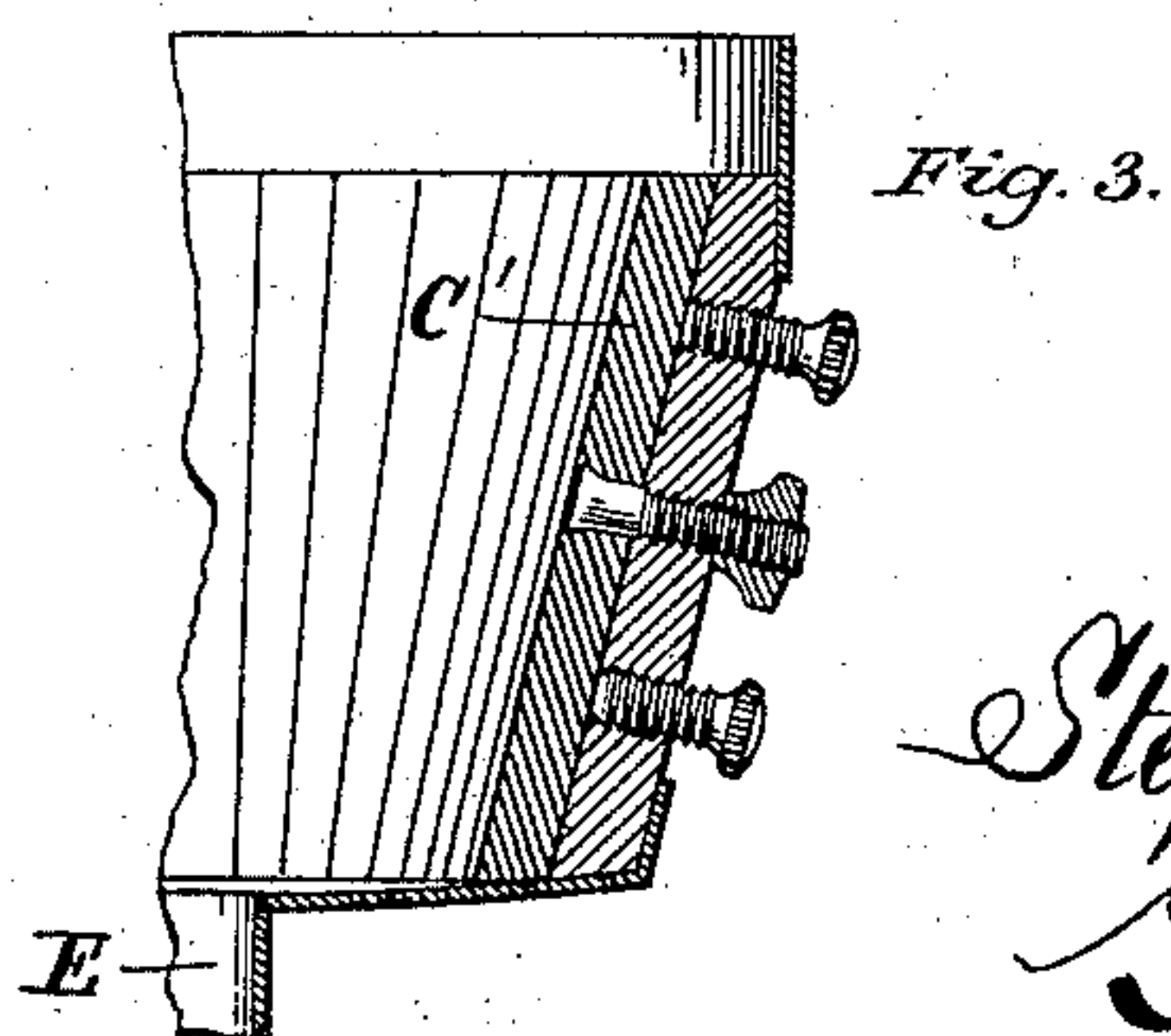
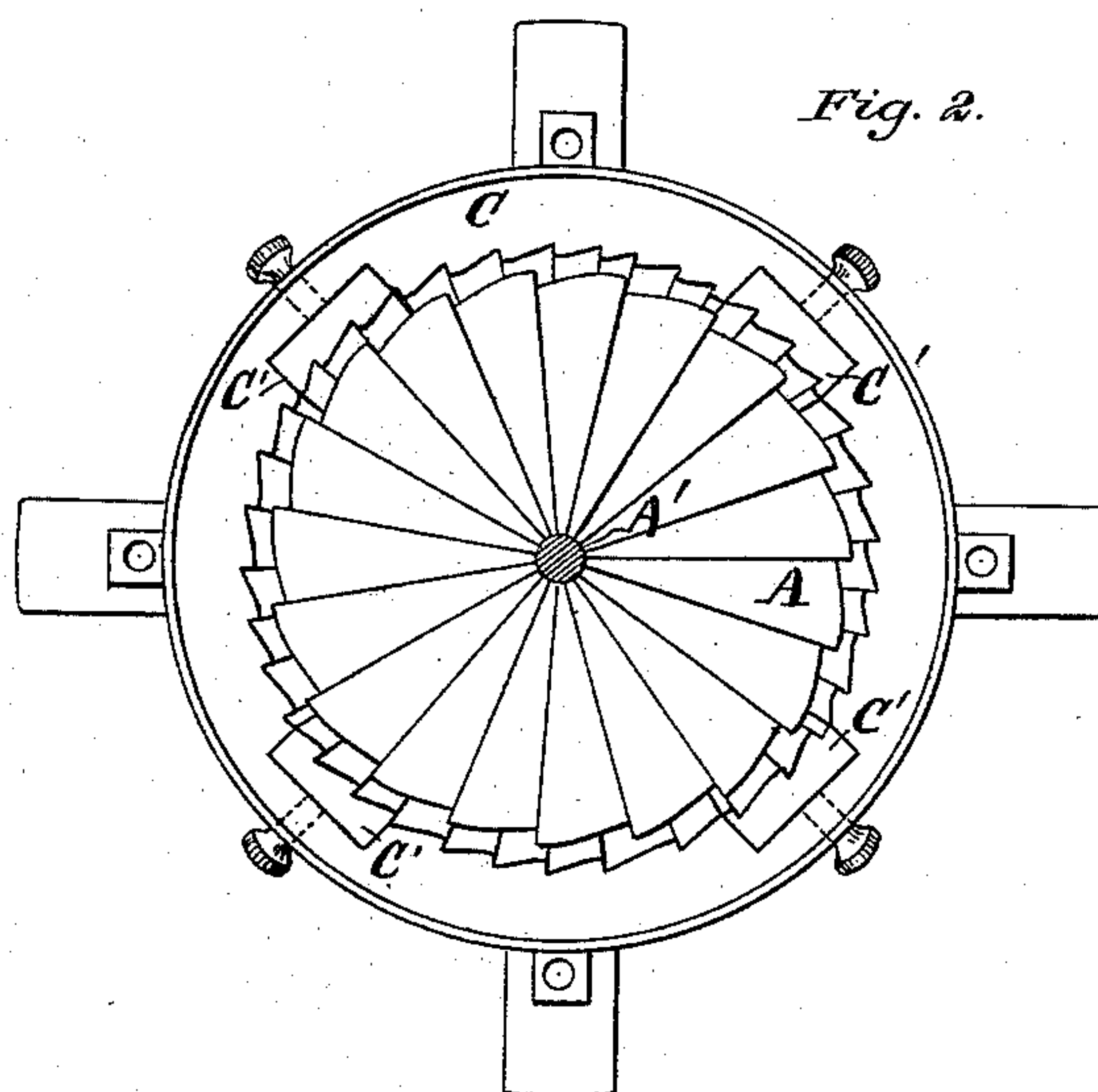
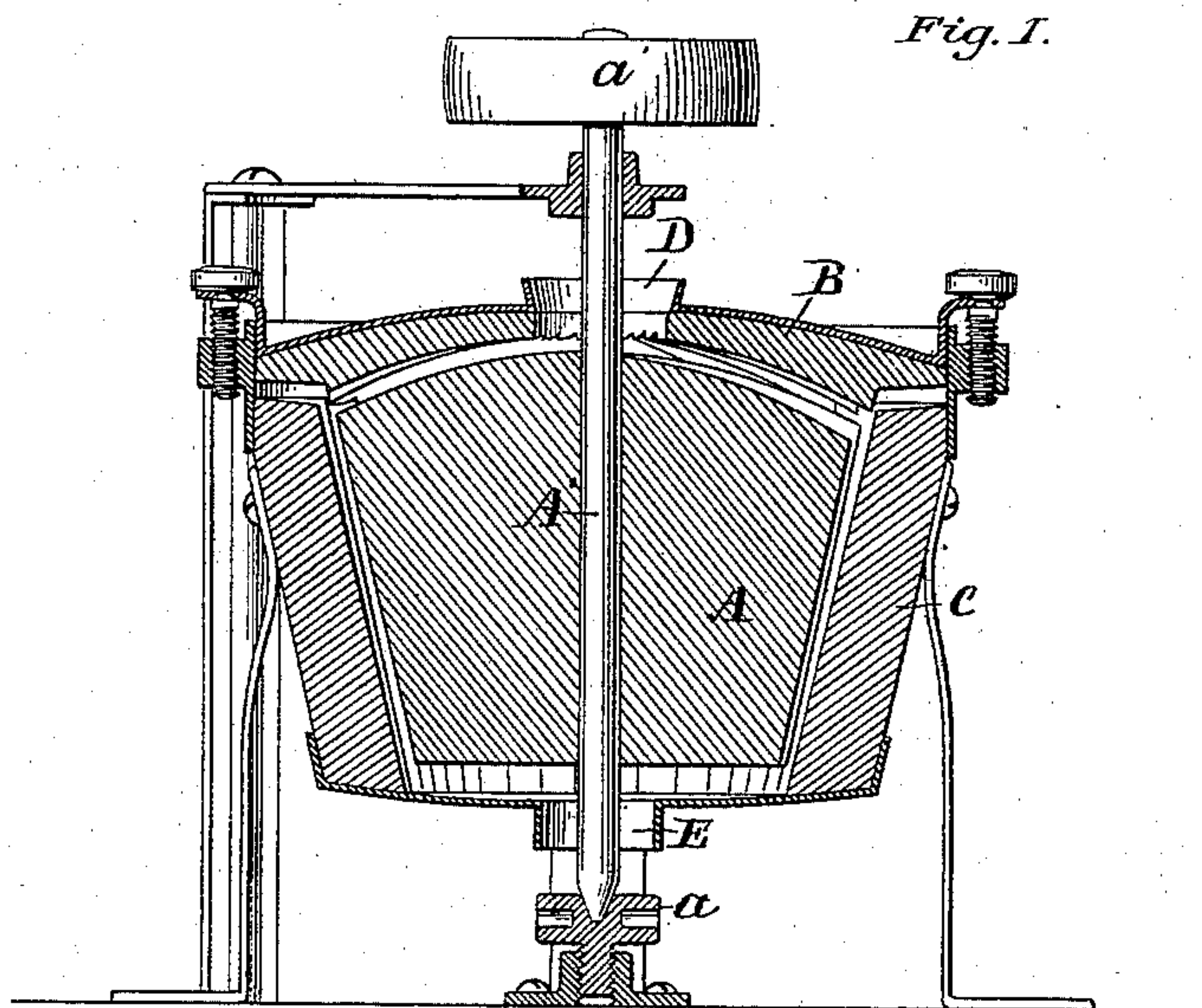


S. M. ALLEN.
 Manufacture of Paper-Pulp from Wood.
 No. 221,992. Patented Nov. 25, 1879.



Witnesses:
C. J. Hedrick
Philip Mauro

Inventor:
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his attorney.

UNITED STATES PATENT OFFICE.

STEPHEN M. ALLEN, OF DUXBURY, MASSACHUSETTS.

IMPROVEMENT IN THE MANUFACTURE OF PAPER-PULP FROM WOOD.

Specification forming part of Letters Patent No. **221,992**, dated November 25, 1879; application filed October 7, 1879.

To all whom it may concern:

Be it known that I, STEPHEN M. ALLEN, of Duxbury, Plymouth county, Massachusetts, have invented a new and useful Improvement in the Manufacture of Paper-Pulp from Wood, which improvement is fully set forth in the following specification.

This invention relates to a new and improved method of and apparatus for disintegrating, crushing, and grinding wood and other fiber into pulp, for paper and for other purposes.

The object of the invention is to preserve the integrity of the fiber at given lengths, while it may be finely fibrilized with reference to its diameter.

By my invention I produce a superior pulp in its tendency to set or interlace its fibrils when made into paper.

My new system or process, which may be called the "float-crushing," is based upon the following principle: The fiber is prepared from wood in strips or shavings by crushing and grinding the latter between two properly-prepared stones (artificial stone or metallic grinders) in such volume of flowing water as shall, by the pressure of its current, float the fibers of the wood between the faces of the crushing-surfaces in a longitudinal direction, so that the pressure upon the same shall, in its progress from its entrance to the hopper to its final exit, be upon the sides of the fiber, tending to refine the same without flouting or making it too short.

The grinders are in the form of double cones, and are dressed upon their upper and side surfaces with proper channels or grooves, so that when filled with pulp followed by copious streams of water, the fiber will be pressed forward by centrifugal force from above and drawn by suction below, the tendency being always to float the same onward between the crushers, so as to preserve the fibrils in a longitudinal direction and not cut them across their axes.

In order more clearly to explain my invention, and the manner of carrying the same into effect, reference is made to the accompanying drawings, which form a part of this specification, and which illustrate a grinding-engine constructed and operating in accordance with this invention.

Figure 1 is a vertical section; Fig. 2, a plan with the top bed-plate removed, and Fig. 3 a detail view.

A is a conical revolving cylinder or grinder with sloping top face, with a shaft, A', running through the center of the same, and dressed with grooves, channels, or corrugations on the top and sides in a proper manner to carry off the pulp, which is crushed by friction in passing along the top and sides of the same, when in motion, by contact with the bed-plate B above, or the casing C around the sides.

The bed-plate B or top stone cover, made to fit the top of the revolving grinder, is grooved or corrugated, and is adjusted to the runner or grinder by proper set-screws, as shown, or by other suitable means, so that any degree of fineness desired can be secured to the pulp passing between.

The side casing, C, surrounding the revolving cylinder, conforming to the conical shape thereof, is lined with stone or artificial-stone staves or metallic sides. On the inside of the casing are a number of sections, C', adjustable by set-screws, as shown, or by other means, to produce side pressure against the cylinder, to secure the fineness of pulp desired.

The lining of the casing is grooved and corrugated in a proper manner to carry off the pulp when flooded with the requisite amount of water. The shaft A' at the bottom rests on an adjustable step, a, which furnishes an additional means for adjusting the distance between the grinder A and the bed-plate B and casing C, and at the upper end is supported in a journal. It is revolved, together with the grinder A, by a belt or pulley, a', or other gearing.

D is the opening or hopper at the top around the shaft, into which the prepared wood is placed, as also into which a stream of water is run, to float the pulp through the machine. E is the opening in the bottom of the casing through which the pulp flows in milk form, thoroughly mixed with water.

The corrugations or grooves on the top and sides of the grinder and on the bed-plate and casing extend radially from or toward the axis of the machine with which the shaft A' corresponds. It will, of course, be understood

that inasmuch as the sides and top of the grinder incline in opposite directions, the corrugations will be closest together at the top and bottom, and farthest apart at the junction of the top with the sides. The shape of the corrugations or grooves which is preferred is, in section, that of ratchet-teeth, as shown in Fig. 2, those on the grinder and the bed-plate and casing facing in opposite directions.

The operation of the machine and the method of grinding will be readily understood in connection with the foregoing description. The grinding-surfaces being adjusted to the proper distance apart, the wood, of any proper degree of fineness, prepared in any manner suitable for the purpose, being chipped, stripped, shaved, or finely sawed, is floated into the mouth of the machine in either warm, hot, or cold water, or chemicals, and, as fast as it can be crushed or ground, is floated through the apparatus.

The wood is first acted upon by the under surface of the bed-plate B, and the sloping top of the revolving cylinder or grinder A, and then between the conical sides of the latter and the lining of the casing C, by which the fibrils are separated from each other without breaking or shortening them. The pulp from the machine is collected in a receptacle, and may be used for paper-making or other purposes.

The top plate may be adjusted to grinding coarse sticks or shavings of wood, while the side casing plates or staves may be very close, so as to refine the same to its fullest extent.

In this manner I have entire control of the wood or other fiber ground, and can make the same long or short, coarse or fine, according to the dressing of the grinders, and the pressure and speed upon the revolving cylinder.

Having thus fully described my said inven-

tion, and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. The method of grinding or reducing fiber from wood, which consists in floating, by means of a sufficient current of water or chemical solution, the prepared wood between grinding-surfaces, channeled or grooved, substantially as described.

2. The combination, with a revolving cylinder or grinder having conical sides and sloping top, of a casing having a lining of suitable material and a bed-plate, the said cylinder, casing, lining, and bed-plate being provided with channels or grooves on the contiguous surfaces, extending radially from or toward the axis of the cylinder, substantially as described.

3. The combination, with a grooved cylinder or grinder, with conical sides and sloping top, a casing with grooved lining, and a bed-plate also grooved, of means for adjusting independently the space between the bed-plate and top of the cylinder or grinder, and between the sides of the latter and the casing, substantially as described.

4. In combination with a revolving grinder or cylinder, the casing lined with suitable material, having a grinding-surface and provided with set-screw or similar means for adjusting said lining or portions thereof with reference to said cylinder or grinder, substantially as described.

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

STEPHEN M. ALLEN.

Witnesses:

EDWARD HAMILTON,
GEO. A. SAVAGE.