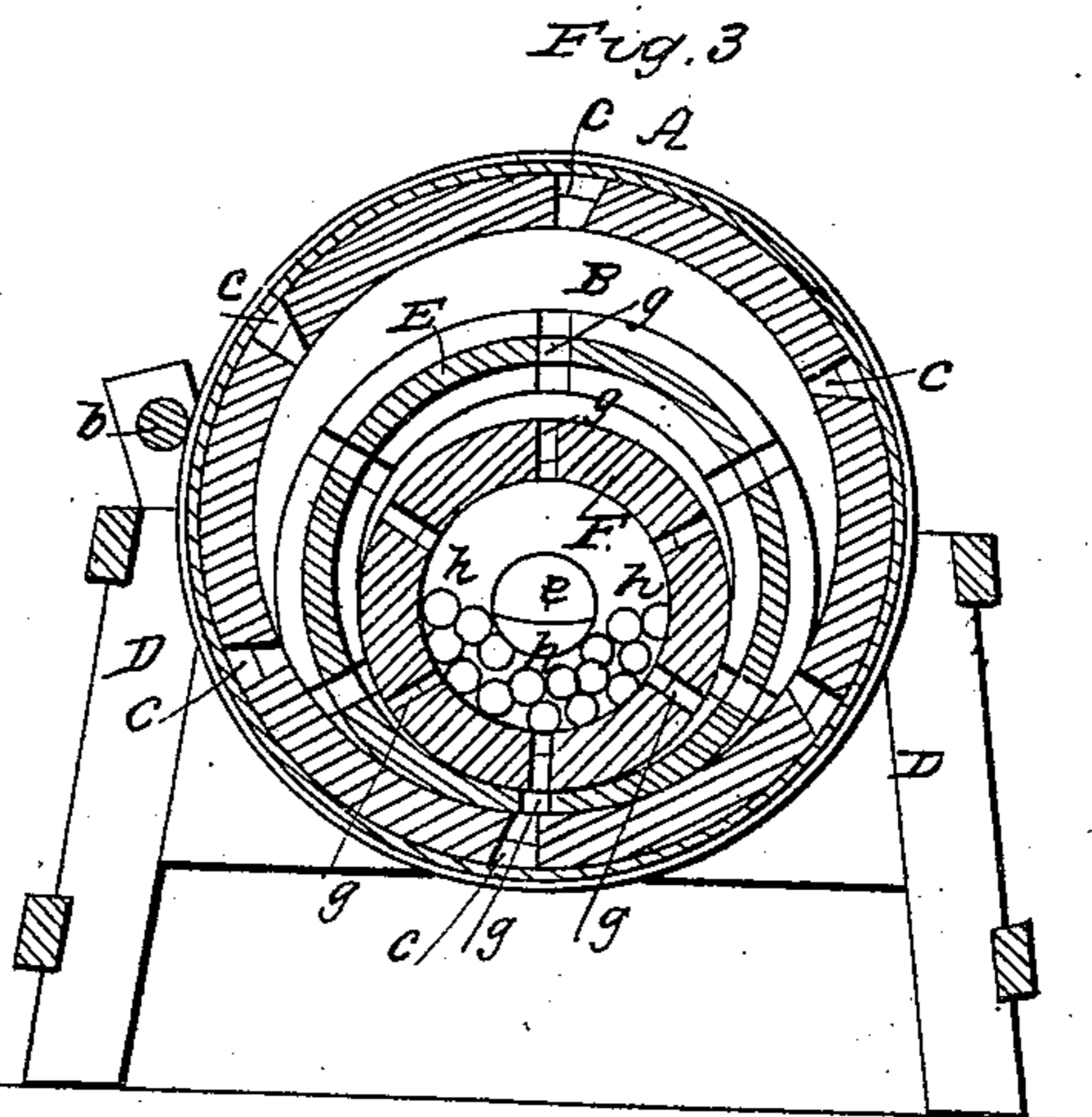
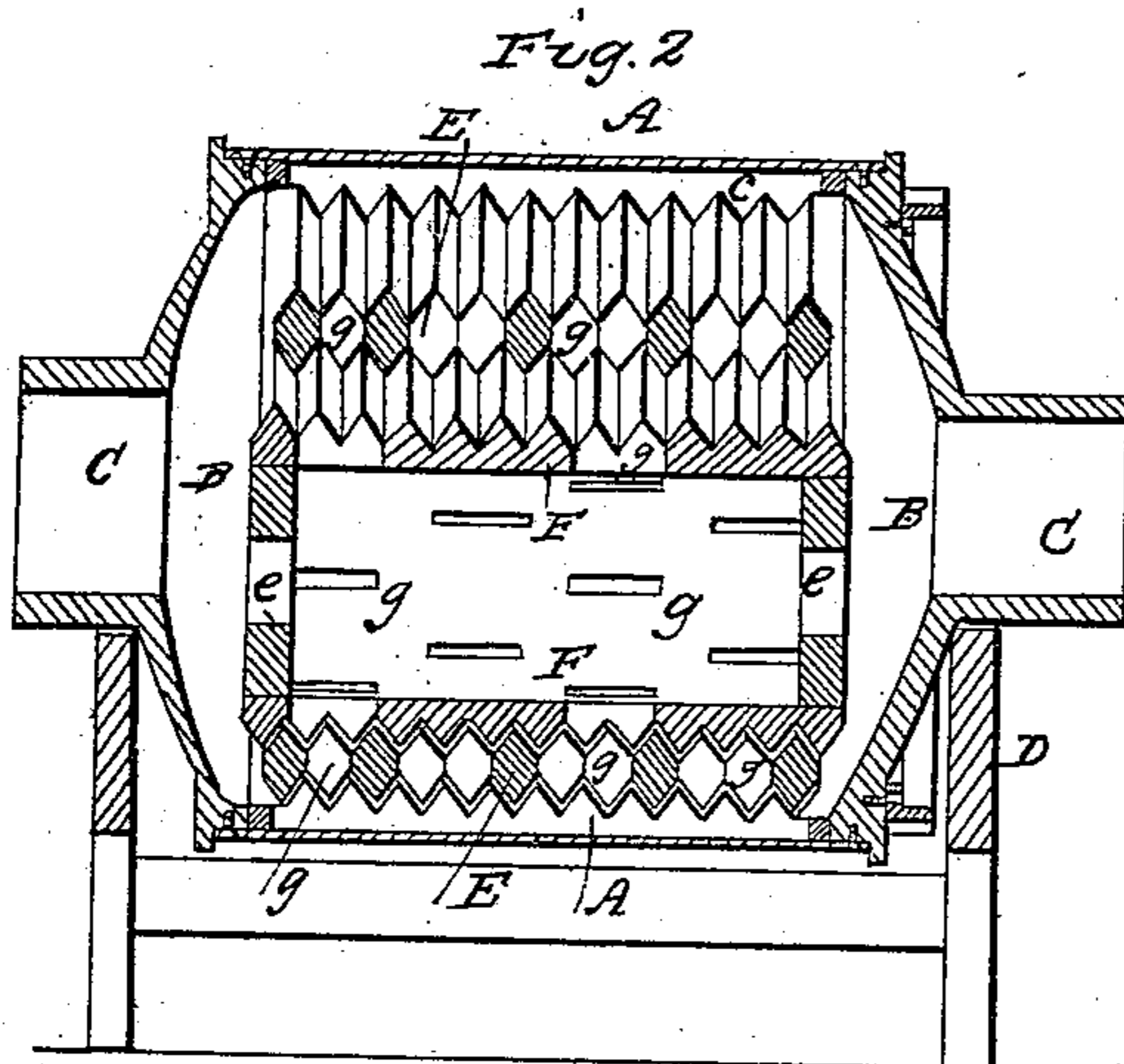
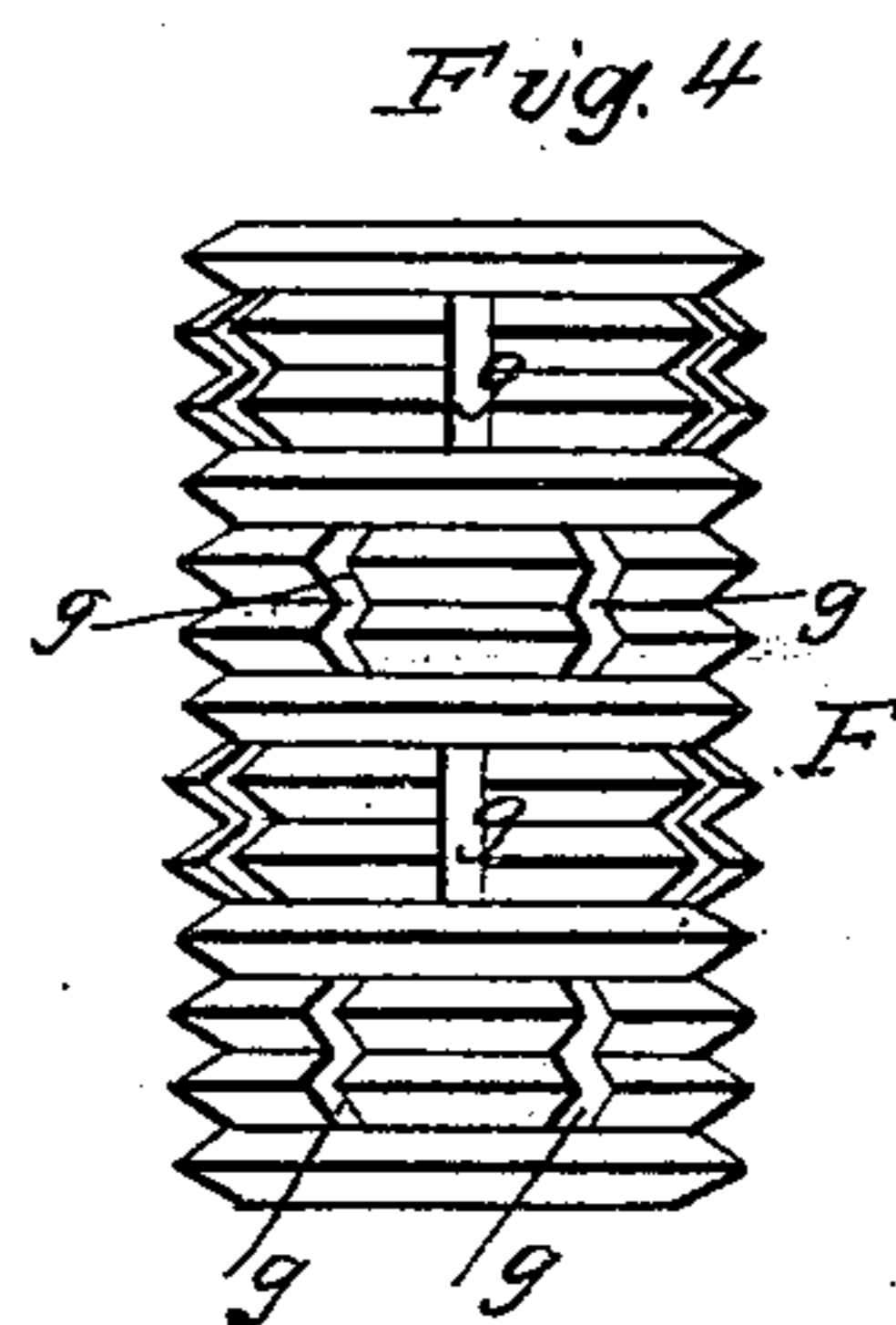
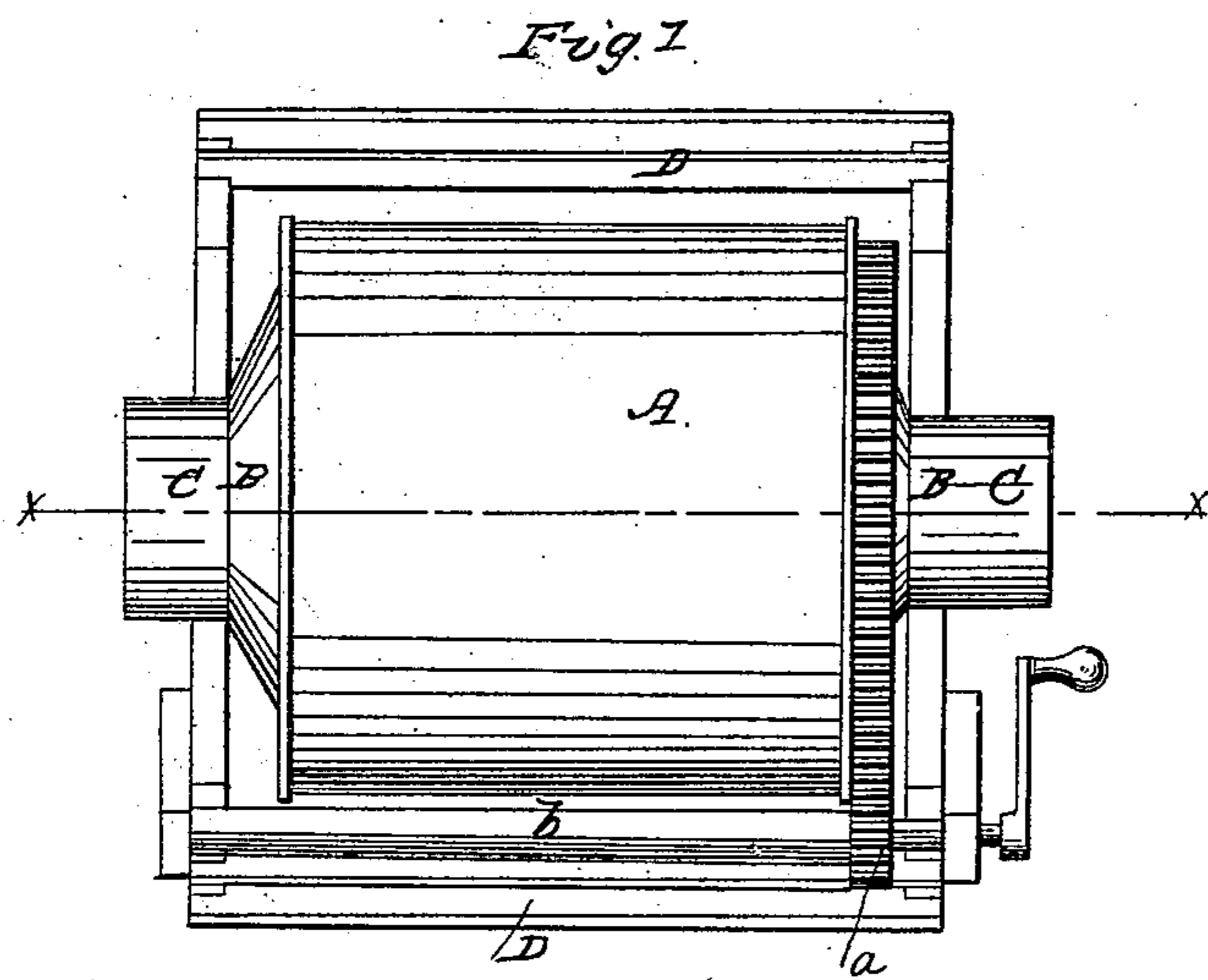


SCOVILLE, GATES & FRASER.

Quartz Mill.

No. 59,463.

Patented Nov. 6, 1866.



WITNESSES

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UNITED STATES PATENT OFFICE.

H. H. SCOVILLE, P. W. GATES, AND D. R. FRASER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN QUARTZ-MILLS.

Specification forming part of Letters Patent No. 59,463, dated November 6, 1866.

To all whom it may concern:

Be it known that we, H. H. SCOVILLE, P. W. GATES, and D. R. FRASER, of Chicago, in the county of Cook and State of Illinois, have invented a Machine for Pulverizing and Amalgamating; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a top view of the machine. Fig. 2 is a vertical section taken longitudinally through the center of the machine. Fig. 3 is a transverse section taken in the vertical plane indicated by red line *yy*. Fig. 4 is an exterior view of the inner cylinder.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to an improvement on machinery which is particularly designed for pulverizing and reducing to an impalpable powder substances containing precious metals, for the purpose of effecting a more perfect separation of such metals by a subsequent process.

The nature of our invention consists in arranging within a revolving cylinder a series of corrugated cylinders in such manner that the latter shall roll loosely one upon another and operate upon the substances with a grinding and crushing action, as will be hereinafter described.

The invention also consists in so constructing cylinders or rings, which are arranged to roll freely within a revolving cylinder, that the quartz shall be carried upward and discharged through the cylinders from the largest to the smallest during the grinding and crushing operation, thus subjecting the quartz or substance to be reduced to the action of the several cylinders, as will be hereinafter described.

To enable others skilled in the art to understand our invention, we will describe its construction and operation.

Before subjecting argillaceous substances containing precious metals to the separating process, or the process of amalgamation, it is important to reduce such substances to a fine powder, so as to expose the fine particles of metal as much as possible to the action of mercury or lead, if the latter be preferable. The ordinary quartz crushers and grinders

will not reduce the quartz to the fineness required, and for this reason we propose to re-grind the substances after they have passed through the crushers.

In the accompanying drawings, A represents a revolving cylinder, having bulging or concavo-convex heads applied to its ends in any suitable manner. These heads B B are constructed with central tubular journals, C C, which are supported upon a frame, D, so that the cylinder, with its heads, can be easily rotated. For the purpose of rotating said cylinder a toothed ring, *a*, may be applied concentrically to one of the heads of the cylinder and engaged with a pinion spur-wheel, *a'*, which is on a horizontal driving-shaft, *b*. By rotating this shaft *b* the cylinder A will receive a revolving motion. The inner surface of this cylinder is corrugated, as shown in Fig. 2. The corrugations, or elevations and depressions, pass around the cylinder at right angles to its axis of motion, and at certain intervals grooves *c*, running in a direction parallel to the axis of the cylinder, are formed, which constitute buckets for elevating the crushed substance from the lowest point of the cylinder and discharging the same from the highest point of this cylinder.

The corrugations above mentioned may be made angular in cross-section, or they may be made up of curved surfaces.

Within the cylinder A is a smaller cylinder, E, whose inner and outer surfaces are corrugated, as shown in Fig. 2; and within this cylinder E is still another cylinder, F, whose outer surface only is corrugated and whose ends are closed, except at *ee*, which are central apertures for the escape of the finely-ground substances. These inner cylinders, E F, have no axial support, but are allowed to roll freely, when the outer cylinder is rotated, by their own gravity, as shown in Figs. 2 and 3.

The corrugations of the cylinder E correspond with and fit into the corrugations of the outer cylinder, and the corrugations of the cylinder F fit into those which are formed on the inner surface of the cylinder E. By multiplying these cylinders it will be seen that the grinding-surfaces may be increased indefinitely; but for all ordinary purposes, or for illustrating our invention, two inner cylinders will answer, as shown in the drawings.

We make oblong openings *g g* through the

inner cylinders, E F, which form buckets for elevating the substances being ground and discharging these substances again through them. In this way and by these means the quartz will be subjected to the crushing and grinding action of the outer cylinder, A, and inner cylinder, E, when first put into the machine. Then these substances will be discharged through the openings *g* of the cylinder E and subjected to the action of the cylinder F, after which the substances will be discharged through this cylinder, to be carried off through its ends or to be further acted upon by a number of iron balls, *h*. (Shown in Fig. 3.)

By this arrangement of perforated cylinders the quartz in its coarsest state will be acted upon by the most powerful crusher, and as the powder is reduced in fineness it will be acted upon by a less powerful crusher.

For dry grinding and crushing we employ a suction or blast fan for carrying off the particles as soon as they become light enough; but for wet-crushing a stream of water is conducted through the machine, so as to float off the particles as rapidly as they are reduced to such a degree of fineness as will allow them to float in the water.

The balls which are represented in Fig. 3 may be dispensed with, as the pulverized substance will escape from the inner cylinder, F, back to the cylinders surrounding it and be reground, if in its first passage through the cylinders it is not sufficiently ground.

We do not confine our invention to the use of the machine herein described for regrinding or pulverizing argillaceous substances, as it may be employed advantageously for mixing pulverized substances containing precious metals with mercury or lead in the operation of amalgamation or separation of the fine metal from its matrix.

The rings or cylinders E F may be constructed of segments of chilled iron, and the corrugated surface or lining of the outer cylinder, A, may be constructed also of chilled-iron segments.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The corrugated cylinder A, constructed so as to revolve and elevate the quartz or other substances, in combination with one or more hollow cylinders, such as E and F, which are corrugated and perforated circumferentially, so as to admit and conduct the quartz or other substances, after they have been elevated, into and out of the chambers of such cylinders as E and F, the cylinder A having hollow journals and the cylinders E and F having an opening in each end, so that the quartz may be fed in and discharged continuously, all substantially as set forth.

2. A corrugated cylinder, E or F, perforated entirely through its shell, substantially as and for the purpose described.

3. The construction and arrangement of the cylinders A E F so that the substances to be operated upon are free to pass through the circumferences of the cylinders E and F, and are subjected to a grinding and crushing action between the said cylinders A, E, and F, substantially as described.

4. Constructing the corrugated lining of the cylinder A, which has axial supports, with cups or channels *c*, substantially as and for the purpose described.

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Witnesses:

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