

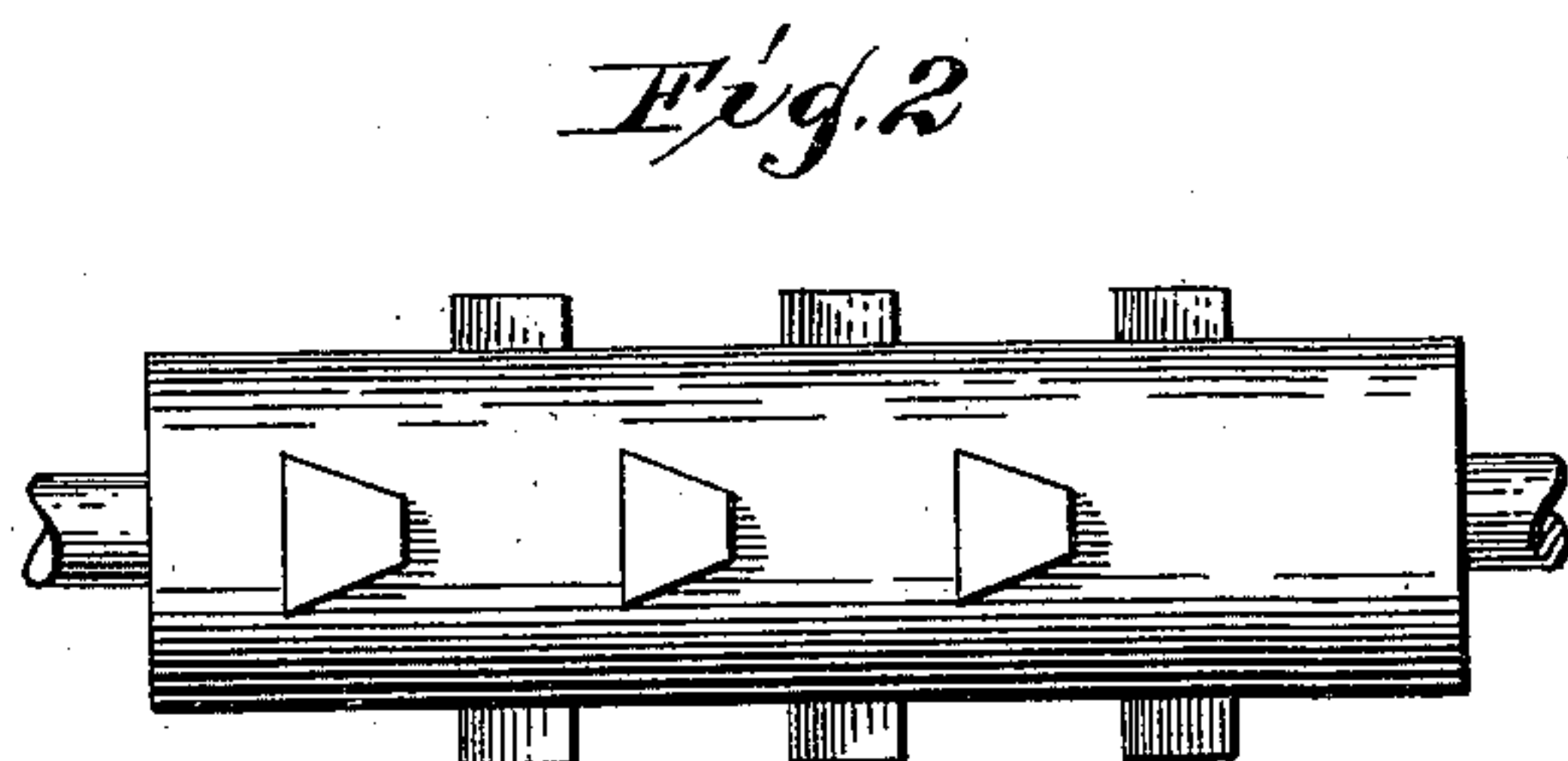
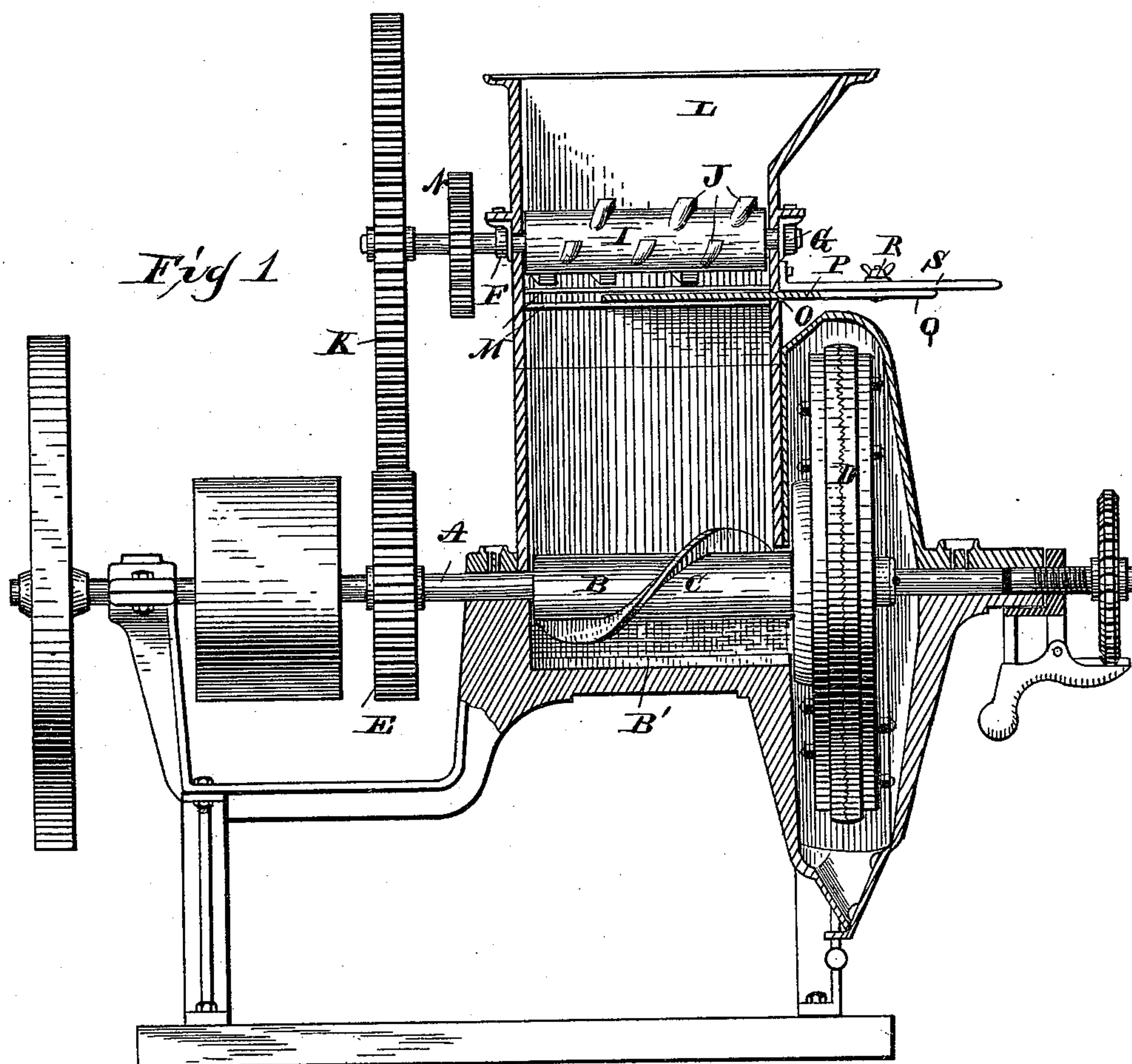
(No Model.)

2 Sheets—Sheet 1.

J. F. WINCHELL.
CRUSHING AND GRINDING MILL.

No. 408,448.

Patented Aug. 6, 1889.



WITNESSES
James H. Mahan
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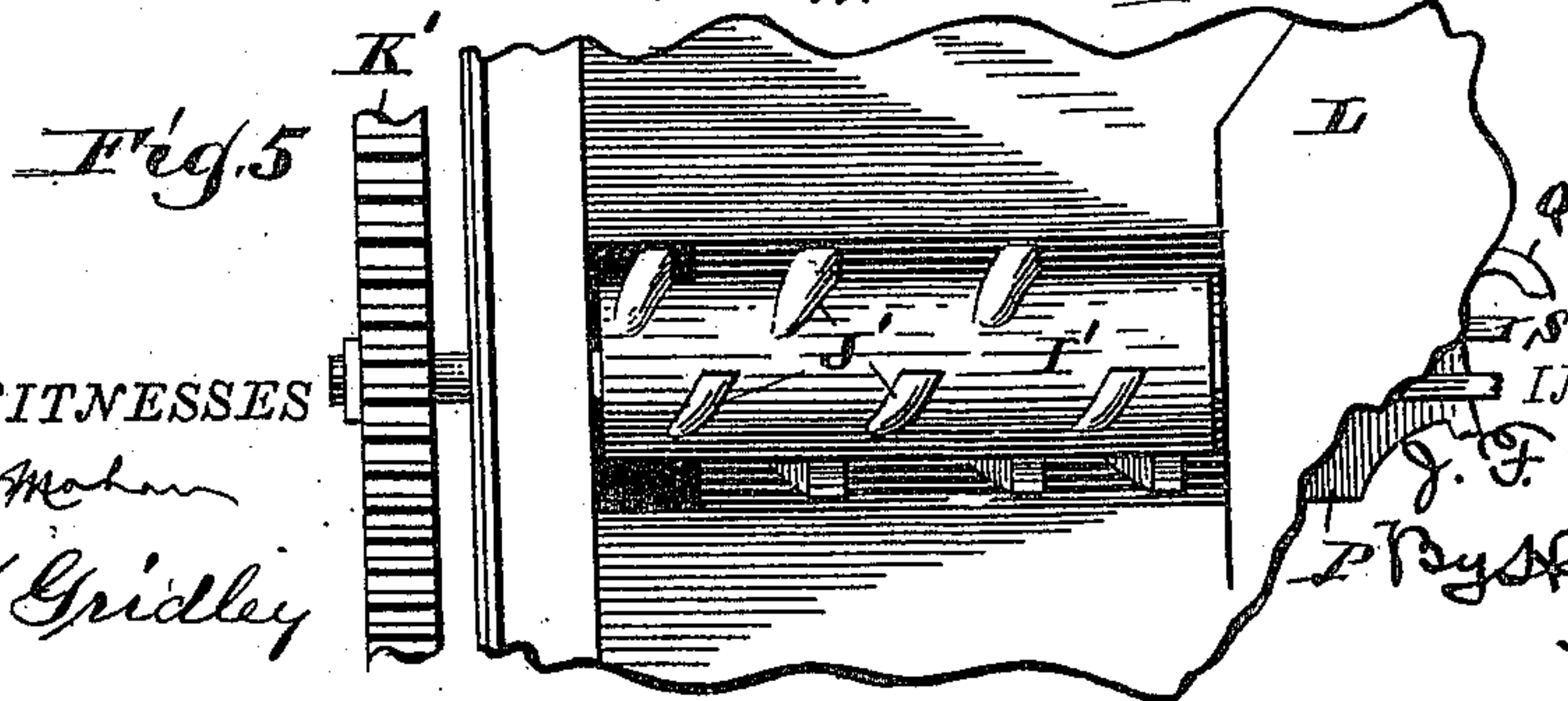
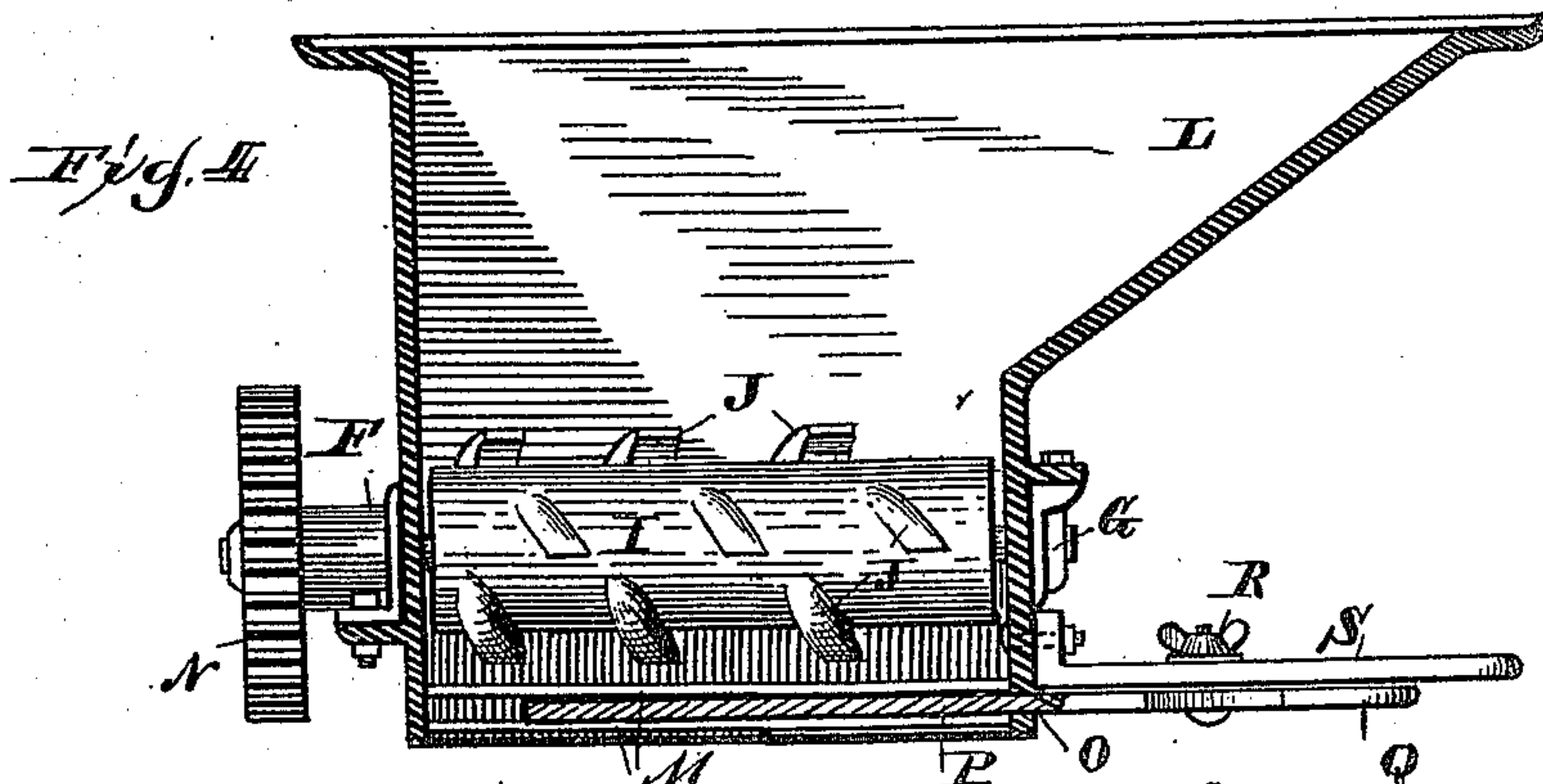
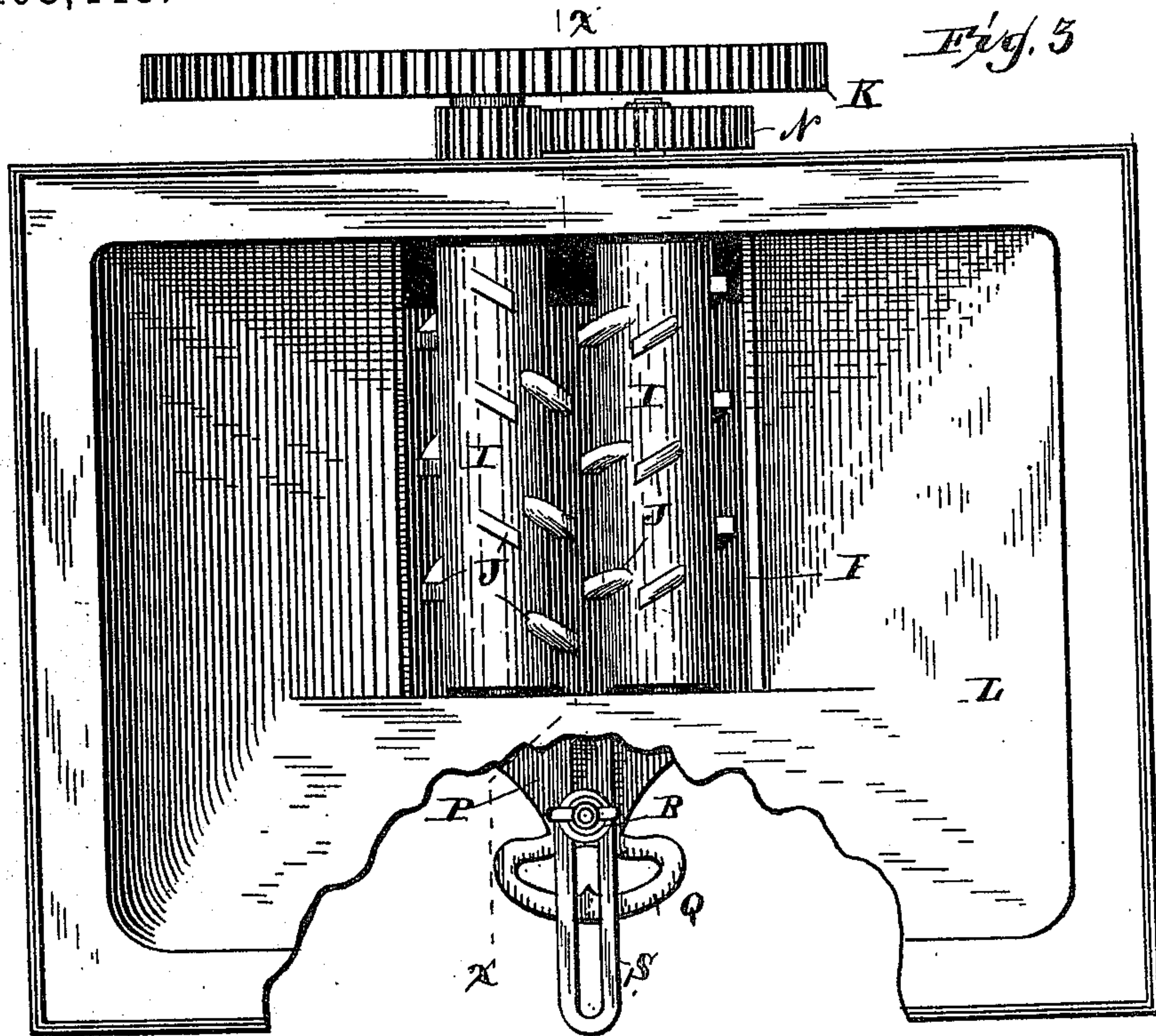
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UNITED STATES PATENT OFFICE.

JAMES F. WINCHELL, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE FOOS
MANUFACTURING COMPANY, OF SAME PLACE.

CRUSHING AND GRINDING MILL.

SPECIFICATION forming part of Letters Patent No. 408,448, dated August 6, 1889.

Application filed April 2, 1888. Serial No. 269,294. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. WINCHELL, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Crushing and Grinding Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in crushing and grinding mills for reducing corn-cobs with or without corn and corn and shuck on them, roots, bark, bones, cotton-seed, and linseed-meal
15 cakes, and other substances, first to a broken state; secondly, to a finer state, and, lastly, to a granular state. It is designed as an improvement upon the mill for which Letters Patent were granted to me March 15, 1887, No.
20 359,588, and the mill upon which I filed an application for a patent September 21, 1886, Serial No. 214,176.

The object of my present invention is to regulate the flow or passage of the crushed
25 material from the crushing and feeding mechanism to the remaining mechanism of the mill, irrespective of the amount of material in the hopper, (so long as there is enough material to supply the capacity of the crushing and
30 feeding mechanism,) so that the supply passing from said latter mechanism will be uniform.

Another object of the invention is to prevent the passage to the lower mechanism of
35 the mill of such material as may happen to be not sufficiently reduced by the crushing and feeding mechanism. In some sections of the country, as in some of the Eastern States, the ears of corn grow long and slim, and in grinding
40 them it frequently happens that they will drop endwise or sidewise between the crushers and pass below them without being crushed to the required extent. In such case the difficulty is overcome by my present improve-
45 ments.

In the accompanying drawings, forming a part of this specification, and on which like reference-letters indicate corresponding parts, Figure 1 represents a partial side elevation
50 and partial vertical sectional view of a mill

of the kind embodied in my above-mentioned Letters Patent, showing my present improvements applied thereto; Fig. 2, a detail view of a modified form of crushing-conveyer; Fig. 3, a plan view of the hopper, its operating-gears, 55 and the crushing and feeding mechanism; Fig. 4, a detail enlarged view of the same parts with the hopper and cut-off in section; and Fig. 5, a similar view to Fig. 3, showing
60 modification of crushing mechanism.

The machine illustrated in Fig. 1 is constructed substantially in accordance with the machine embodied in the Letters Patent above alluded to—that is, it consists, essentially, of the main frame mounted upon suitable supports and divided into the lower part, which supports the main shaft and partially incloses the grinding-heads, and the upper part, which completes the inclosure of said heads and extends upward to support the hopper—and in
65 which figure the letter A designates the main shaft of the machine, on which is rigidly mounted a crushing-conveyer B, with a suitable flange or worm C, or with angular lugs constituting conveying-surfaces with a broken
70 flight for the purpose of feeding and further crushing or reducing the crushed material to the grinding-heads D, which receive and grind it to a granular state according to the adjustment of the heads with respect to each
75 other. The main shaft also carries the balance-wheel and the driving-pulley and the pinion hereinafter referred to. At the opposite end of the frame adjusting mechanism is shown for adjusting the shaft longitudi-
80 nally, so as to bring the rotating grinding-head to the proper distance from the stationary grinding-head; but as this feature forms no part of the invention I will not minutely describe it. The chamber in which
85 the crushing-conveyer works is provided with longitudinal ribs B', and the distance between the conveyer and the sides of the chamber is greater than the distance between the conveyer and the said ribs for the purpose named
90 therein—that is, to cause the material to feed or pass more rapidly to the conveyer—while the presence of said ribs more readily enables the conveyer to further reduce or crush the material before it reaches the grinders proper. 100

In suitable bearings F and G in the upper portion of the casing or the hopper of the machine I mount the crushing and feeding mechanism, the same consisting in some instances of two crushers I, side by side, each having crushing-protuberances J, the crushers being sufficiently near each other to cause the protuberances of the respective crushers to stand either about in line with each other, as seen in Fig. 3, or to overlap each other, or to not quite reach each other, while in other instances said mechanism consists of a single crusher I', similarly mounted and provided with like or similar protuberances J'. In instances where the crushers rotate with differential speed the protuberances which, if any there are, occupy the same or substantially the same vertical plane are made to not reach or quite reach each other, so as to prevent those on one crusher from interfering with those on the other.

In the one case the shafts of the crushers are provided with pinions N, of equal or unequal diameter, which mesh with each other, and the shaft of one of the crushers is additionally provided with a gear-wheel K, whereby rotary motion is imparted to both crushers by a pinion E, which meshes with the gear-wheel K. In the other instance the shaft of the crusher I' is provided with a like or similar gear-wheel K', which meshes with said pinion, whereby it receives rotary motion. The term "crushing and feeding mechanism" is used herein in a generic sense. The protuberances J and J' are preferably arranged as shown—that is to say, they have their sides placed at an angle to the axis of their rotation for the purpose of constituting conveyers, which will move the material to the point whence it drops to the crushing-conveyer, and they have their ends and forward sides formed with edges more or less sharp, as seen more particularly in Figs. 3, 4, and 5, for the purpose of more readily disintegrating the material and effecting a cutting-like action on such material as is of a fibrous nature—corn-shucks, for instance. The protuberances coact with each other—that is, the protuberances of one crusher coact with those of the other crusher when more than one crusher is used, and coact with a fixed part of the mill both when one and when two crushers are used—in performing the above function of disintegrating and cutting, and the protuberances perform the above-re-cited function of a conveyer by co-operating with the cut-off when two crushers are used, and by co-operating with the cut-off and the wall or walls of the hopper when a single crusher is used. The hopper L is provided with slides, ribs, or cleats M, and is slotted at O for the reception and guidance of a transverse metallic plate P, which constitutes a cut-off below the crushing and feeding mechanism. This cut-off is by preference, though not necessarily, placed at such a distance from said mechanism that any material, as slim

corn-cobs, which, as hereinbefore mentioned, sometimes escape without being sufficiently crushed, will be held in it and caught by the protuberances before passing over the inner edge of the cut-off. The cut-off is provided with a handle Q and is held in adjusted positions by a clamp-screw and nut R, which bind it to a fixed slotted plate S. It will be observed that the opening through which the material passes from the crushing and feeding mechanism may be varied in size. This is done to agree with the power which is at hand to operate the mill, for the less the material which passes to the lower mechanism of the mill the less power is required to operate it, and if a user happens to have an engine of few-horse power he can regulate the supply to agree with that power. It should be observed that if the hopper is entirely filled and more material supplied to the crushing and feeding mechanism than can pass below them at a given adjustment of the cut-off P the surplus which is crushed merely accumulates around them and prevents so rapid an engagement of the protuberances with the uncrushed material above them, so that the general sameness of the supply passing from the cut-off is not materially affected. This is valuable in practice, because the material is usually thrown into the hopper in basketfuls, and because the grinding mechanism works better when the supply is constant in quantity, and this is the result and the practical gain derived from the conjoint operation of the cut-off and the crushing mechanism.

The protuberances J and J', as shown, constitute a broken flight. It is obvious, however, that they may be continuous, after the manner of the crushing-conveyer shown at B. From these statements of the functions of the feeding and crushing mechanism it will be seen that such mechanism co-operates and works against the fixed portions of the mill in the reduction, disintegration, and severance of the material, and that when two crushers are used this coaction also takes place between them. It will be observed that the angular position of the sides of the protuberances gives the crusher's a conveying capability when coacting with the cut-off and a kind of a draw-cut action when coacting with the fixed parts of the mill. There may be as many spiral rows of protuberances as desired, and the pitch of the spiral may be varied to any suitable degree, and the spiral row of protuberances may extend entirely or partly around the body of the crusher. The body I and I' of the crushers, it will be noticed, constitutes the means by which the crushing, disintegrating, and cutting features are supported and carried, and will be so considered and understood, and the term "crusher" will be understood as meaning the rotating device entire, by which this crushing, disintegrating and cutting action of the material is effected, and by which, when coacting with the cut-off, the material is conveyed as above described.

The presence of the cut-off, however, enables them to act to crush as well as convey. The feeding-crushers I and I' have a double feeding and crushing capacity, because they feed 5 and they crush as they draw the material between each other (in the case of the devices I) or draw it down against the side wall of the hopper or casing, (in the case of the single device I',) and because they feed and crush 10 in their conjoint action with the cut-off, as above mentioned. The term "gearing" herein is used in the sense of means to constitute motion.

Having thus fully described my invention, 15 what I claim as new, and desire to secure by Letters Patent, is—

1. In a mill, the combination, with the upper portion of the casing or hopper thereof, and crushing and feeding mechanism rotatably 20 mounted therein and provided with a peripheral construction whose sides are at an angle to the axis of rotation, of a cut-off mounted below and near said mechanism and in the same general direction as the axis 25 thereof and adjustable in said direction to more or less reduce the area of the cut-off, which coacts with said mechanism, the said peripheral construction acting to feed the material in conjunction with the cut-off and to 30 crush the escaped material which is caught by the cut-off.

2. In a mill, the combination, with the upper portion of the casing or hopper thereof and two intergeared crushers having protuberances which extend approximately in line 35 with each other, of a cut-off mounted below and close to said crushers and adjustable to expose more or less of the length thereof, so as to increase the amount of material passing downward from said mechanism. 40

3. In a mill, the combination, with a casing, a main shaft and grinders, and a crushing-conveyer, of a plurality of crushers mounted in the casing to crush and feed the material to the conveyer, and having protuberances 45 which extend approximately in line with each other and whose sides are at an angle to their axis of rotation, whereby they also act as a conveyer, a cut-off mounted between the said feeding-crushers and the crushing-conveyer 50 substantially in line with the axis of the crushers and adjustable in said direction, and suitable gearing connecting the main shaft with the feeding-crushers.

In testimony whereof I affix my signature in 55 presence of two witnesses.

JAMES F. WINCHELL.

Witnesses:

WM. R. HOMER,
JAS. H. MAHAN.