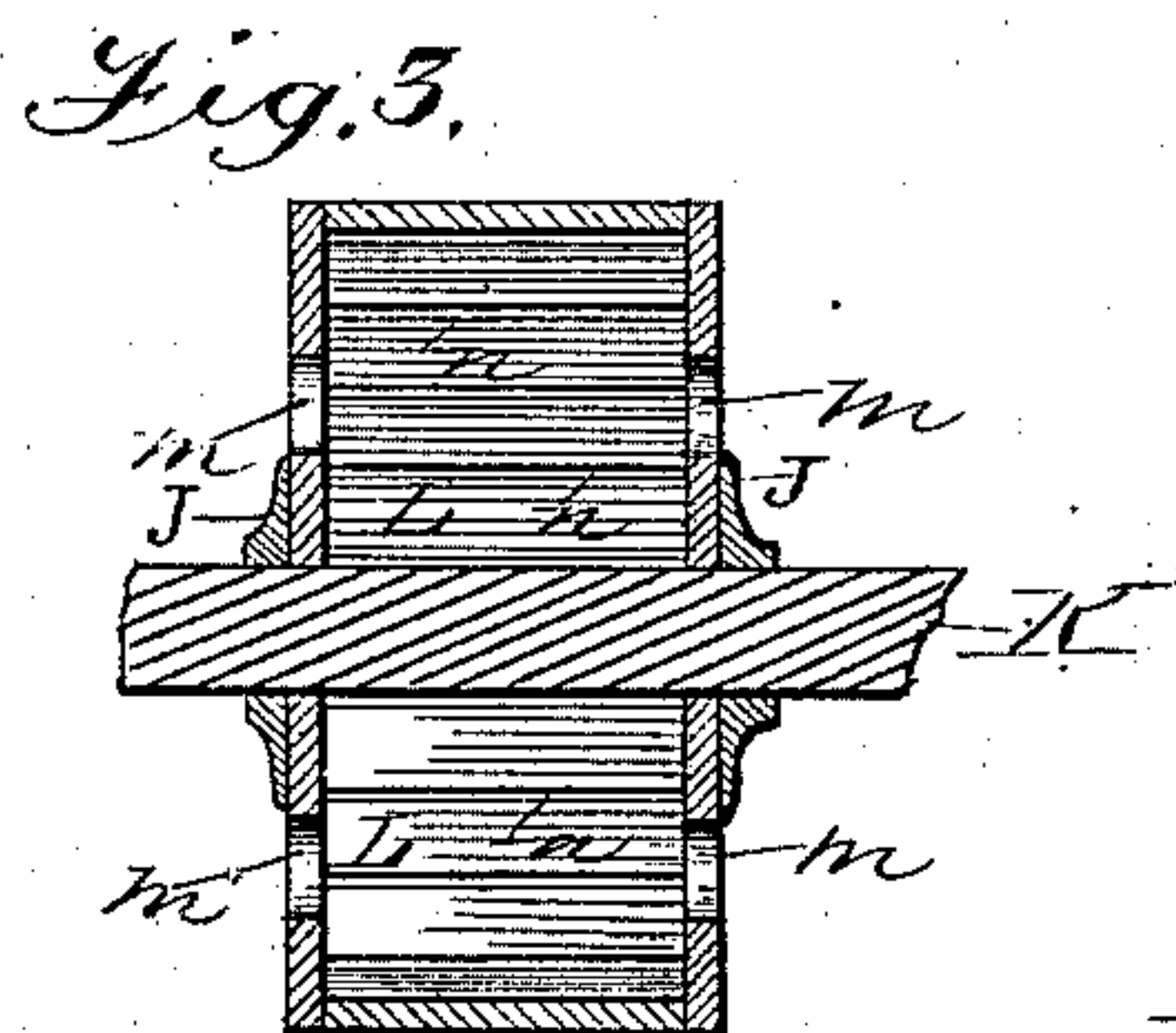
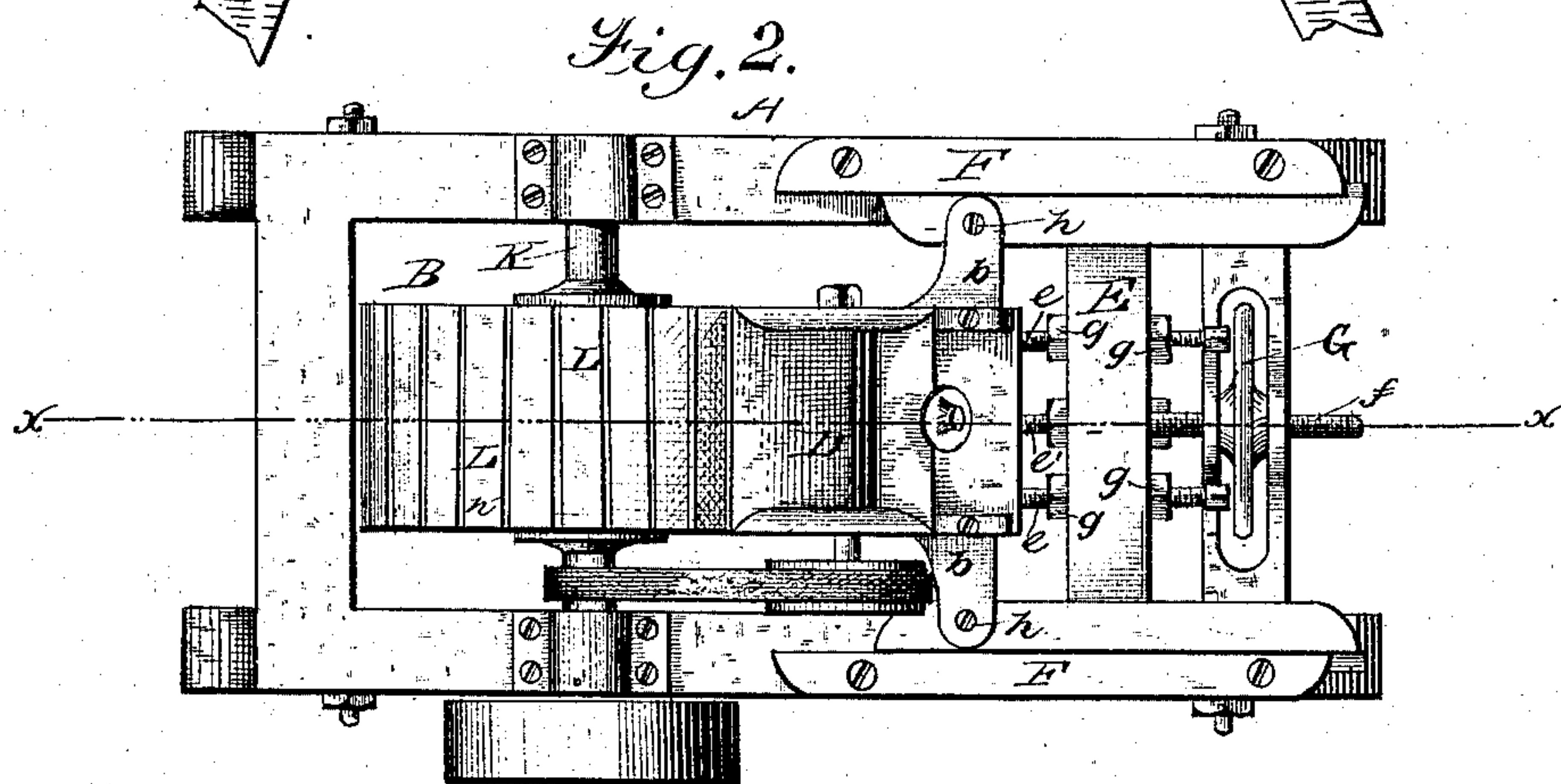
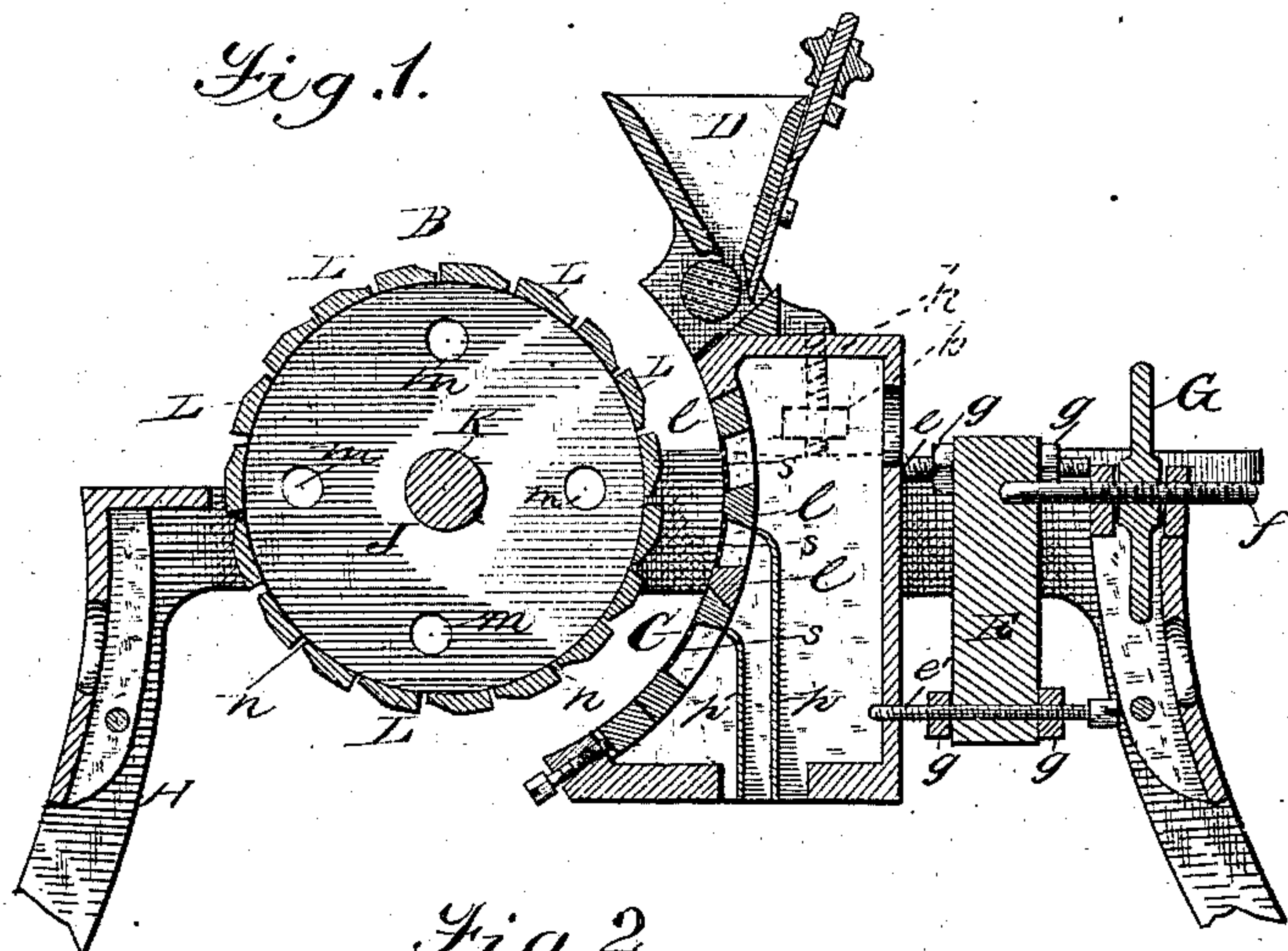


W. N. COSGROVE.  
Grinding Mill.

**No. 238,859.**

**Patented March 15, 1881.**



Attest;

Walter Fowler  
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Inventor  
W. N. Cosgrove  
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His Attorney



# UNITED STATES PATENT OFFICE.

WILLIAM N. COSGROVE, OF FARIBAULT, MINNESOTA.

## GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 238,859, dated March 15, 1881.

Application filed February 4, 1880.

*To all whom it may concern:*

Be it known that I, WILLIAM N. COSGROVE, of Faribault, in the county of Rice and State of Minnesota, have invented certain new and  
5 useful Improvements in Machinery for Manufacturing Flour; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this  
10 specification, in which—

Figure 1 represents a longitudinal vertical section of the mill, taken on the line *x x*, Fig. 2. Fig. 2 is a top-plan view of the same, and Fig. 3 a transverse section of the grinding-cyl-  
15 nder.

Similar letters of reference in the several figures denote the same parts.

This invention relates to certain improvements in that class of grinding-mills in which  
20 the material is ground between a vertical rotating grinding-cylinder or runner and a stationary concave.

The invention consists, primarily, in the combination, with a rotating grinding-cylinder, of a  
25 concave having its inner face composed of alternate grinding-surfaces and screen-sections, and capable of adjustment so that each succeeding grinding-surface shall approach nearer to the face of the grinding-cylinder than its  
30 predecessor, whereby the material is enabled to be subjected to a reduction more or less gradual, and the fine flour and middlings screened off as fast as made.

It further consists of a hollow rotating grinding-cylinder having apertures in its sides  
35 through which to take air, and openings in its periphery or grinding-surface through which to force out, by the rotation of the cylinder, the air so supplied.

It further consists in constructing the grinding-cylinder of two side plates or circular  
40 flanges secured to an arbor and lands or grinding-surfaces secured between the side plates, or to the peripheries thereof, with spaces between the lands for the escape of air forced out  
45 from within the cylinder.

It further consists in the combination of a hollow rotating grinding-cylinder, having openings in its periphery for the escape of air, with  
50 a concave composed of alternate grinding-surfaces and screen-sections, whereby the air es-

caping from the grinding-cylinder assists in bolting the fine flour and middlings through the screen-sections of the concave as fast as  
55 made.

In the drawings, A represents the frame of a vertical grinding-mill; B, the rotating cylinder or runner; C, the concave, and D the hop-  
60 per into which the grain to be ground is placed, and from which it is conducted between the rotating grinding-cylinder and the concave, in the usual manner.

The concave is secured to a cross-head, E, which is adapted to be adjusted back and forth in guides F F from and toward the rotating  
65 grinding-cylinder by means of a screw-rod, *f*, and a hand-wheel, G. The devices by which the concave is connected to the cross-head consist of two screws, *e e*, which pass through the upper part of the cross-head, and are secured  
70 to the back of the concave on opposite sides of a plane drawn through the vertical center of the latter, and a third screw, *e'*, which passes through the lower part of the cross-head, and is secured to the back of the lower part of the  
75 concave at or near the vertical center thereof.

By means of nuts *g g g*, working on the screws *e e e'* on opposite sides of the cross-head, the concave can be adjusted as desired  
80 with respect to the face of the rotating grinding-cylinder, and held firmly and securely in its adjusted position. Side ears or lugs, *b b*, are provided on the concave, through which vertical screws *h h* pass and bear upon the top  
85 of the cross-head. When it becomes necessary to take the concave out of wind or adjust it sidewise, it can be done by loosening one of these screws *h* and tightening the other.

The interior of the concave is preferably made hollow, as shown in Fig. 1, and its face,  
90 or that part next the grinding-cylinder, is composed of grinding-surfaces or lands *l l* and screen-sections *s s*, arranged alternately, so that the fine flour and middlings made by the first  
95 lands are screened out through the first screen-section, while the remaining material passing to the next land is still further reduced and the resulting fine flour and middlings screened  
100 out through the second screen-section, and so on throughout the extent of the concave. The grinding-surfaces or lands of the concave may be dressed or prepared in any preferred man-



ner, and the screen-sections may consist of wire-cloth or ordinary bolting-cloth or other form of screen of any grade desired. The screen-sections are arranged slightly below the grinding surfaces, for obvious reasons. The concave is moved up to the grinding-cylinder and adjusted as desired with respect to the face of the latter, preferably so that the lower part of the concave shall be closer to the face of the cylinder than the upper part. The grain, being fed from the hopper in between the rotating cylinder and the concave in the usual manner, is subjected to the action of the cylinder and the first grinding-surface or land of the concave, and the fine flour and middlings by them made are screened out through the first screen-section, the remaining materials being then subjected to further reduction by the second grinding-surfaces, and the resulting fine flour and middlings screened out through the second screen-section, and so on throughout the extent of the concave, the fine flour and middlings being screened off as fast as made, and the remaining material subjected to a gradual reduction without intermitting the operation of the grinding cylinder or stone. The screens may all be of the same grade or of different grades, and the flour and middlings screened out through them may mingle in the interior of the hollow concave and be carried off in a mass; or, as shown in the drawings, partitions *p p* may be provided within the concave between the various screens, and the flour and middlings passed by each screen kept separate and apart from that passed by the others. The proper adjustment of the concave to the cylinder will be determined by the quality of the grain operated upon, the grade of flour to be made, and other circumstances.

The rotating cylinder or runner used in connection with my improved concave may consist of a solid or a sectional stone, or may be of any other well-known construction, but is preferably constructed so that currents or jets of air may be caused to issue from openings in its periphery or grinding-surface as it rotates, for the purpose of keeping the grinding-surfaces of the mill cool, and for the further purpose of assisting in sifting out through the screen-sections of the concave the fine flour and middlings as fast as made. In the drawings I have shown a grinding-cylinder constructed on this principle. It consists of two circular side plates or flanges, *J J*, secured to an arbor or shaft, *K*, and having lands *L* secured between them, or to their peripheries, apertures *m* being made in the side plates and spaces *n* left between the lands, as shown. When the mill is in operation the rapid rotation of the grinding-cylinder causes air to be drawn in through the apertures *m* in the side plates and forcibly expelled through the openings or spaces *n* between the lands *L*, thus cooling both the cylinder and the concave, and

assisting in sifting out the fine flour and middlings through the screen-sections from the materials being ground.

Numerous modifications of the plan of forcing currents or jets of air through the periphery of the grinding-cylinder will at once suggest themselves. For instance, instead of constructing the cylinder with openings in its sides through which to draw air by the rotation of the cylinder, the arbor or shaft of the cylinder may be made hollow or tubular and divided or provided with openings in the interior of the cylinder, so that air under any desired pressure may be forced into the cylinder through said arbor or shaft, as will be readily understood.

It is evident that instead of adjusting the concave to the stone or grinding-cylinder, as herein shown and described, the stone or grinding-cylinder may be so arranged as to be capable of being adjusted to the concave with the same results. The plan of adjusting the concave is, however, preferable.

The machine may be used to grind middlings or bran or any kind of grain.

I claim as my invention—

1. In a grinding-mill, the combination, with a concave provided with alternate grinding-surfaces and screen-sections, of means for adjusting said concave with respect to the face of the rotating cylinder or runner, whereby the material can be subjected to a reduction more or less gradual, and the fine flour and middlings screened off as fast as made, substantially as described.

2. The combination, with the rotating grinding-cylinder, of the concave having alternate grinding-surfaces and screen-sections, and having internal partitions between the screen-sections, whereby the ground product passed through each screen-section is kept separate and apart from that passed through the other screen-sections, substantially as described.

3. In a grinding-mill, a hollow grinding-cylinder consisting of two perforated side plates or circular flanges secured to an arbor, and lands or grinding-surfaces secured between the side plates, or to their peripheries, with spaces between the lands for the escape of air, substantially as described.

4. In a grinding-mill, the combination of a hollow rotating grinding-cylinder, having openings in its periphery or grinding-surface for the escape of air, with a concave composed of alternate grinding-surfaces and screen-sections, whereby the air escaping from the cylinder assists in bolting the fine flour and middlings through the screen-sections of the concave, substantially as described.

WILLIAM N. COSGROVE.

Witnesses:

JOSEPH C. MOLD,  
J. H. HARDING.