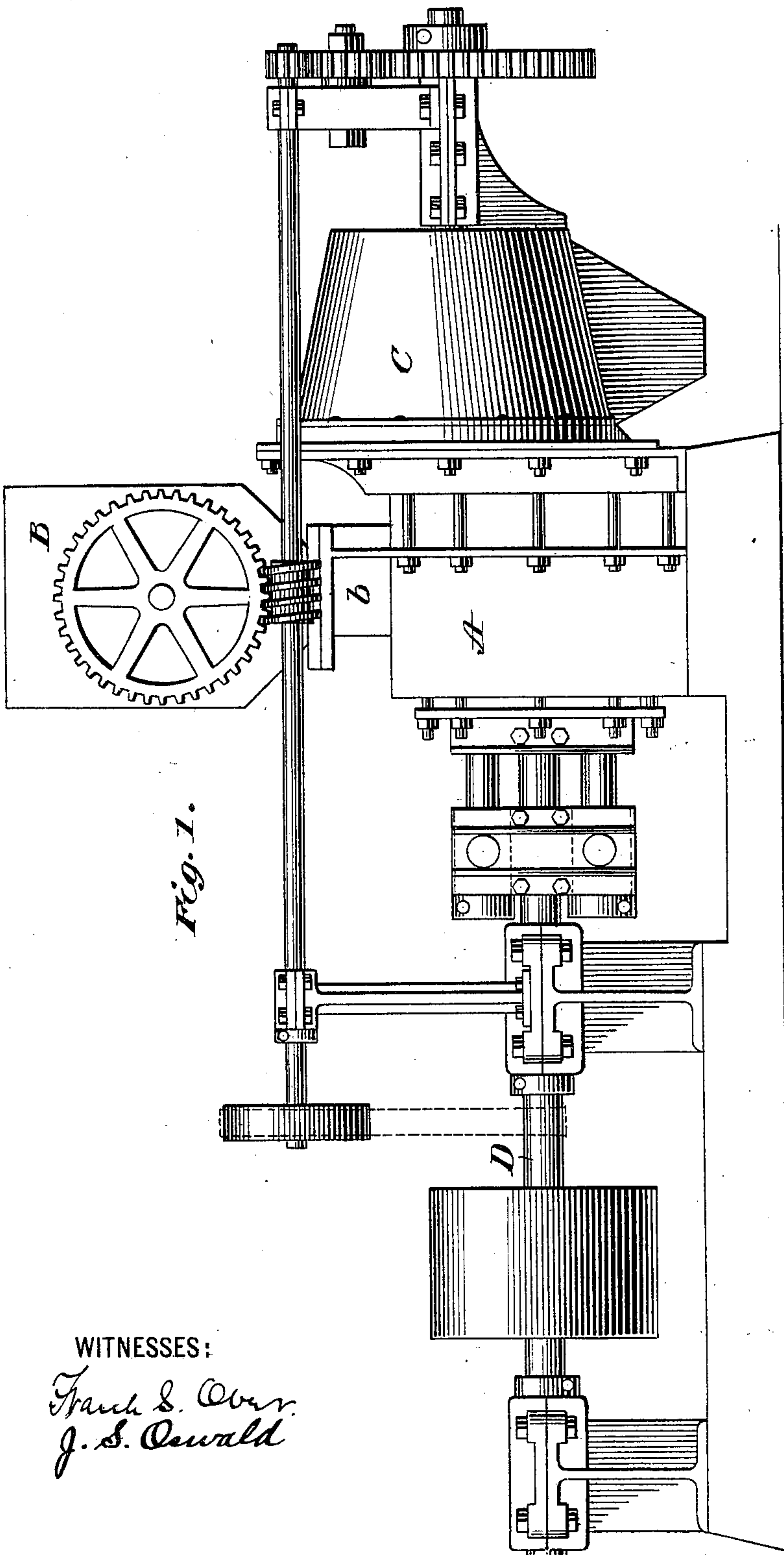
Patented Aug. 22, 1899.

G. FRISBEE.
PULVERIZING MACHINE.

(Application filed June 15, 1898.)

(No Model.)

6 Sheets—Sheet 1.



WITNESSES:

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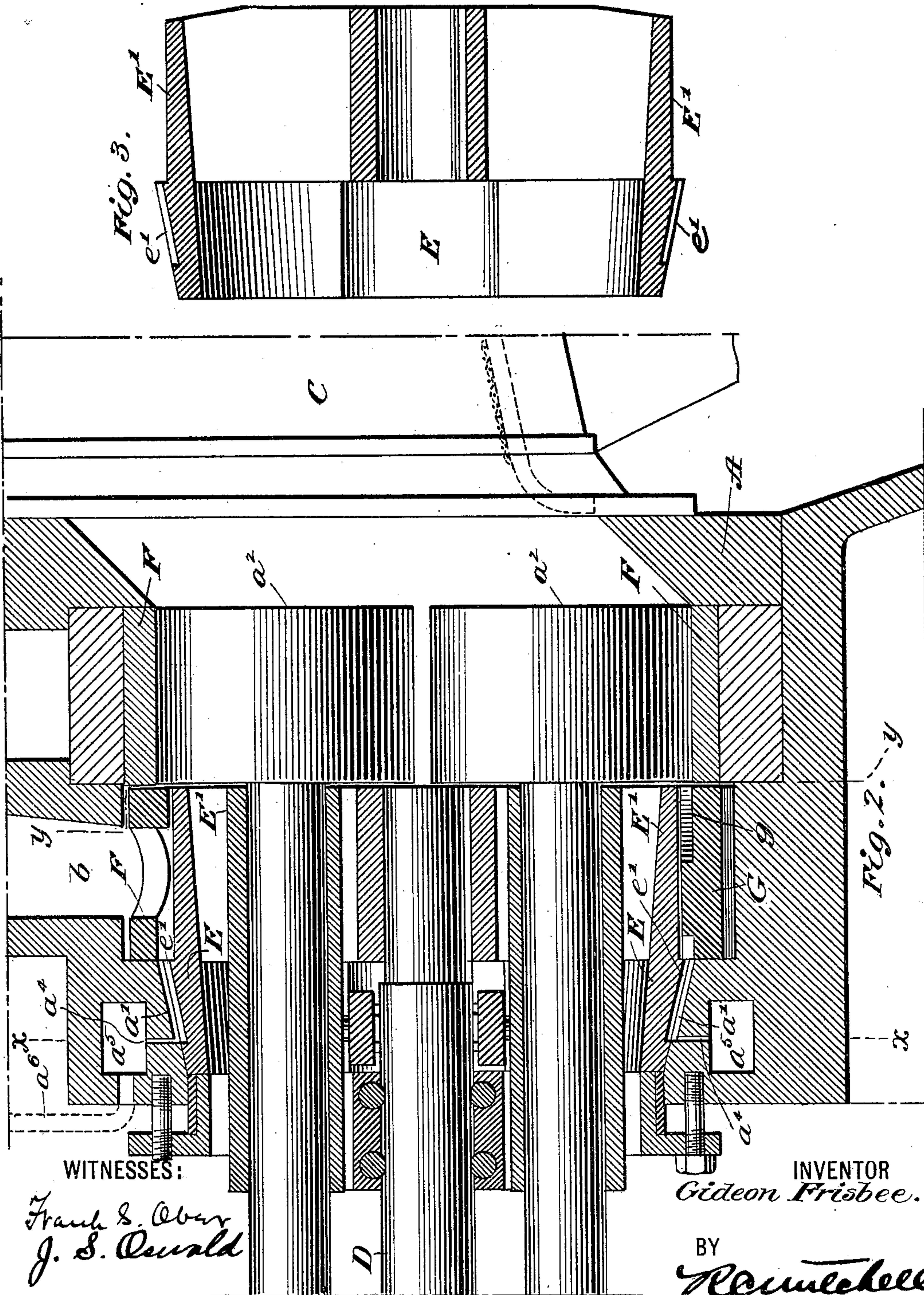
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6 Sheets—Sheet 2.



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Fig. 5.

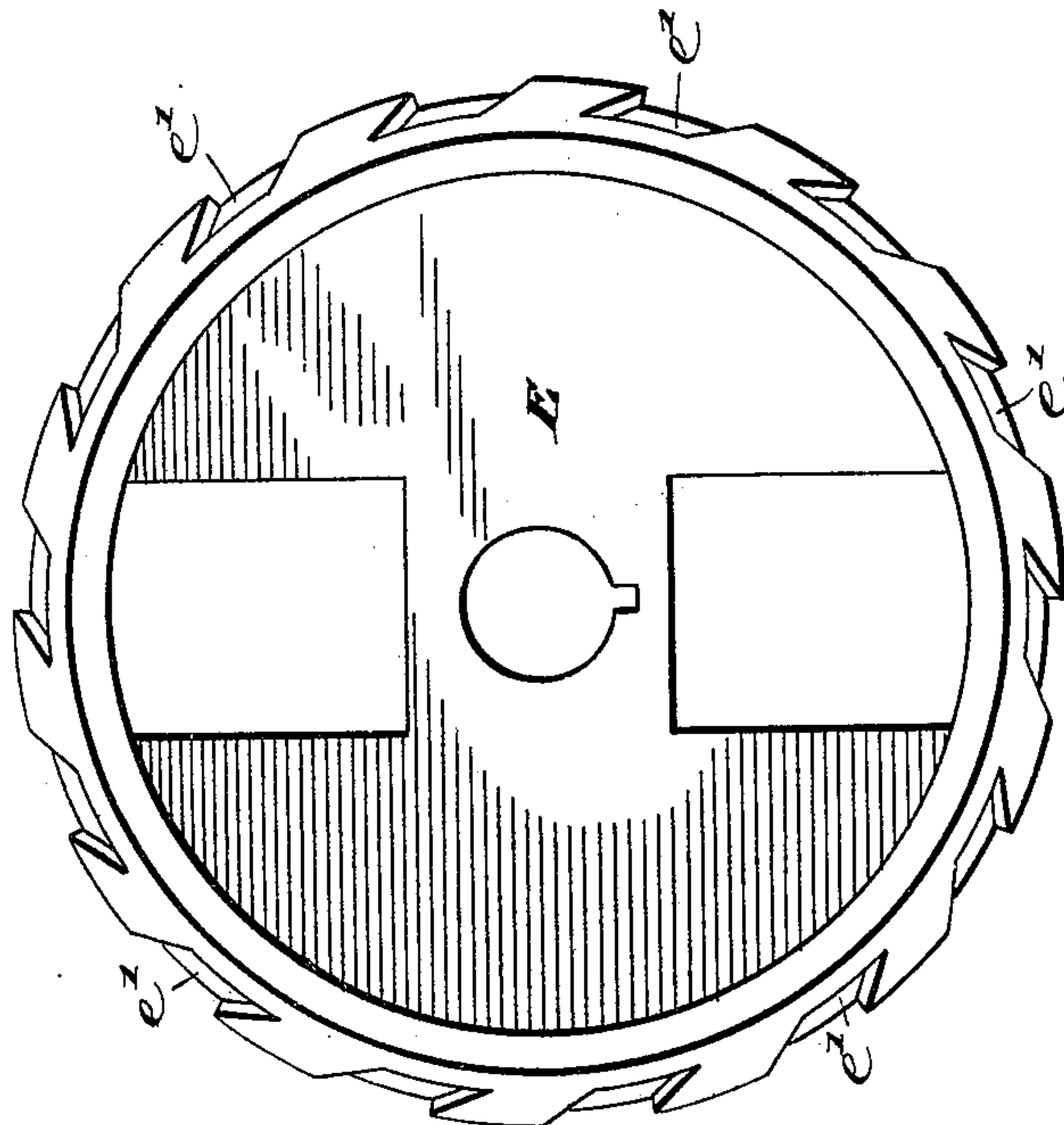
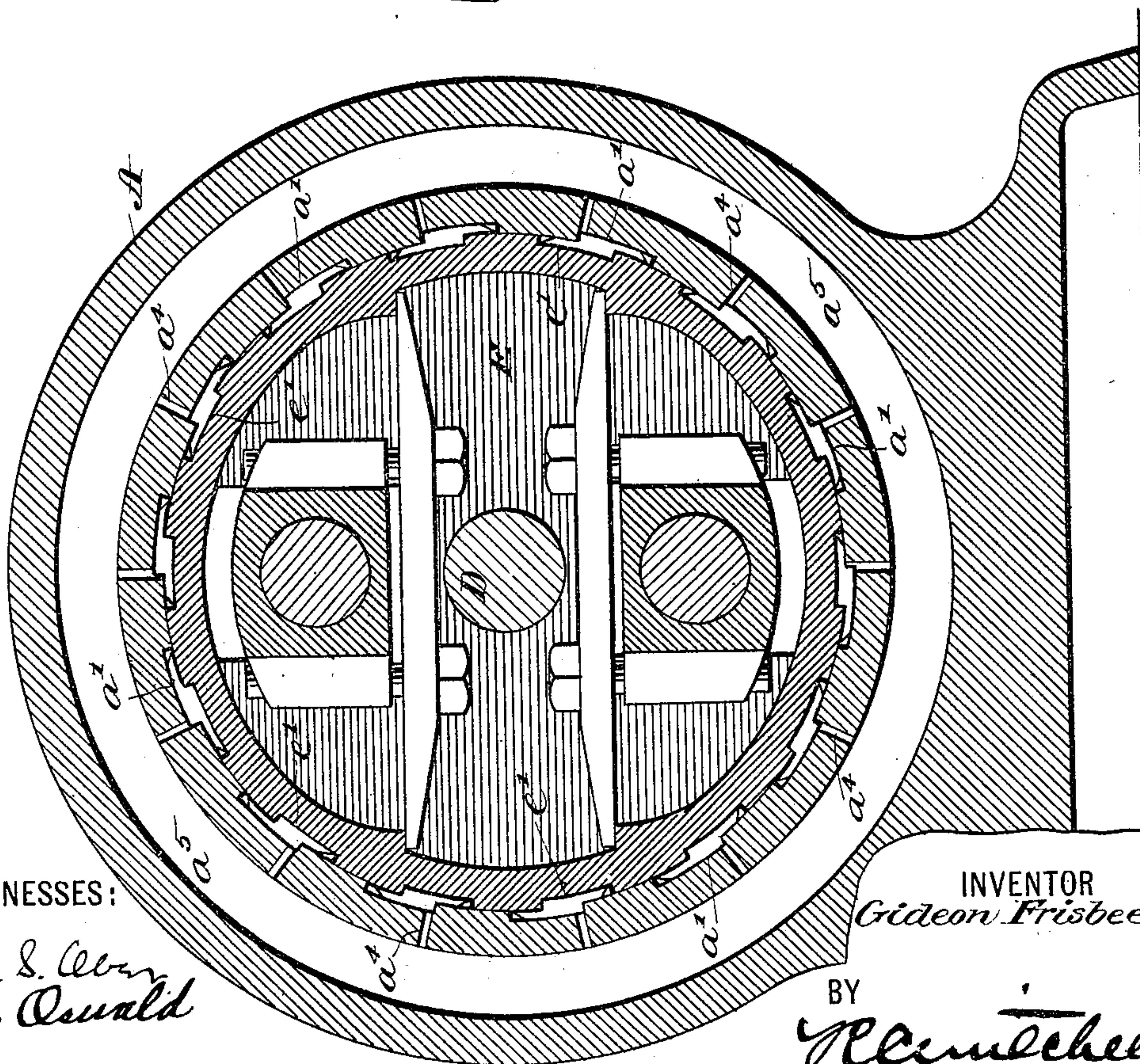


Fig. 4.



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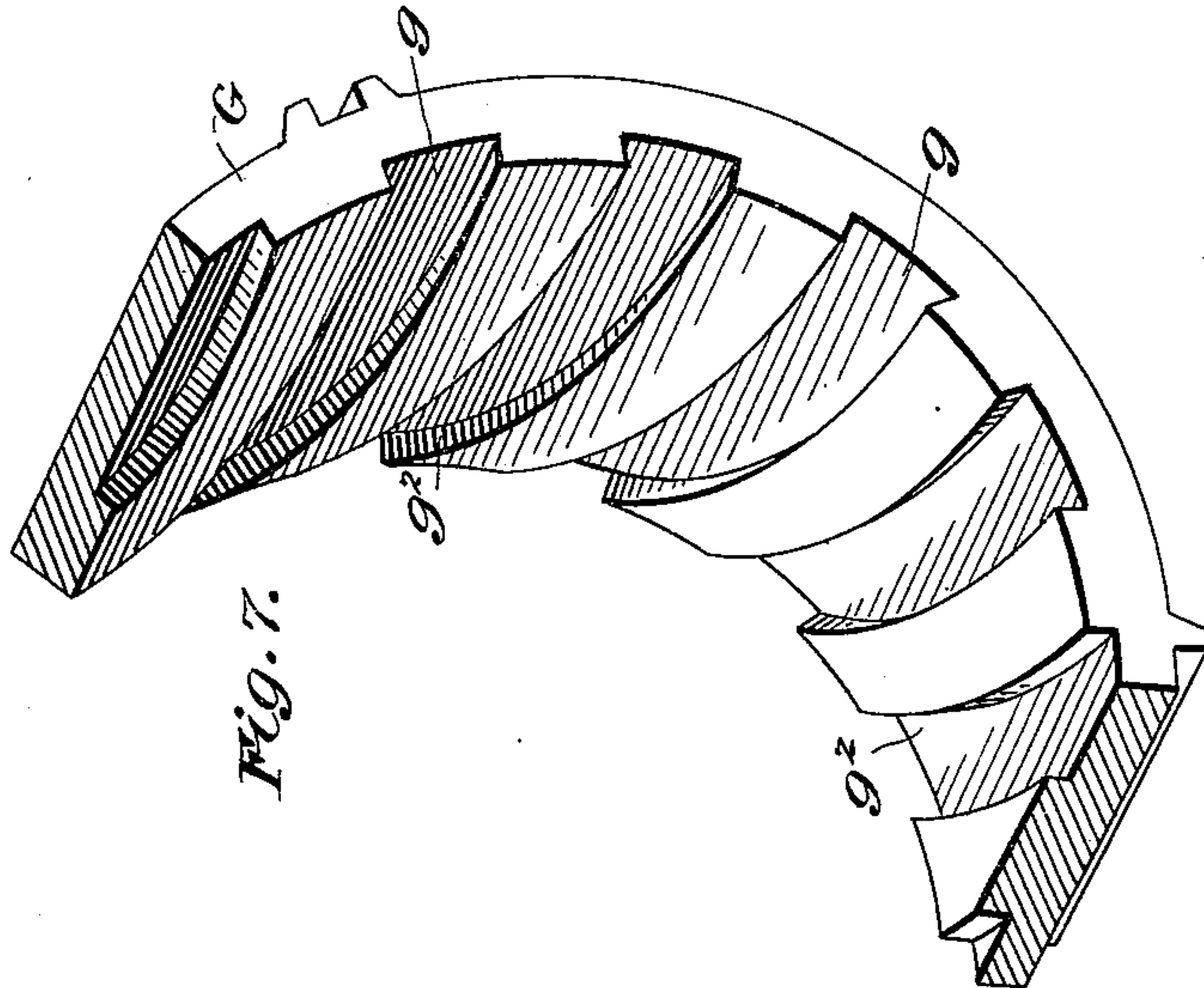


Fig. 7.

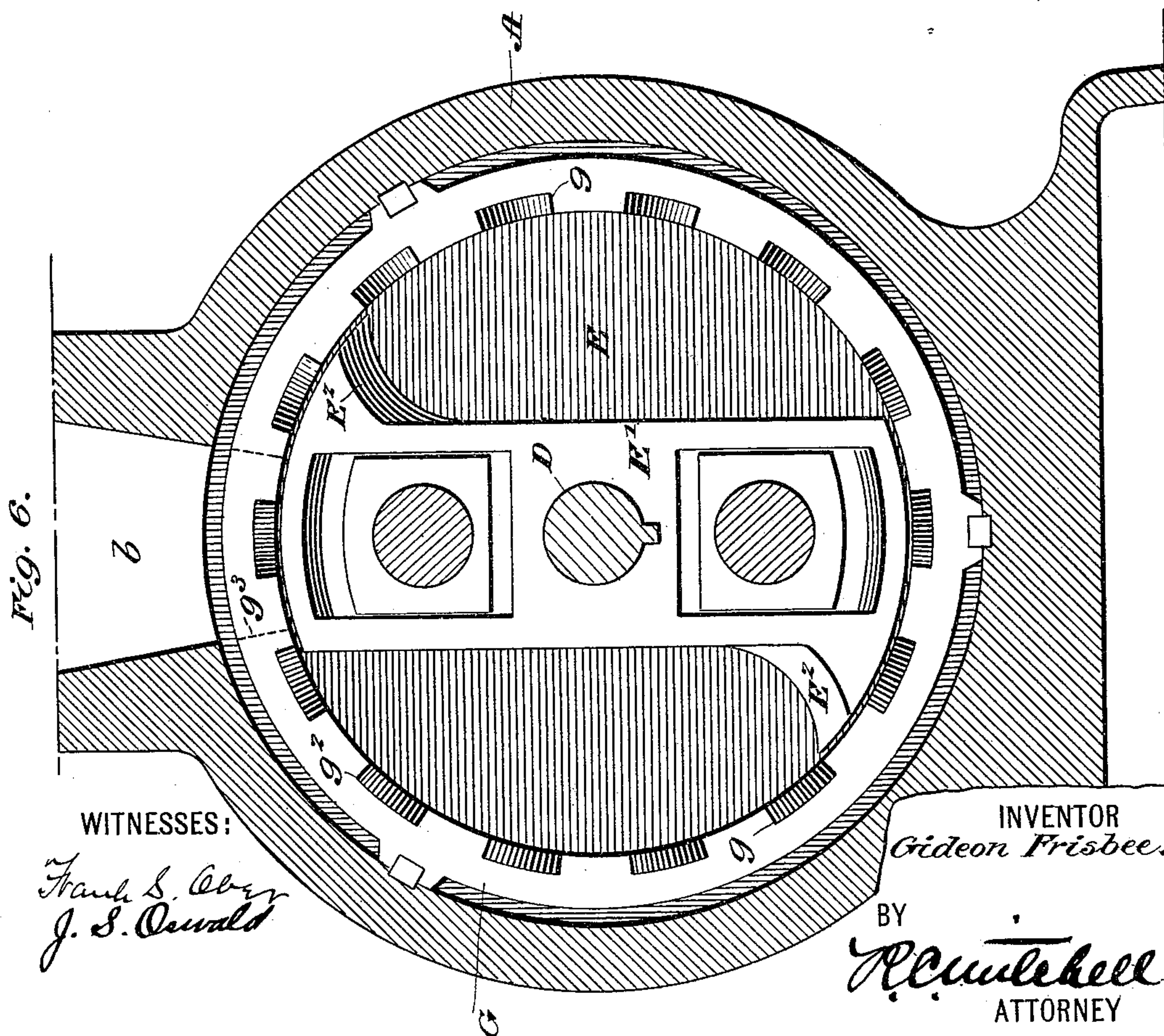


Fig. 6.

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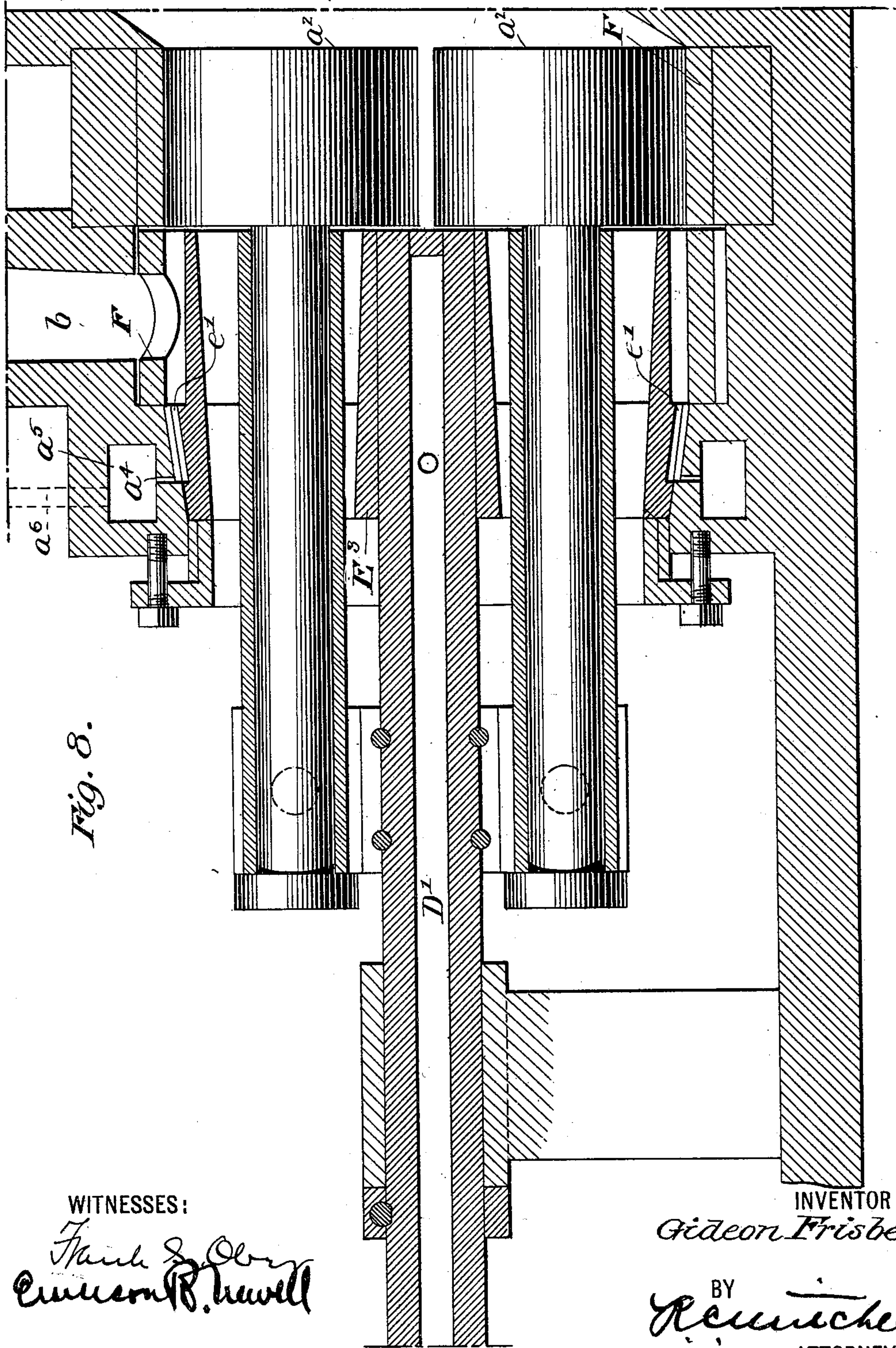
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6 Sheets—Sheet 5.



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Fig. 9.

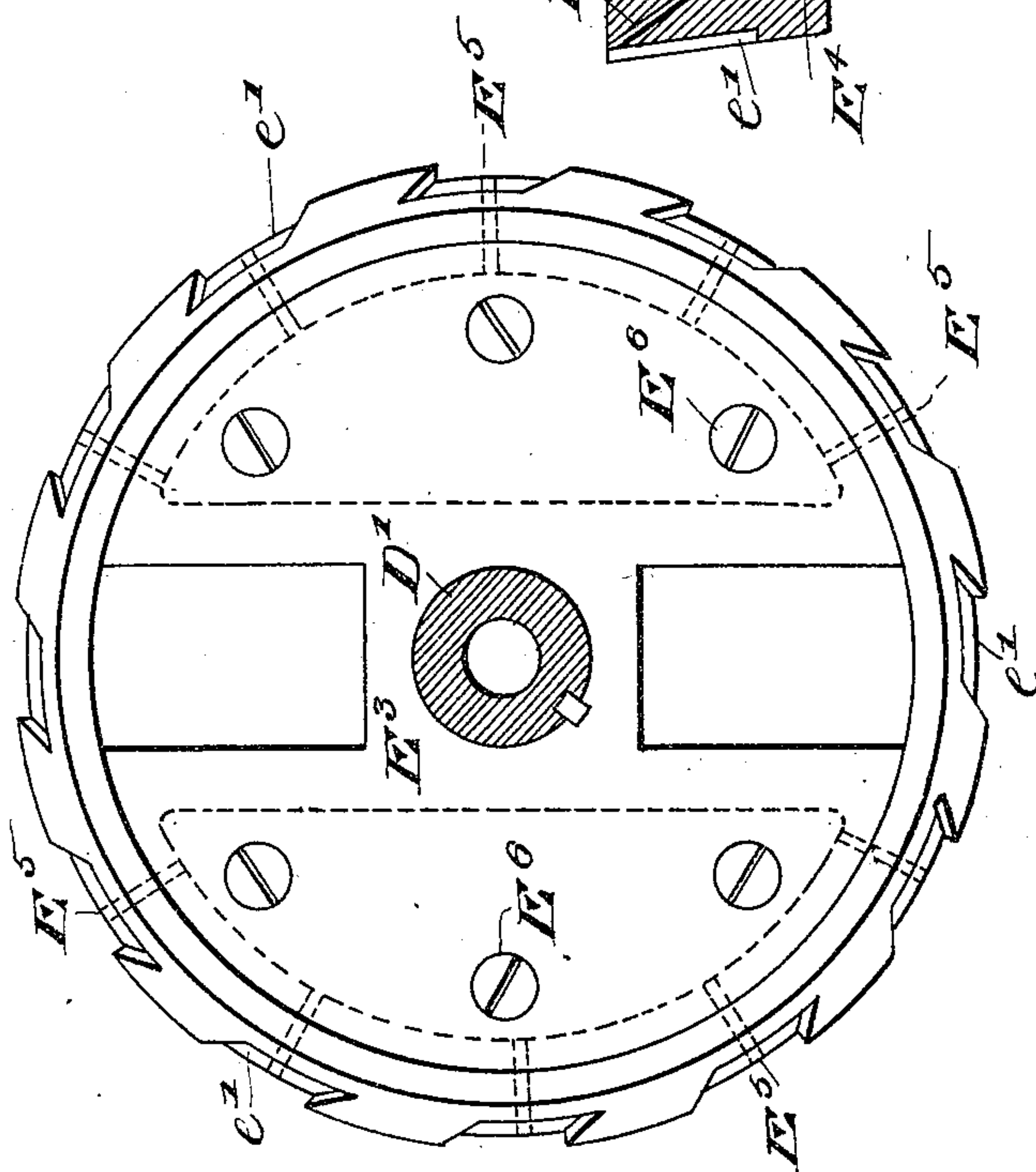
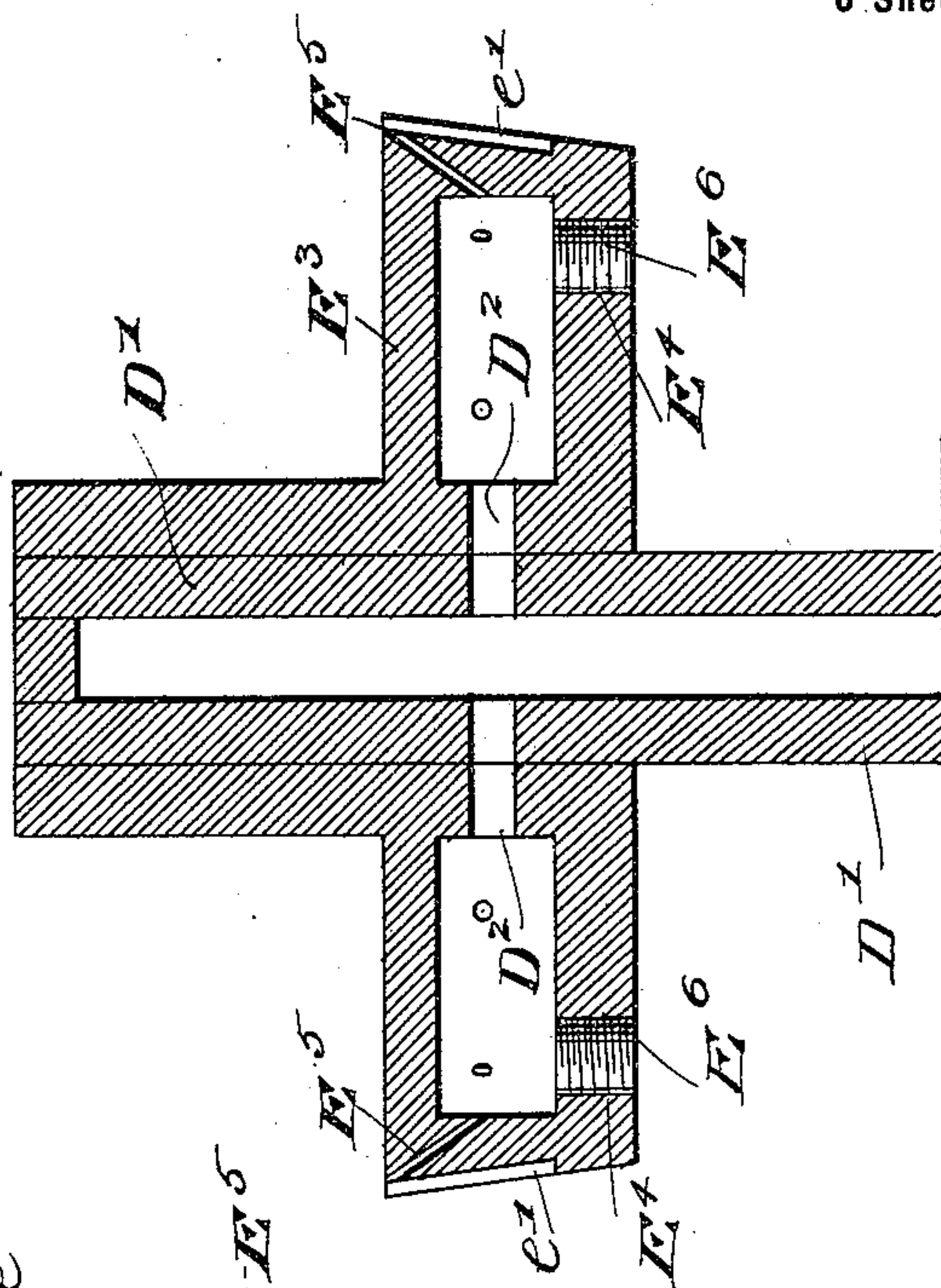


Fig. 10.



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UNITED STATES PATENT OFFICE.

GIDEON FRISBEE, OF PHILADELPHIA, PENNSYLVANIA.

PULVERIZING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 631,291, dated August 22, 1899.

Application filed June 15, 1898. Serial No. 683,537. (No model.)

To all whom it may concern:

Be it known that I, GIDEON FRISBEE, a citizen of the United States, residing at Philadelphia, Philadelphia county, in the State of Pennsylvania, have invented certain new and useful Improvements in Pulverizing-Machines, of which the following is a full, clear, and exact description.

This invention relates to machines for pulverizing ore, stone, and other similar substances; and it consists, primarily, in providing a novel mechanical means for feeding the material to be crushed to the pulverizing-rolls.

The main object herein is to combine with any suitable driving mechanism and screening device a pulverizing-chamber provided with simple and efficient means whereby the substances to be crushed are acted upon immediately on their entrance to the crushing-chamber by a force tending to keep the substances constantly moving toward and into the path of the crushing-rolls. By my invention I maintain a constant and steady feed of material from the supply end toward the discharging end of the machine. Thus any tendency of the material to clog or choke at the entrance is prevented. Furthermore, the particles of ore or stone are moved in one direction, and the contents of the pulverizing-chamber must therefore be ejected from the proper discharge apparatus, the direction of the blast being in that direction. As will hereinafter be seen, the machine may be run either wet or dry.

Referring to the drawings, Figure 1 is a side elevation of a device embodying my invention. Fig. 2 is a central vertical section of a portion of the same. Fig. 3 is a similar view of a detail. Fig. 4 is a view, largely in section, on the plane of the line $x\ x$, Fig. 2, and looking in a direction toward the upper end of the sheet bearing said Fig. 2. Fig. 5 is an end view in perspective of a detail. Fig. 6 is a view, largely in section, on line $y\ y$, Fig. 2, and looking in a direction toward the upper end of the sheet bearing said Fig. 2. Fig. 7 is a perspective view of a detail, partly in section. Fig. 8 is a relatively-enlarged section of a modified construction. Figs. 9 and 10 illustrate, respectively, side and cross-sectional elevations of details.

A represents the pulverizing-casing.

B is a hopper placed at the top of the ma-

chine, into which the material to be pulverized is first placed.

C is a discharging-chamber located at one end thereof and provided with suitable mechanism, the details of which are not shown in these drawings.

A main shaft D, suitably mounted and suitably driven, extends into the pulverizing-chamber A, and fixed thereon is the rotatable disk E, which forms a closing-head for that end of the pulverizing-chamber opposite the discharging-chamber C. Intermediate of the chamber C and the disk is located the crushing mechanism, which may be of any desired construction, but preferably consisting of a ring-die F in combination with a pair of rollers $a^2\ a^2$, the shafts of which pass through an opening in the disk E and are loosely mounted on trunnioned blocks carried by the main shaft.

As shown in the drawings, the periphery of the disk E is by preference beveled and stands in close proximity to the similarly-formed portion of the wall of the chamber C. The surface of the disk is provided with a series of recesses or grooves e' , inclined at a suitable angle, preferably about thirty degrees to the axis of the shaft D. The adjacent surface of wall A is similarly grooved, as shown at a' , the angle of these grooves, however, being inclined in a direction opposite to that of the grooves in the disk. The grooves a' communicate by ports a^4 with the annular chamber a^5 , which in turn communicate with the air or water supply a^6 . (See Fig. 2.)

To the rear of the grooved periphery of the disk E and adjacent to its outer edge is an extension E' , having an inclined face E^2 , directed toward the axis of rotation of said disk. Surrounding this extension is the stationary ring G, provided with a series of oblique channels g , of by preference a gradually-increasing pitch. The ring G stands under the feed-supply chute b and is cut away at g^3 to allow the passage of material from the hopper B to the chamber A.

The operation is as follows: The main shaft and its attached parts are rotated at a high rate of speed in the direction of the arrow. The grooves a' being rapidly cut across by the grooved surface of the disk E, a current is directed from the annular chamber a^5 toward the pulverizing-chamber of the machine. Material—such as ore, stone, &c.—

entering the chamber A is caught by the disk E and whirled therewith into the path of the crushing-rolls. The current of air or water caused by channeled paths in the parts A E passing through this mass may carry the particles which are sufficiently fine directly to the discharging-chamber C and force the heavier particles, as above described, within the path of the crushing-rollers. This operation is greatly facilitated by the action of the inclined-faced projections E² and the curved channels g, as will be readily understood. When the material is reduced to its proper degree of fineness, it is blown into the chamber c, and if sufficiently fine passes out of the machine through suitable mechanism located therein.

Figs. 8, 9, and 10 illustrate a slightly-modified construction, in which the rotatable disk in its modified form is lettered E³. This disk is hollow, as indicated in Figs. 9 and 10, and in one side I provide openings E⁴. Leading outwardly from the chamber within the casing are outlet-holes E⁵, by preference diagonally arranged, so as to have their outer ends lead into the obliquely-arranged grooves in the periphery of the disk, which may be arranged as previously described. This hollow rotatable disk is mounted upon a hollow shaft D' in place of the solid shaft previously referred to, and ports D² connect the opening in the shaft D' with the space within the casing E³. The openings E⁴ in the casing may be, if desired, provided with plugs E⁶. When it is desired to run the machine dry—that is, to make a dry pulp or powder—the plugs E⁶ are removed to allow the free circulation of air within the casing. As these plug-holes are nearer the center than the outlets E⁵, the rapid rotation of the disk E³ will cause a current of air to flow outwardly through said openings E⁵, and thus supplement the draft of air supplied through the openings in the stationary ring G, previously alluded to. When it is desired to run water instead of air into the pulp, the plugs E⁶ are inserted and water is allowed to flow into the hollow shaft and thence into the chambered rotatable disk E³. As this chambered disk is rapidly rotated the centrifugal action causes the water to naturally flow through the outlets E⁵ in a direction to supplement the force occasioned by the obliquely-arranged grooves.

It is obvious that in carrying out my invention slight changes in the particular construction shown and described may be desirable. I would therefore have it understood that I do not limit myself to the particular means shown, but hold myself at liberty to make such alterations and changes as are fairly within the spirit and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. In a pulverizing-machine, a die, a crushing-roller, a rotatable disk back of said die and closing one end of the pulverizing-chamber against the discharge of pulverized mate-

rial, grooves formed in the periphery of said disk, an external casing around the pulverizing-chamber and disk, grooves on the interior surface of said external casing adjacent to the grooves in the disk, the former grooves being arranged at an angle relatively to the latter, whereby a current is created.

2. The combination of a pulverizing-chamber having an open end and a series of grooves on the internal surface thereof, of a rotatable disk closing the opening at one end of said chamber and formed with a series of oblique grooves in its peripheral face, said grooves being closed at one end and cooperating with the grooved surface first mentioned, whereby a current is created.

3. In a crushing or pulverizing machine, a ring-die, crushing-rollers, a rotatable disk at one end of the pulverizing-chamber, a series of obliquely-arranged grooves on the periphery thereof, said grooves being closed at one end, and a series of grooves in a stationary part adjacent the first-mentioned grooves but arranged at a relatively different angle, substantially as and for the purpose described.

4. In a pulverizing or crushing machine, the combination of a rotatable disk having inclined-faced projections thereon adjacent to its outer edge and directed toward the axis of rotation of said disk, with a spirally-grooved stationary ring surrounding said disk, said grooved portion of the latter being out of the path of movement of said projections.

5. In a pulverizing or crushing machine, a rotatable disk, inclined-faced projections thereon adjacent its outer edge in combination with a stationary spirally-grooved ring surrounding said disk, the grooves in said ring being out of the path of movement of said projections and with grooves in the outer face of said disk opposite the grooves in said stationary ring but arranged at an opposite inclination.

6. In a pulverizing or crushing machine the combination of a revoluble disk having a series of grooves in the periphery thereof, a series of grooves in a fixed frame adjacent thereto, a cam projection also carried by the disk, and a spirally-grooved ring in line and adjacent to said projections.

7. In a pulverizing-machine the combination of a hollow revoluble disk having obliquely-arranged grooves at its outer periphery, ducts connecting the said grooves with the chamber within said disk, and an inlet to said disk, substantially as described.

8. In a pulverizing-machine, a hollow rotatable shaft carrying a hollow revoluble disk, an inlet from the opening in the said shaft to the chamber within said disk, ports in the side of said disk and ducts leading from said chamber to the grooved periphery, substantially as described.

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