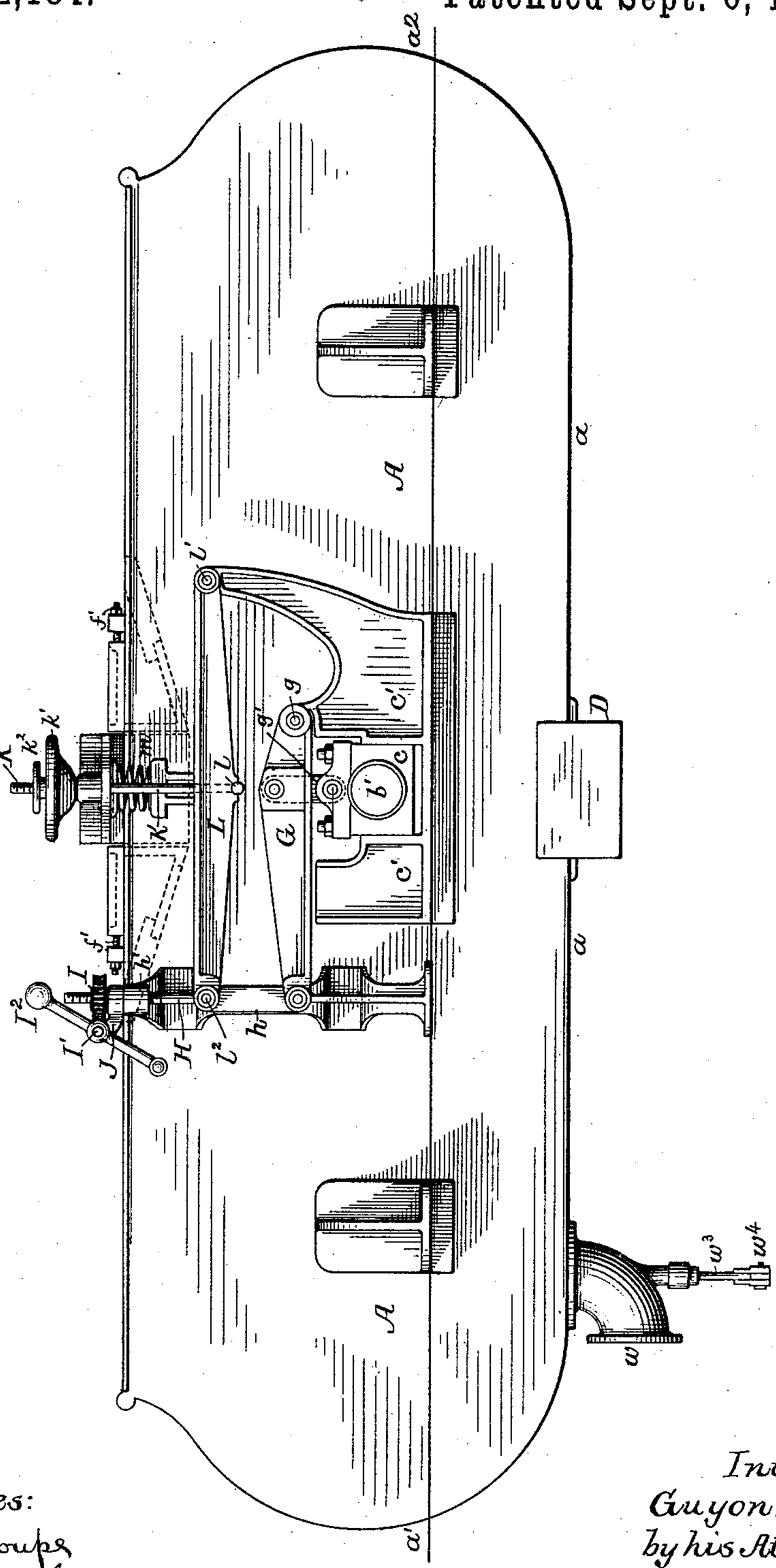
(No Model.) 4 Sheets—Sheet 1.

G. MILLER.

PULP ENGINE.

No. 482,184. Patented Sept. 6, 1892.

FIG. 1.



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(No Model.) 4 Sheets—Sheet 2.

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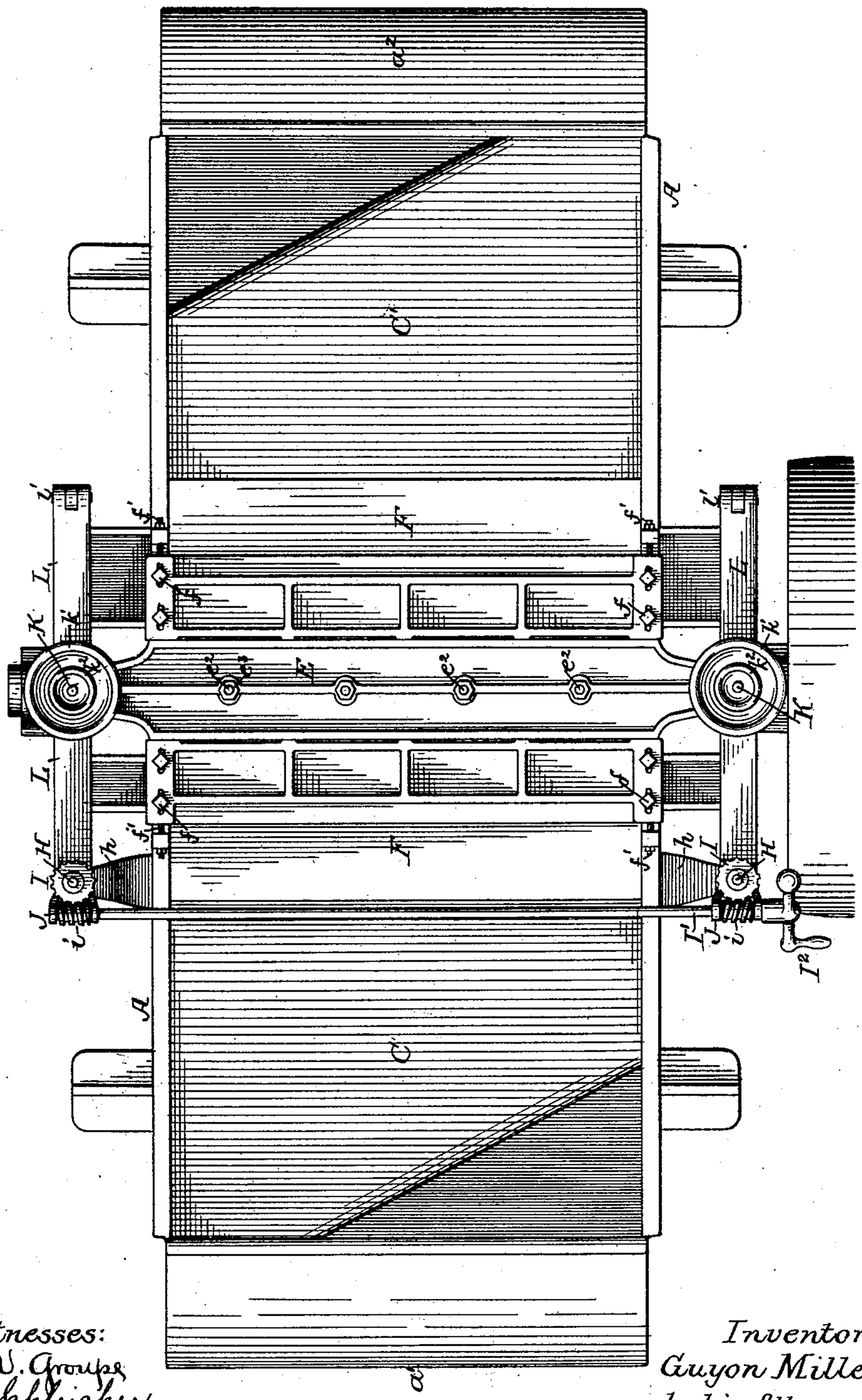
FIG. 2



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(No Model.) 4 Sheets—Sheet 3.

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PULP ENGINE.

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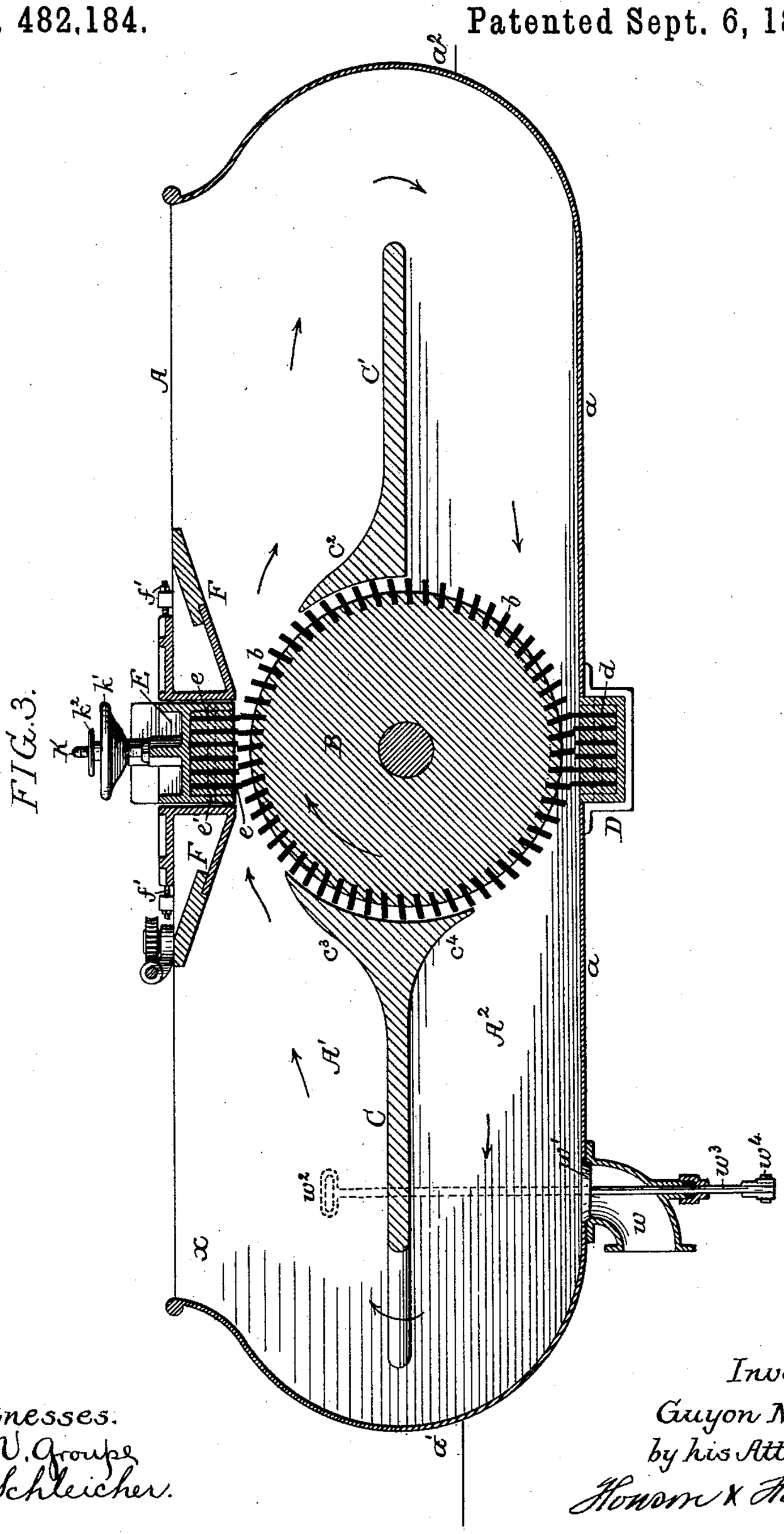
FIG. 3.



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(No Model.) 4 Sheets—Sheet 4.

G. MILLER.

PULP ENGINE.

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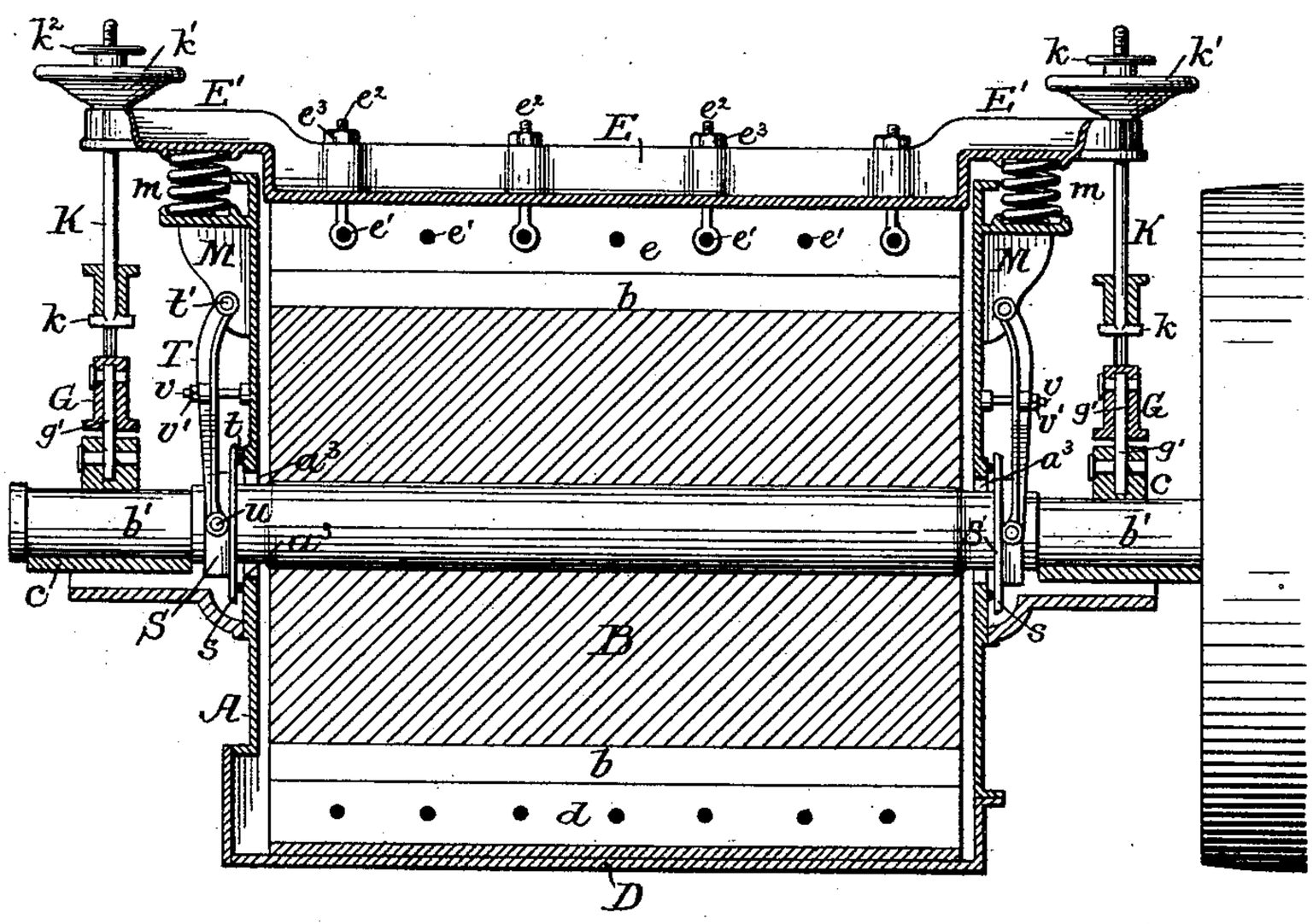
FIG. 4.



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UNITED STATES PATENT OFFICE.

GUYON MILLER, OF DOWNINGTOWN, PENNSYLVANIA.

PULP-ENGINE.

SPECIFICATION forming part of Letters Patent No. 482,184, dated September 6, 1892.

Application filed October 23 1891. Serial No. 409,588. (No model.)

To all whom it may concern:

Be it known that I, GUYON MILLER, a citizen of the United States, and a resident of Downingtown, Chester county, Pennsylvania, have invented certain Improvements in Pulp-Engines, of which the following is a specification.

The object of my invention is to so construct a pulping-engine that it will thoroughly pulp the material and to so arrange the parts that its capacity will be materially increased. At the same time the floor-space occupied by my improved machine will be of much less area than the space occupied by the machines now in common use.

In the accompanying drawings, Figure 1 is a side view of my improved pulping-engine. Fig. 2 is a plan view. Fig. 3 is a longitudinal sectional view, and Fig. 4 is a transverse sectional view.

I would state at the outset that my improved engine is of a type in which the mid-feather or central partition forming the two passage-ways is horizontal instead of vertical. Therefore the passage-ways are one above the other and not arranged side by side. Consequently the width of the machine is greatly decreased, thus reducing the area of the floor-space occupied.

Referring to the drawings, A is the casing, preferably made of metal and of the shape shown, having a flat bottom plate *a*, slightly inclined toward the delivery end and rounded ends a' a^2, the upper portion of the casing being open.

Situated at or about the center of the casing is the transverse disintegrating-roll B, having suitable blades *b* of the usual form and secured to the roll in the usual manner. The journals b' of this roll are adapted to boxes *c c* in guides c', secured to the exterior of the casing A. The journals pass through elongated openings a^3 in the casing, which are suitably closed by caps, described hereinafter. On one of the journals is mounted a suitable driving-wheel, through which motion is imparted to the disintegrating-roll B.

Separating the casing into two sections or passages A' A^2 are two partitions C C′, one on each side of the roll B, forming a mid-feather on a line with the center of the roll. Both partitions stop short of the ends of the casing, and their edges are on an angle, as clearly shown in Fig. 2, so as to turn the stock as it passes from one passage to the other. The travel of the stock in the engine is clearly indicated by the arrows in Fig. 3. The partition C has a curved guideway c^3 for guiding the stock over the roll B, while the partition C′ has a curved back fall or receiving-way c^2, which removes the stock from the roll and directs it to its course through the passage A′. On the under side of the partition C is a guide c^4 for directing the stock from under the roll B.

Directly below the roll B is a series of disintegrating-knives *d*, held in a box D in the usual manner. This box is fixed as regards any vertical movement.

Directly above the roll B is a series of disintegrating-knives *e*, held in a vertically-movable box E. This box is so geared to the roll that it will raise or lower with the roll when it is raised or lowered.

On each side of the box E are frames F F, the lower portions of the frames being beveled toward the knives, so that the stock will not pack around the box, but will pass through between the upper portion of the roll and the upper knives. These frames are secured to the casing by clamp-bolts, which are adapted to slots in the flanges of the frames, and the frames can be adjusted toward or from the box by set-screws f'. It will be seen by the above description that the roll acts in conjunction with two sets of knives, attacking the stock first in the lower passage A^2 and then in the upper passage A′. Thus the stock is acted upon twice during one circuit of the machine, and the forward motion of the stock is increased, owing to its being propelled both in the upper and lower passages by the roll.

I will now describe the mechanism for raising and lowering the roll and upper knife-box. On each side of the casing A is a lever G, pivoted at *g* in the present instance to one of the guide-frames c'. The boxes *c* for the trunnions of the roll are suspended from each lever by links g', as clearly shown in Fig. 1. The outer end of each lever G is connected by a link *h* to a vertically-adjustable screw-rod H, adapted to suitable bearings h' on the side of the casing. Adapted to the

screw-threads of the rods H is a nut I in the form of a worm-wheel having teeth on its periphery engaging with the worm *i*. A transverse shaft I′, adapted to bearings J, caries a worm *i* at each end. The worms engage with their respective worm-wheels I, as clearly shown in Fig. 2. The transverse shaft is provided with a handle I^2, by which it can be turned so as to raise and lower the lever, and consequently raise and lower the disintegrating-roll B.

In order to raise the upper knife-box at the same time as the roll, and so that it will lift automatically when the roll is lifted by any foreign matter passing between the knife and roll, I connect the upper knife-box in the following manner: The knife-box E has two side extensions E′, through which pass rods K K. These rods are T-shaped at their lower ends, so as to rest in sockets *l* in levers L on each side of the machine. The opposite ends of the lugs K are screw-threaded, and adapted to these screw-threads are handled-nuts *k′* and jam-nuts k^2. The lever L is pivoted at *l′* to guide-frames *c′* or to a bracket on the casing, the opposite end of the lever being connected at l^2 to the link *h* and the rod H, so that any adjustment of the rod H will not only adjust the roll lever and roll, but also the box-lever and upper knife-box. In the present instance I place the fulcrum of the roll-lever G nearer the connection of the link to which is attached the roll-box than the fulcrum *l′* of the lever L to the connection with the upper knife-box, so that if the roll is lifted one inch the upper knife-box is raised more than an inch, according to the distance between the fulcrum of the lever and the weight. In the present instance I so arrange it that if the roll is raised one inch the upper knife-box will be raised two inches, leaving a clearance of an inch between the roll and upper knife-box. The upper knife-box is mounted upon two springs *m m* on each side of the machine, the springs resting upon brackets M, projecting from the casing A.

In place of the springs weighted levers may be used, being the equivalent of the springs, or indirect-acting springs may be used, which are also the equivalent of the direct-acting spring shown.

I mount the bearings J, carrying the transverse shaft I′, on the vertical rods H, as shown clearly in Fig. 1, the bearings resting upon the brackets *h′* at the side of the machine. The bearings are not secured to the brackets, but are free as regards any vertical motion, so that if by accident any foreign matter should pass between the rolls and either of the knives, as is often the case in pulp-engines, the bearings J will be lifted off their seats as the rods H will be raised by the roll or the upper knife-box. Consequently while the roll and upper knife-box can be regulated by turning the shaft I′ it will not interfere with the movement of either the roll or knife-box, as above described.

In order to prevent leakage through the openings a^3 in the sides of the casing, I mount on each spindle *b′* a neat-fitting ring S. Between a flange *s* on the ring and the casing I insert a packing-ring *t*, and the ring S is kept up against the packing by a lever T, fulcrumed at *t′*, having preferably a roller *u*, which bears against the flange *s* of the ring. A bolt *v* on the casing passes through an opening in the lever, and on this bolt is a nut *v′*, so that on screwing up this nut the lever is pressed against the ring, preventing any leakage between the casing and the ring. At the same time this arrangement does not interfere with the free vertical movement of the ring with the roll.

The blades *e* of the upper knife-box E are secured together and to the separated pieces by transverse pins *e′*. Some of these bolts pass through eyes in eyebolts e^2, which extend up through the box E and are provided with nuts e^3, which firmly hold the blades *e* in the box.

w is the outlet for the casing and is provided with a suitable valve *w′*, which is operated by a suitable handle w^2, connected to the stem w^3 by a lever w^4. This valve is of the ordinary construction.

The operation of my improved pulp-engine is as follows: The pulp is introduced into the machine, preferably at the end *x*, Fig. 3, and is carried forward, as indicated by the arrows, Fig. 3, between the disintegrating-roll and the upper blade *e* and after passing through the passage A′ is carried to the lower passage A^2 under the partitions C. It is then carried between the roll and the lower blades *d*, passing to the opposite side of the roll. This course is followed until the stock is thoroughly treated, after which it is discharged in the ordinary manner. The stock in passing from one compartment to the other travels over the inclined end of the partition or mid-feather, and consequently the fibers of the stock are rearranged before being presented to the knives. Thus I am enabled to thoroughly disintegrate the stock in an even manner throughout. The upper knives more readily disintegrate the light stock and the lower knives act more readily upon the heavy stock. If any foreign matter—such as a piece of metal—should by accident enter the machine, it would be drawn toward the roll and carried thereunder, raising the roll without injuring any portion of the machine, and when the metal passes the roll it would remain undisturbed in the lower passage, to be removed when the machine is cleaned.

In some instances I may construct a machine in which the lower set of knives is dispensed with, using only the upper set when a specific pulp is to be operated upon.

I claim as my invention—

1. The combination, in a pulping-engine, of the tank, the disintegrating-roll B, and partitions C C′, one on each side of the roll, forming the mid-feather which separates the tank into

upper and lower passages, with upper disintegrating-blades directly above the roll and acting in conjunction therewith, substantially as described.

2. The combination of a casing, the disintegrating-roll, and the mid-feather forming upper and lower passages in the casing with disintegrating-blades situated below the roll and acting in conjunction therewith on the stock as it passes through the lower passage and upper disintegrating-blades acting in conjunction with the blades on the stock as it passes through the upper passage, substantially as set forth.

3. The combination of the casing, a central disintegrating-roll therein, the horizontal mid-feather on each side of the roll, forming upper and lower passages, one or both of the outer ends of the mid-feather being at an angle, substantially as described.

4. The combination of the casing, a central mid-feather forming two passages, and a disintegrating-roll mounted in the casing and projecting into each passage with disintegrating-blades in each passage, acting on the stock in conjunction with the roll, substantially as described.

5. The combination of the casing, the mid-feather, the fixed lower blades, the vertically-movable roll, the vertically-movable upper blades, and mechanism, substantially as described, whereby the carrier of the upper blades is connected to the roll, so that when the roll is raised the upper blades will be raised, substantially as described.

6. The combination of the casing, the mid-feather separating the casing into upper and lower passages, a roll extending into both passages, fixed lower blades, movable upper blades, boxes for the trunnions of the roll, levers connected to said boxes, levers connected to the upper blade-carrier, said levers being connected together, and mechanism for raising and lowering the rolls and blades, substantially as described.

7. The combination of the casing, the mid-feather, a disintegrating-roll, bearings for the journals of said roll, the fixed lower blades, the vertically-movable upper blades, a lever on each side of the casing, linked to the bearings for the roll, a lever on each side of the casing, connected to the upper blade-carrier, connections between the roll-levers and the blade-levers, vertical screw-rods connected to said levers, nuts on said screw-rods having gear-teeth in the periphery, a transverse shaft, and worms on said transverse shaft gearing with the teeth of the said nuts, substantially as described.

8. The combination, in a pulping-engine, of the upper blade-casing, blades therein, filling-pieces between said blades, transverse securing-pins for the said blades, and eyebolts through which the pins pass, said bolts passing up through the box, with nuts adapted to said bolts, substantially as described.

9. The combination, in a pulping-engine, of the casing, the upper blades, box therefor mounted in said casing, and a disintegrating-roll connected to the box with springs or their equivalents situated between the casing and the box, said springs tending to raise the blade-box, substantially as described.

10. The combination of the casing, disintegrating-roll, vertical adjusting-rods connected to the bearings of said roll, adapted to guideways on the casing, threaded worm-wheels on the bars, a transverse shaft, worms on the shaft, engaging with the worm-wheels, and bearings for said shaft mounted on the upright rods and resting on the guides therefor, so that any accidental raising of the roll will not disengage the gearing, but merely raise the bearings of the transverse shaft, substantially as described.

11. The combination of the casing, the disintegrating-roller, bearings therefor, levers connected to said bearings, upper disintegrating-blades, carrier therefor, levers connected to said carrier, and connections between the roll-levers and the blade-levers, the fulcrum of the blade-lever being at a greater distance from its weight than the fulcrum of the roll-lever, whereby when the roll is raised the blades will be moved a greater extent than the roll, substantially as described.

12. The combination of the casing, openings in the side of said casing, a disintegrating-roll, the trunnions of said roll extending through the openings in said casing, flanged rings adapted to said trunnions, pivoted levers adapted to bear against said rings, and bolts for holding the levers against the ring with annular packing between each ring and the casing, substantially as described.

13. The combination, in a pulping-engine, of the casing, the disintegrating-roll, the upper knife-box situated above the roll, knives contained in said box, and frames on each side of the knife-box, the lower portion of each frame being beveled toward the knives, so as to guide the stock thereunder, substantially as described.

14. The combination of the casing, disintegrating-roll, the upper disintegrating-knives situated above the roll, a box for said knives, frames on each side of the box, having inclined portions, said frames being adjustable upon the casing, and set-screws for adjusting said frames and locking each frame in the adjusted position, substantially as described.

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

GUYON MILLER.

Witnesses:
HENRY HOWSON,
WILLIAM D. CONNER.