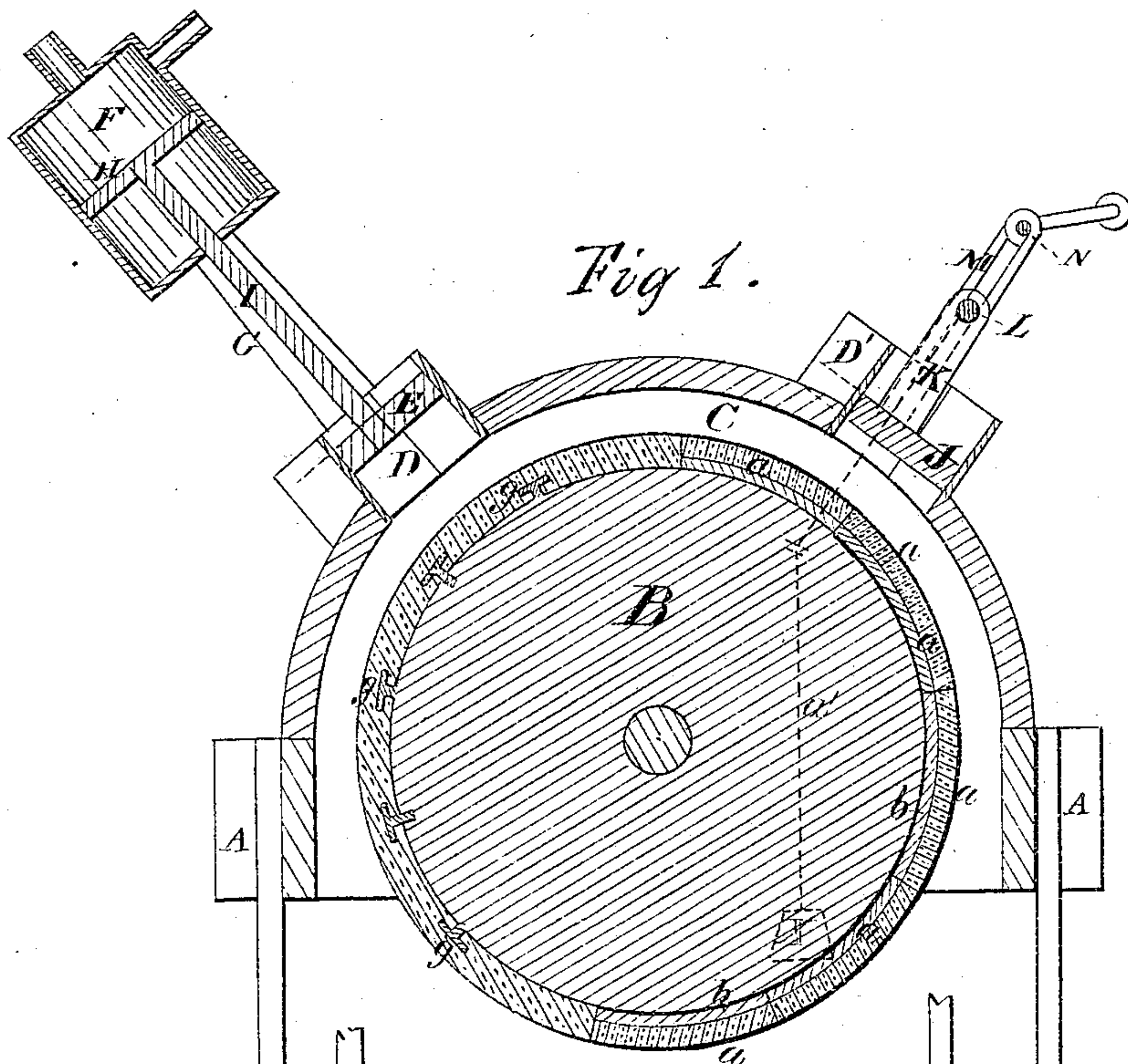


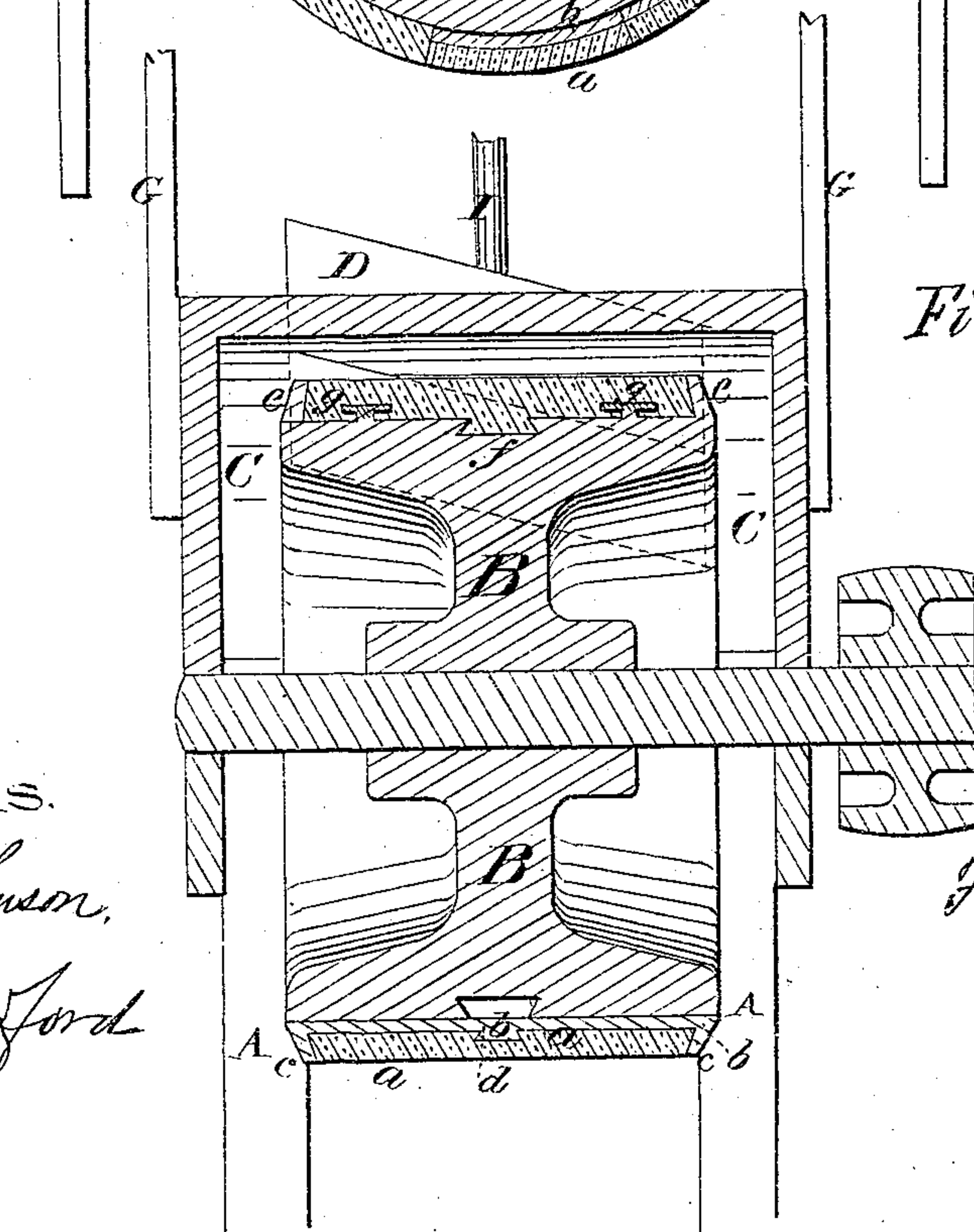
**F. A. CUSHMAN.**  
**Wood-Grinders for Paper Pulp.**

No. 153,190.

Patented July 21, 1874.



*Fig 1.*



*Fig 2.*

WITNESSES.

*E. B. Johnson,*  
*J. P. Crawford*

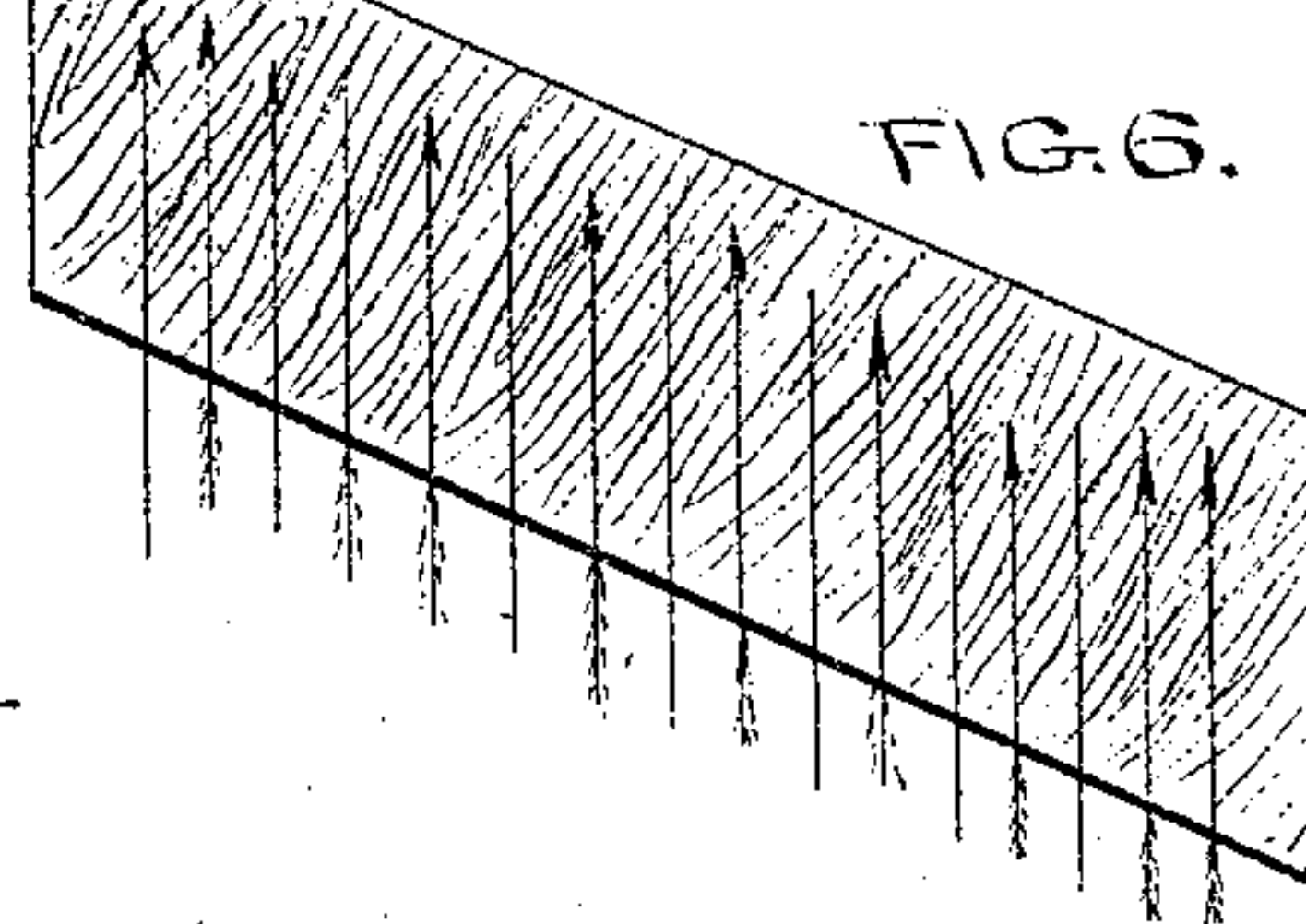
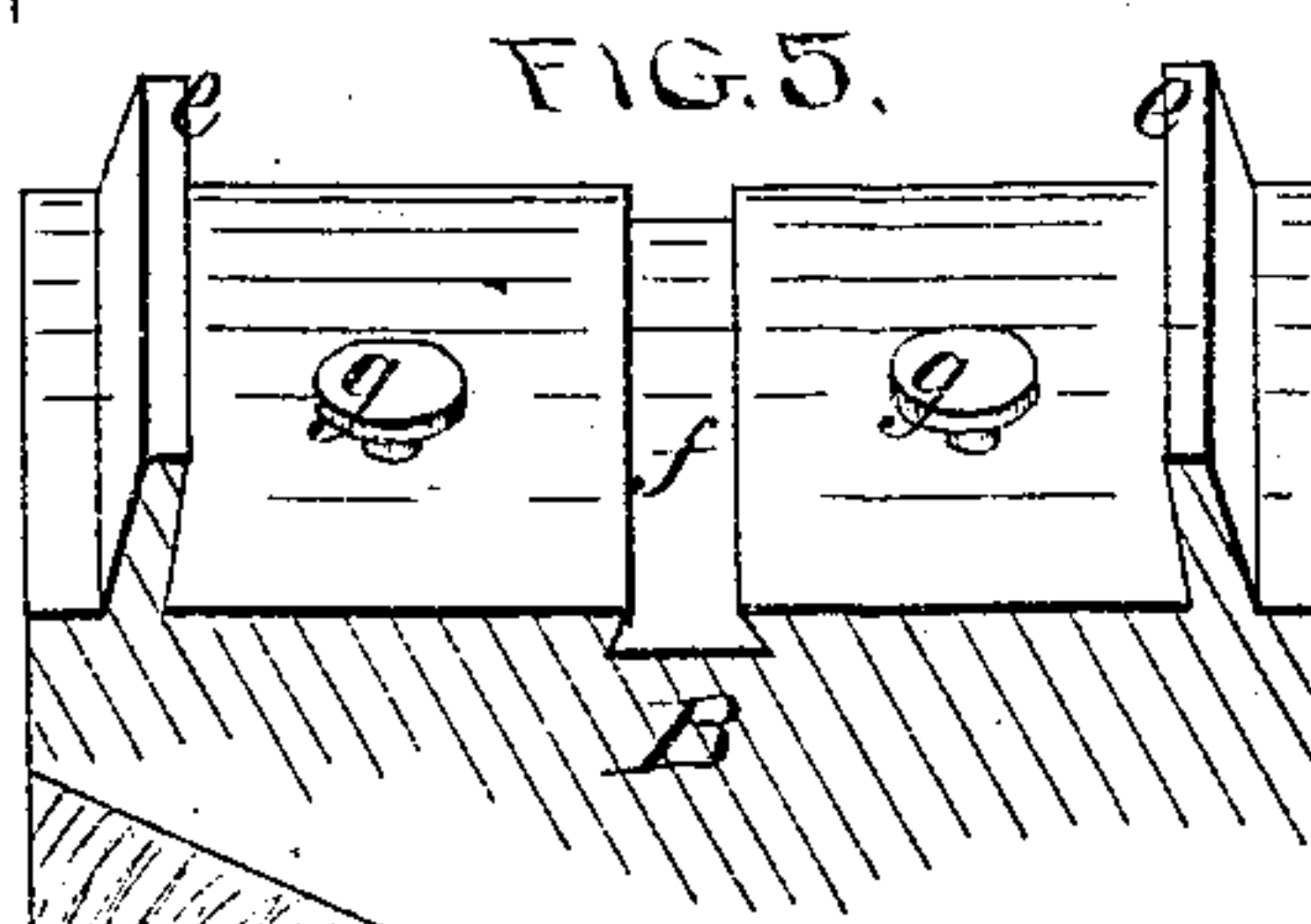
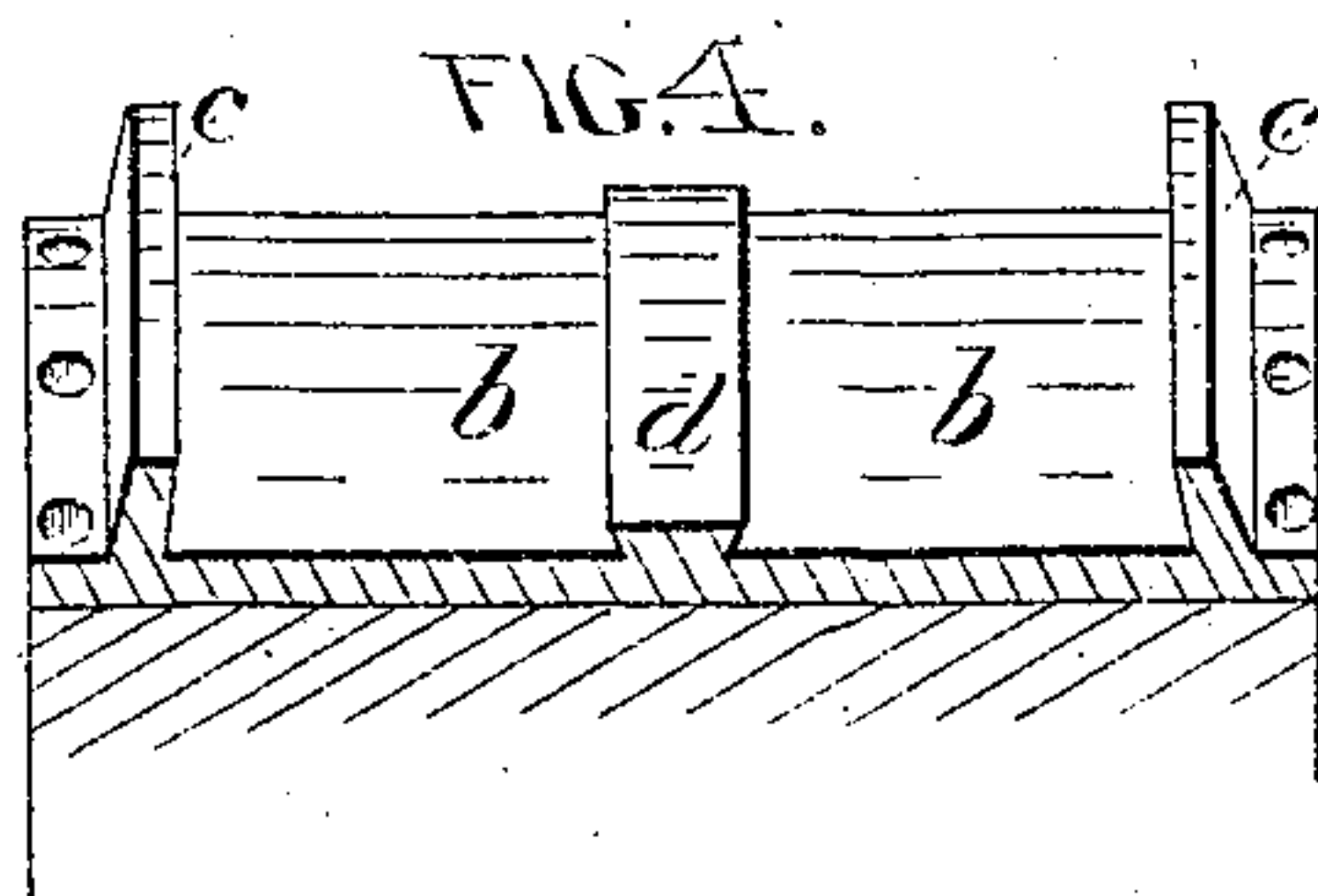
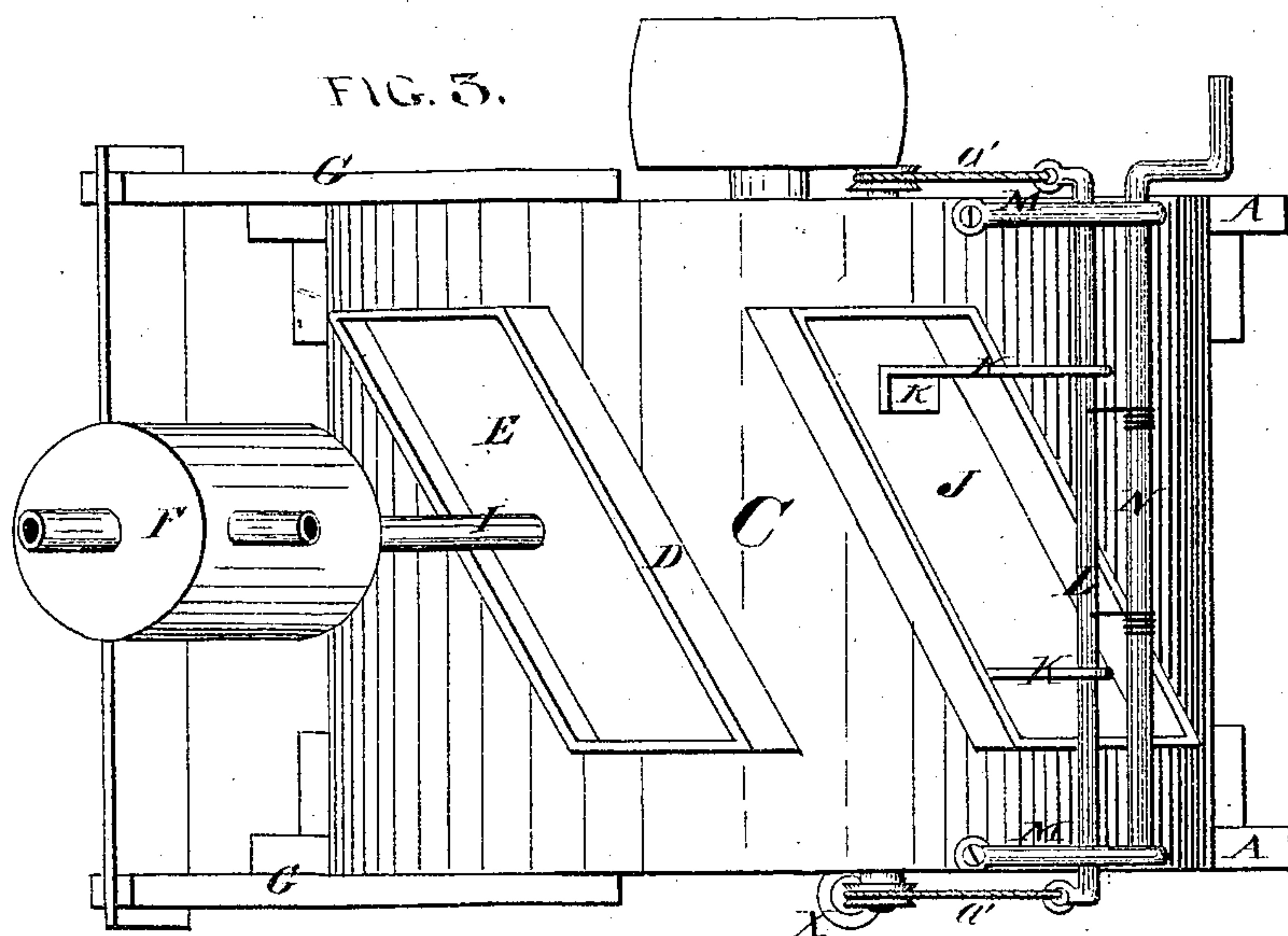
INVENTOR.

*F. A. Cushman*  
*Attorney*

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WITNESSES.

E. H. Johnson.  
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# UNITED STATES PATENT OFFICE.

FRANCIS A. CUSHMAN, OF LEBANON, NEW HAMPSHIRE.

## IMPROVEMENT IN WOOD-GRINDERS FOR PAPER-PULP.

Specification forming part of Letters Patent No. **153,190**, dated July 21, 1874; application filed May 1, 1874.

*To all whom it may concern:*

Be it known that I, FRANCIS A. CUSHMAN, of Lebanon, Grafton county, New Hampshire, have invented an Improved Machine for Reducing Wood to Pulp for Making Paper, of which the following is a specification:

My invention relates to machines for grinding and defibering wood so as to reduce it to a pulp from which paper is made; and it consists in a novel construction, combination, and arrangement of parts, and has for its object to improve the operation of such machines, increase their capacity for production, reduce their cost of manufacture, and produce a more perfect machine, as will be fully hereafter set forth.

Figure 1 represents a vertical longitudinal section; Fig. 2, a vertical transverse section; Fig. 3, a plan or top view; Figs. 4 and 5, parts in detail; Fig. 6, a block of wood operated on by the machine.

This machine is of the class that employs a revolving stone or rasping-cylinder, the surface of which, as the cylinder is rotated, tears out the fibers of the wood, which is pressed against it by mechanical devices.

In the drawings, A represents a frame supporting the shaft on which the stone or grinding-wheel B is secured. C is a cover or hood inclosing the grinding-wheel. D D' are hoppers situated in the periphery of the hood, in which boxes or hoppers the blocks of wood to be ground are placed. E is a follower or plunger working in the hopper D. F is a cylinder supported above the hopper D by the uprights G G. H is a piston working water-tight in the cylinder F, and connected with the follower E by the rod I.

The frame A, as shown in the drawing, represents a portion of a water-trough or other part of the machine irrelevant to a description of my invention.

The grinding-wheel is constructed of a substantial cylinder, B, which may be of any desirable shape conducive to strength and capable of resisting the action of centrifugal force when revolved rapidly. The grinding-substance is secured to the periphery or face of this cylinder, so as to present an even grinding-surface. These segments consist of segmental plates *b*, of cast-iron or other ma-

terial, with flanges *c c* cast on their outer or convex surface, near the edges, and a dovetail rib, *d*, in the middle. The edges of this segmental plate, outside of the flanges *c c*, are drilled for screws in attaching it to the cylinder.

The grinding material, consisting of emery, corundum, quartz, or other suitable substance, while in a plastic state is filled in on the segment between the flanges *c c*, which are undercut or inclined inwardly, so as to retain the grinding material when set, the dovetail rib *d* serving to hold it down in the middle.

The grinding material may be filled in on the iron segment *b* before it is secured to the cylinder, or the segments may be bolted to the cylinder first and then the material applied in a continuous intact layer around the cylinder by means of a proper mold.

It will thus be seen that the material is held between the flanges which are entirely covered with the grinding material, thus leaving a free, clear grinding-surface, and which, when applied in sections, may be removed and replaced when injured or worn.

The hoppers D D' are arranged diagonally across the cover C, and, consequently, are in the same relative position to the wheel or cylinder B; or, in other words, their sides are at an angle to the axis of the stone and the plane of its (the stone's) revolution, so that a block of wood the fibers of which, when the block is placed in the hopper, are at right angles, or nearly so, to the sides of the hopper, will be ground by the stone diagonally across its fibers, as shown in Fig. 6, where the arrows represent the plane of rotation of the grinding-wheel and the imitation graining the direction of the fibers of the wood.

The block of wood to be ground or defibered is held against the stone or grinding-wheel by the followers E under pressure working in the hoppers D D'.

The pressure in the cylinder F may either be exerted by a column of water or by pumping, and may be regulated by suitable appliances.

Having thus fully described my invention, what I claim is—

1. The cylinder B, made up of a central metal body with circumferential inclined flanges *e*

and grooves *f*, so as to hold the grinding substance cast or molded to and combined with the wheel, substantially as described and specified.

2. The diagonal hoppers D D', combined with a grinding-wheel and holding-surface to keep the wood in contact with the wheel and

defiber it diagonally, substantially in the manner described.

FRANCIS A. CUSHMAN.

Witnesses:

ELISHA P. LISCOMB,  
W. P. LISCOMB.