

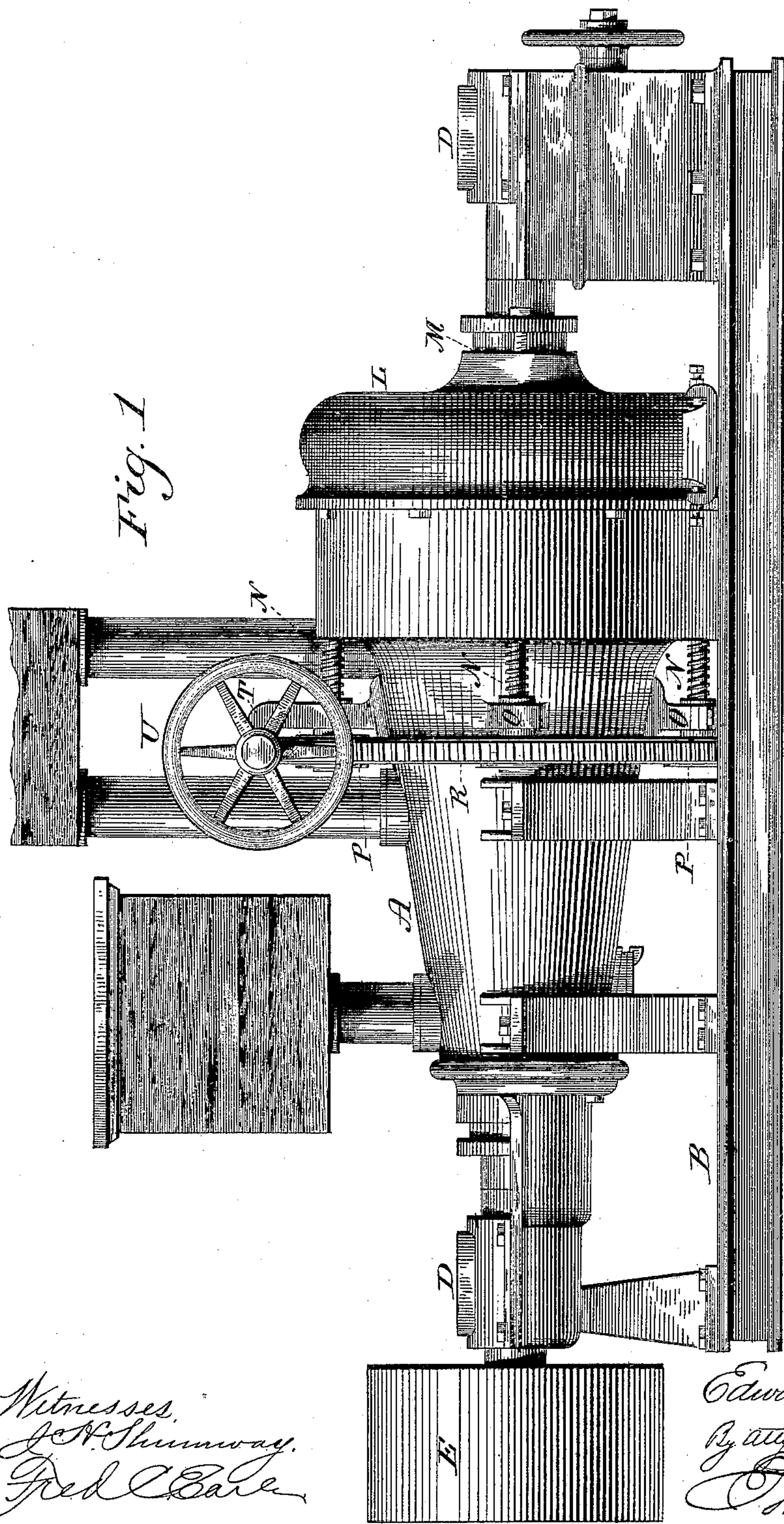
(No Model.)

3 Sheets—Sheet 1.

E. R. MARSHALL.
PULP BEATING ENGINE.

No. 411,251.

Patented Sept. 17, 1889.



Witnesses.
J. H. Shumway.
Fred C. Case.

Edward R. Marshall.
By atty. Inventor.
J. M. Case.

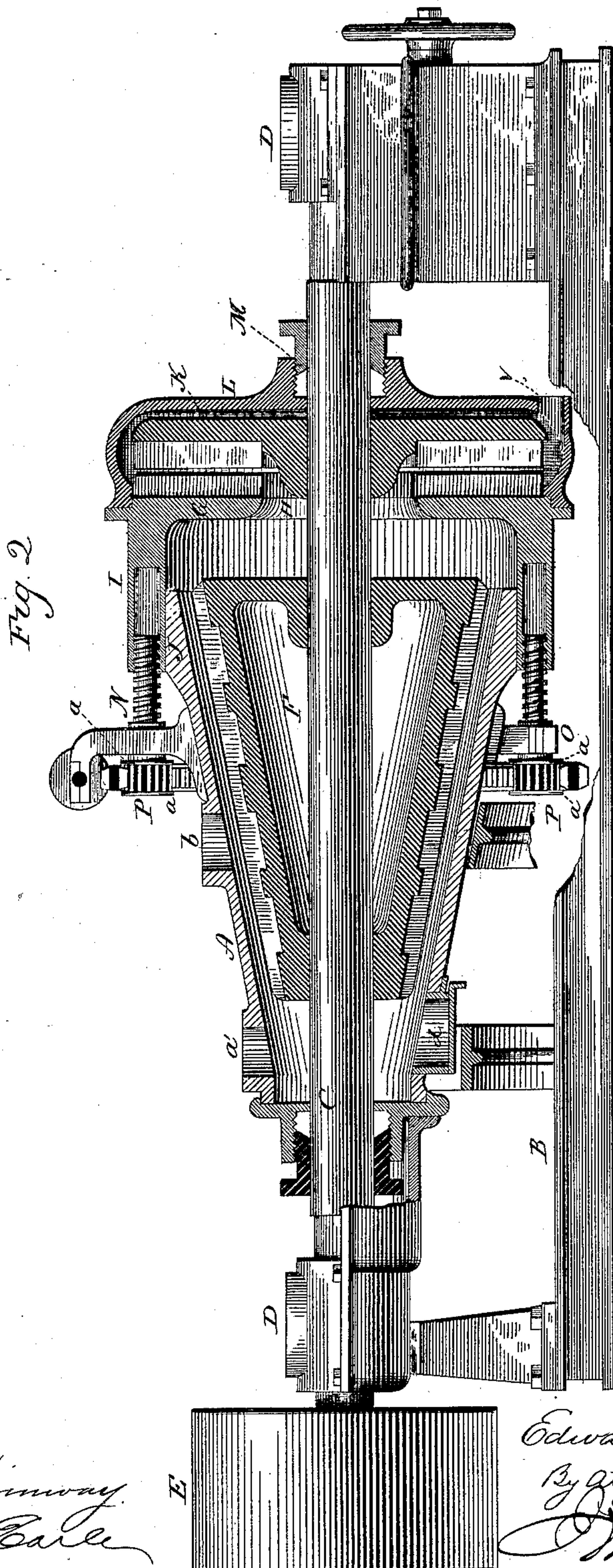
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Witnesses.
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Fred A. Carter

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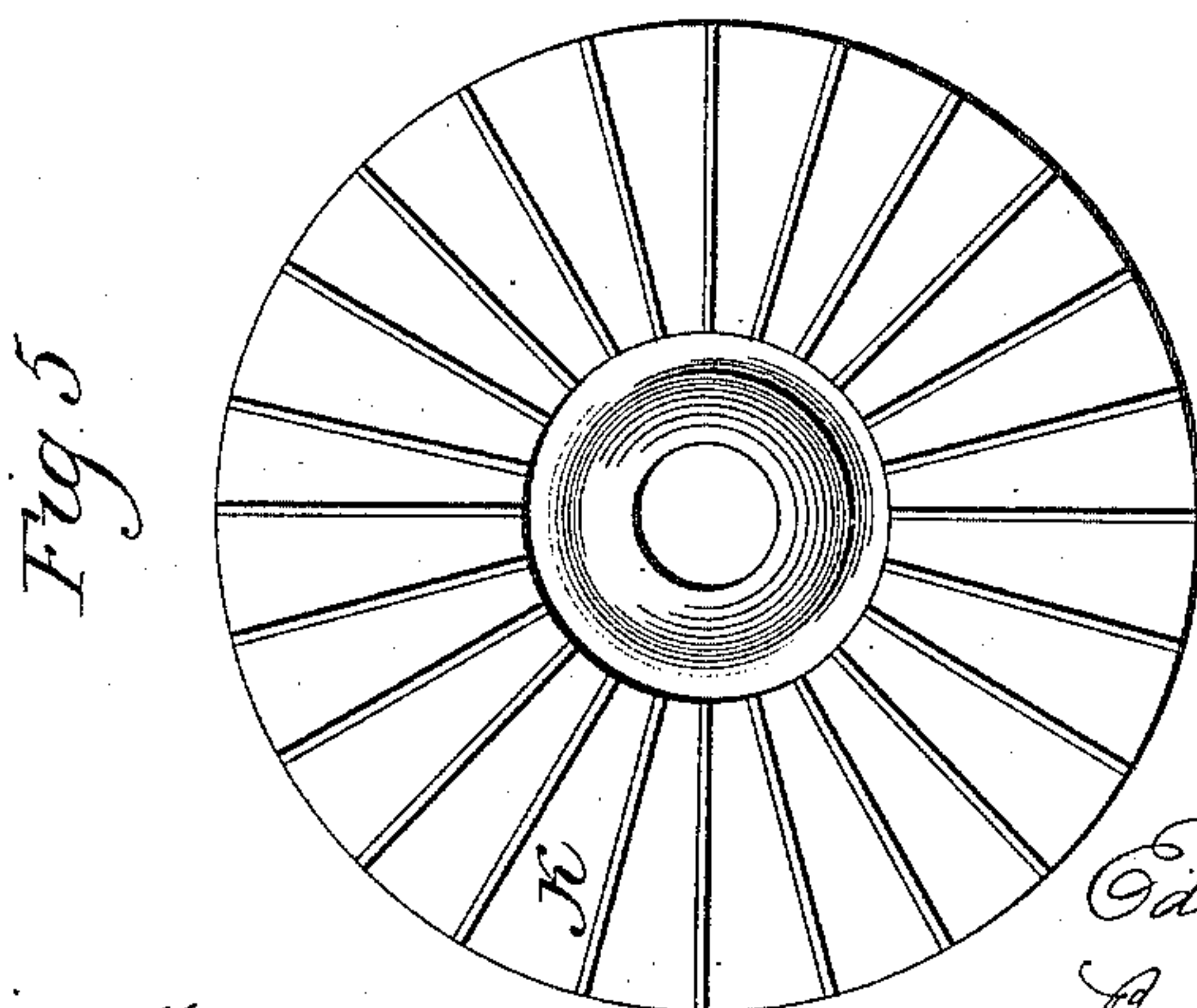
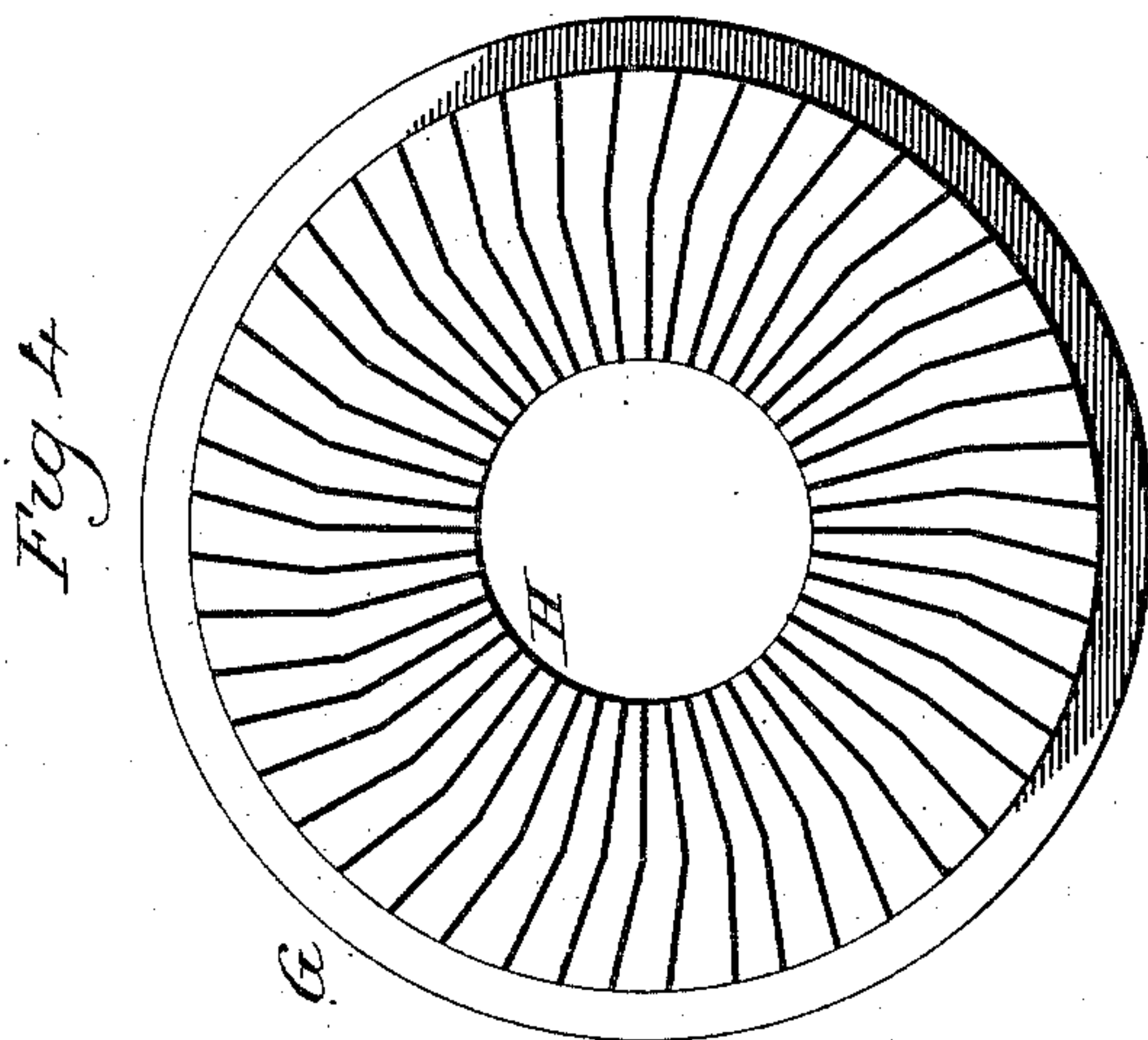
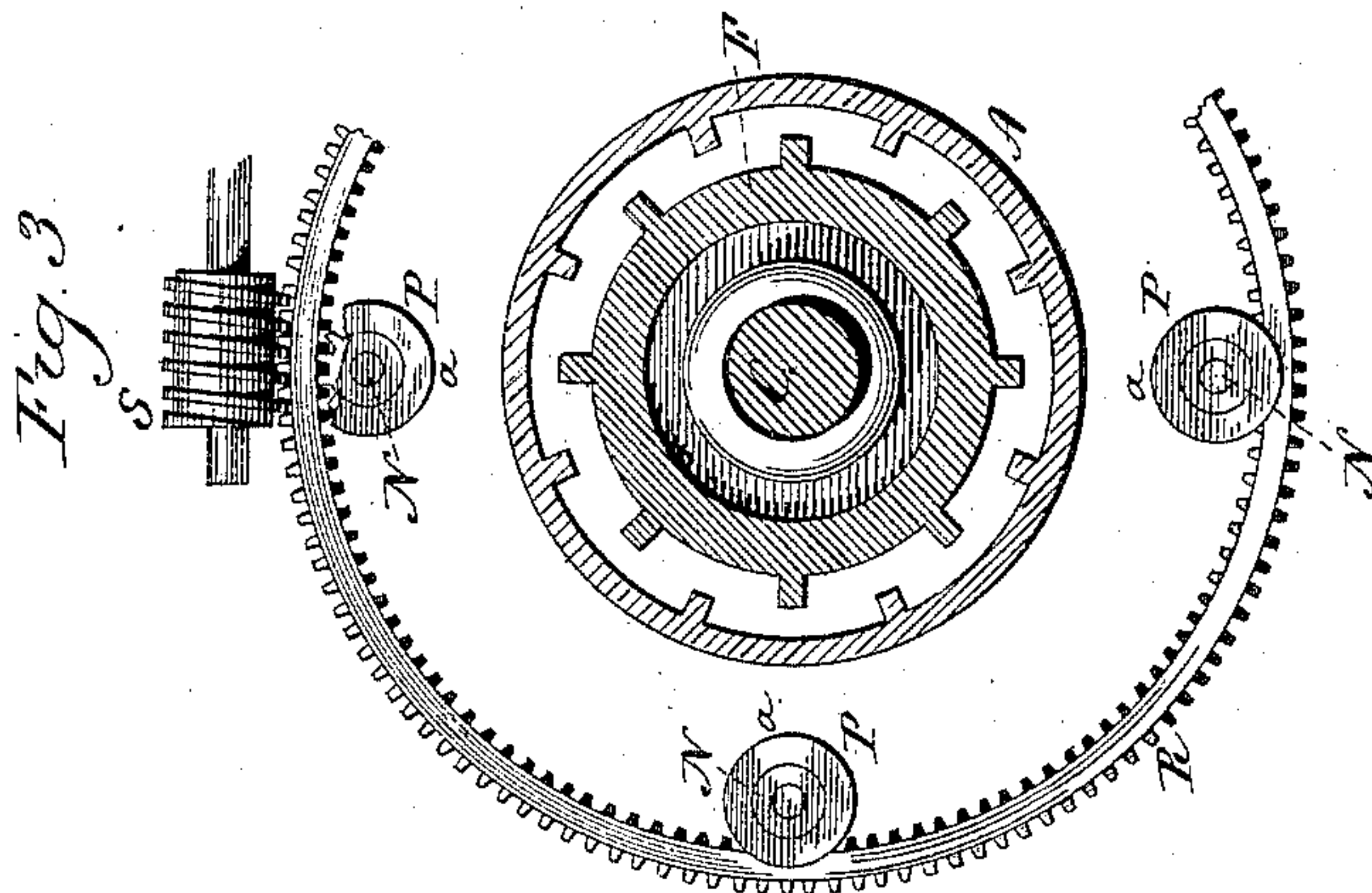
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PULP BEATING ENGINE.

No. 411,251.

Patented Sept. 17, 1889.



Witnesses
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Fred C. Edie

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UNITED STATES PATENT OFFICE.

EDWARD R. MARSHALL, OF TURNER'S FALLS, MASSACHUSETTS, ASSIGNOR
TO THE MARSHALL ENGINE COMPANY, OF SAME PLACE.

PULP-BEATING ENGINE.

SPECIFICATION forming part of Letters Patent No. 411,251, dated September 17, 1889.

Application filed July 9, 1888. Serial No. 279,365. (No model.)

To all whom it may concern:

Be it known that I, EDWARD R. MARSHALL, of Turner's Falls, in the county of Franklin and State of Massachusetts, have invented a new Improvement in Pulp-Beating Engines; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a side view of the machine complete; Fig. 2, a longitudinal central section of the same, showing portions in side view; Fig. 3, a transverse section in rear of the circular rack, showing the engagement of the rack with the several adjusting-screws; Fig. 4, a face view of the stationary disk; Fig. 5, a face view of the revolving disk.

My invention relates to an improvement in that class of pulp-beating engines in which the engine consists, principally, of a stationary casing of frustum-of-cone shape carrying longitudinal cutters or beaters upon its inner surface, combined with a revolving shaft arranged longitudinally through said casing and carrying a correspondingly-shaped revolving cone provided with longitudinal ribs or beaters upon its surface, which, under the revolution of the said cone within the case, coact with the ribs or cutters upon the interior of the case, so that the pulp to be beaten is introduced at the smaller end of the casing and gradually works its way through to the larger or delivery end of the case, the pulp being beaten in its progress through the case, and the pulp so beaten delivered from the case to the machine, which makes a continuous sheet from the beaten or ground pulp so delivered thereto.

In Letters Patent of the United States No. 342,802, dated June 1, 1886, improvements in this class of machines were described, which consist in the arrangement of a stationary plate at the delivery end of the cylinder, combined with a corresponding revolving disk on the arbor, the adjacent faces of the said stationary plate and revolving disk being armed with cutting-knives, and so that the

beaten pulp as it came from the case would pass between the said revolving disk and stationary plate, and be thereby further cut, beaten, or ground. In that patent the stationary plate was made adjustable by constructing the plate in the form of a ring arranged to slide longitudinally upon a cylindrical portion of the case, and around this cylindrical portion of the case, in rear of the stationary plate, a spiral or screw-thread was formed, on which a concentric collar worked as a nut. This collar was connected with the stationary plate, but so that the collar could revolve, while the stationary plate was only permitted a longitudinal movement under adjustment. The periphery of the said collar was constructed with teeth, into which a worm was arranged to work, so that by the rotation of the worm the said collar would be caused to rotate around the casing and travel toward or from the revolving plate, according to the direction of rotation, like the nut upon a screw, and such travel of the collar imparted corresponding movement to the said stationary plate to bring its face nearer to or farther from the corresponding face of the said revolving plate, as the case might be.

The object of the first part of my invention is to provide several adjusting-screws to act upon said stationary plate in lieu of the said nut-like collar and avoid the great friction which necessarily exists between the said nut-like collar and its thread on the case; and the said first part of my invention consists in combining with the said adjustable stationary plate two or more adjusting-screws supported in stationary bearings, the axis of said screws being parallel with the axis of said stationary plate, each of said screws working in corresponding longitudinal and threaded seats in the said stationary plate, the said screws each provided with a pinion of like diameter and teeth, through which rotation may be imparted to said screws, with a circular rack concentrically around the case, the said rack toothed upon its inner surface corresponding to the teeth of the pinion on the screw and arranged to work therein, with means for imparting rotation to said rack, and whereby, under the rotation of the rack, the several adjusting-screws will be

caused to revolve, and thereby adjust the said stationary plate with relation to the revolving plate, according to the direction in which the screws are turned.

5 In this class of machines as heretofore constructed the stock has been all supplied to the extreme end of the machine opposite the point of delivery.

10 In the manufacture of paper it is frequently advisable to employ two or more qualities of stock, one of which requires considerably more beating or grinding than the other; but where the stock is all introduced at the rear end of the machine all the stock will be treated
15 to the same amount of beating, grinding, or cutting irrespective of its condition or quality.

The object of the second part of my invention is to construct the machine so that stock of different grades may be introduced at different points in the machine, according to the
20 amount of work required upon such stock.

To this end the second part of my invention consists in constructing the case of the machine with a principal receiving-opening at
25 the rear end of the machine and one or more receiving-openings between the said principal opening and the delivery end of the case, whereby the stock requiring the greatest amount of manipulation may be first introduced to the machine, and stock requiring
30 less manipulation be introduced to the machine later.

A represents the case of the machine, supported upon a base B. The interior of the
35 case is of conical shape and is provided with longitudinal ribs or cutters, as in the usual construction. Longitudinally and centrally through the case is the usual driving-shaft C, supported in bearings D D, and to which
40 power is applied to impart revolution thereto through a pulley E or otherwise. Within the case the shaft C carries the cone F, of shape corresponding to the interior of the case, and carrying upon its periphery longitudinal ribs
45 or cutters, also as in the usual construction of this class of machines. These machines are so well known that a more particular description is unnecessary.

G represents the stationary plate, which is
50 arranged at the delivery end of the case, as in the before-mentioned patent, but extends inward nearer to the shaft than in my previous patent, there being a central opening H through the plate around the shaft, through
55 which the material coming from the case may pass.

The plate G is constructed with a concentric flange I, which extends rearward onto a corresponding cylindrical portion J of the
60 case, and so that the said stationary plate may take a firm bearing on the case, but yet be permitted a limited amount of longitudinal adjustment, as in my previous patent.

K represents the revolving disk, which is
65 made fast to the shaft C and so as to revolve in a plane parallel with the plate G. The adjacent faces of the stationary plate G and the

disk K are provided with cutters, as in my previous patent, and as seen in Figs. 4 and 5.

Outside the disk K a cap L is arranged
70 concentrically upon the shaft, and which cap extends over the periphery of the disk K and is secured to the stationary plate, the cap forming a chamber within which the revolving disk operates. The cap is also provided
75 with a stuffing-box M around the shaft to make a tight bearing between the shaft and cap, but yet so as to allow the shaft to revolve freely.

The revolving disk K, being fixed to the
80 shaft, is not permitted adjustment; but the stationary plate G, which carries the cap K, is permitted adjustment with relation to the revolving disk, so that the cutters of the disk and plate may be set nearer to or farther
85 from each other, according to the nature of the work required. To thus adjust the stationary plate G, I arrange two or more adjusting-screws N in stationary bearings O on the outside of the case and in rear of the
90 flange I of the plate G, the axis of the screws being parallel with the axis of the driving-shaft C. I represent four of these screws. They are each tapped into the flange I of the
95 plate G, as seen in Fig. 2. The screws are supported in their respective bearings so as to prevent longitudinal movement of the screws, yet permit their revolution. Consequently as the screws are rotated they will
100 impart a longitudinal movement to the plate G, corresponding to the thread of the screws and according to the direction in which the screws are turned.

In adjusting the plate G it is necessary that it shall be moved at all points simultaneously.
105 To do this I provide each of the screws with a pinion P, the several pinions all being in the same plane, and around the cylinder over the several pinions I arrange a rack R. This rack is toothed upon its inner side, corresponding to the teeth of the several pinions,
110 as seen in Fig. 3, and so as to work therein and make a connection between all the screws, so that any movement imparted to one of the screws will be communicated to all alike.
115 This rack is represented as supported on the pinions, the pinions being constructed with flanges a a upon opposite sides of the rack, as seen in Fig. 2. To operate the rack, it is constructed upon its periphery with teeth into
120 which a worm S is arranged to work. This worm is supported in suitable bearings T, on the case, leaving the worm free to revolve, say, under power applied to a hand-wheel U, but is prevented from longitudinal movement in the
125 usual manner for worms of this character. The worm works into the teeth upon the periphery of the rack in the usual manner for the working of worm-gears, so that a rotation imparted to the worm will be communicated to
130 the rack, and through the rack to the several screws, thereby insuring a like and simultaneous movement to all the screws. Under the revolution of the screws, imparted as be-

fore described, the stationary plate G will be adjusted toward or from the revolving disk K, according to the direction in which the screws are turned, so that the cutting-faces of the stationary plate and revolving disk may be brought to any desired relative position.

While I prefer the employment of a worm as a means for rotating the rack, it will be understood that the worm may be omitted and the rack otherwise operated—say as by applying the hands directly thereto—such movement imparting equal and simultaneous revolution to the several adjusting-screws.

The material is introduced into the machine in the usual manner, and, passing through the case, finds its way between the revolving disk and stationary cutter, where it is operated upon, and thence escapes through the outlet V, as in my previous machine; but under this construction a greater extent of cutting by the plate and disk is attained than in the previous patent, and it is produced nearer the shaft than in that said patent.

The stock to be operated upon is introduced into the rear end of the machine through an opening a' , as in my previous patent. In addition to this first opening a' for the introduction of stock, I construct the case with one or more openings forward of this opening a' —say one opening, as at b , Fig. 2—and these openings are provided with the usual hoppers, as seen in Fig. 1, through which stock is supplied to the machine. By thus providing receiving-openings to the case at points varying in distance from the delivery end of the machine I am enabled to first introduce the stock which requires greater manipulation, and then later to introduce the grade of stock which requires less manipulation, so that not only will the stock be properly mingled, but will be properly worked.

With the exercise of the greatest care in the examination and preparation of stock for the machine foreign substances—such as small pieces of metal—will escape such inspection and enter the machine with the stock, and if permitted to pass through the machine unavoidably injure the cutters or beaters to a greater or less extent. To separate such foreign substances from the stock, a chamber or receiver has been provided in the lower part of the case under the cone, into which such heavy or foreign substances would finally fall, and so prevent their passage entirely through the machine; but, owing to the location of the receiver directly under the cone, such foreign or obstructing material must necessarily pass through the first portion of the beaters or cutters and unavoidably injure those beaters or cutters to a greater or less extent. To remove such obstruction from the material to be beaten or ground before such obstruction can reach the beaters, I make the case of sufficient length, extending to the rear of the cone so far as to enable me to form a chamber d in the lower

part of the case and in rear of the cone, as seen in Fig. 2, so that the hard foreign or obstructing substances as they pass into the case, necessarily sinking to the bottom, will fall into this chamber d before it is possible for them to have reached the beaters, and thus avoid possible contact or interference with the beaters. The bottom of the chamber may be made to open, so as to remove such heavy materials.

From the foregoing it will be understood that I claim nothing in this application shown or described in said Patent No. 342,802, my present invention being an improvement thereon; and I do not claim, broadly, the case of a pulp-beating engine having two or more feed-openings, as such I am aware is not new; but

What I do claim is—

1. In a pulp-beating machine substantially such as described, the combination of the revolving disk K, the stationary plate G, longitudinally adjustable upon the outside of the case and toward or from the said revolving disk, two or more adjusting-screws N, supported in stationary bearings on the case against longitudinal movement, but free for revolution, said screws tapped into the said plate, the said screws each provided with a toothed pinion, with a circular rack constructed to engage the pinions of the several screws, substantially as specified, and whereby under the rotation of the said rack the said screws will impart longitudinal adjustment to the said stationary plate G toward or from the revolving disk.

2. The combination of the case A, constructed with a feed-opening a' and one or more feed-openings, as b , between said feed-opening a' and the delivery end of the machine, the said case gradually increasing in diameter from the said feed-opening toward the delivery end, the revolving cone F within the case, the interior of the case and the surface of the cone constructed with corresponding longitudinal grinding-ribs, the longitudinal adjustable plate G at the delivery end of the machine, the cap L, secured to said plate and forming a chamber at the delivery end of the machine, and the revolving disk K in the said chamber, all substantially as described.

3. In a pulp-beating engine, a conical case, combined with a corresponding revolving cone upon the inside, the cone and case constructed with corresponding cutting or beating ribs, the case constructed with a feed-opening at its smaller end and with a chamber d in the bottom of the case at the smaller end opening directly from the case, substantially as and for the purpose described.

EDWARD R. MARSHALL.

Witnesses:

WILLIAM P. CROCKER,
WILLIAM O. CROCKER.