(No Model.) 2 Sheets—Sheet 1.

# F. J. MARSHALL.

## PULP BEATING ENGINE.

No. 342,802. Patented June 1, 1886.

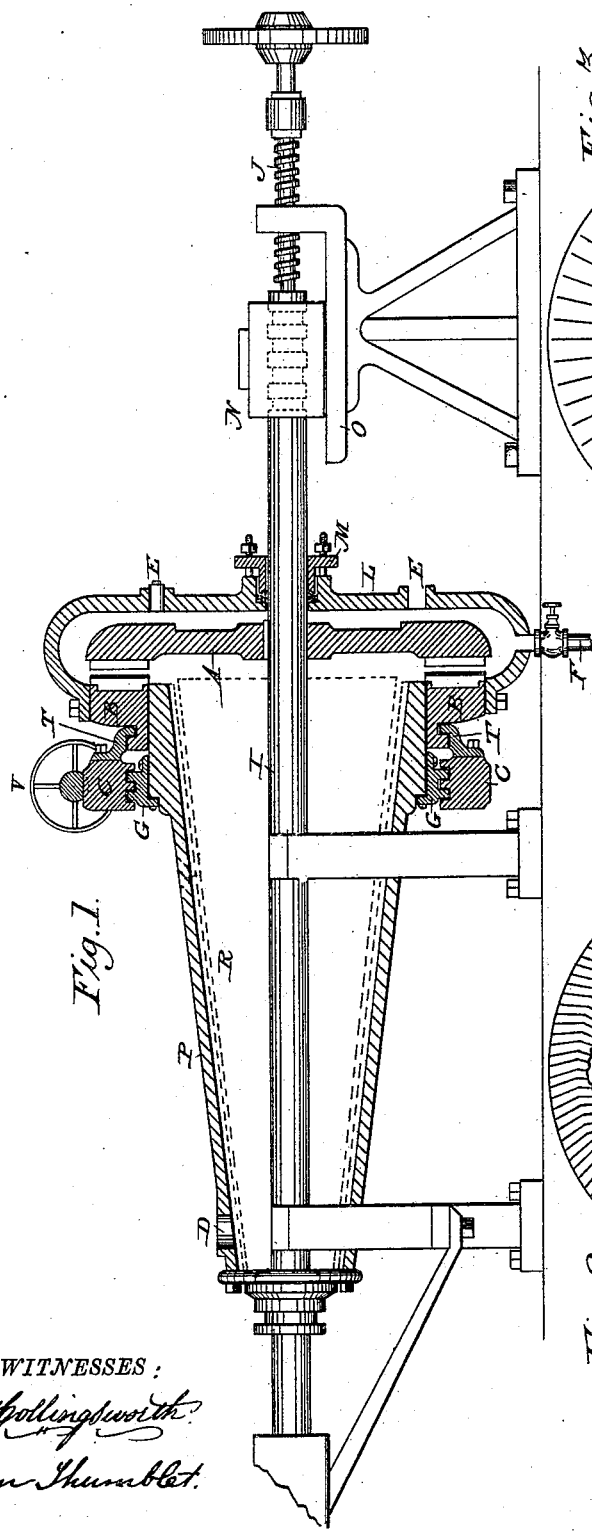

Fig. 1.

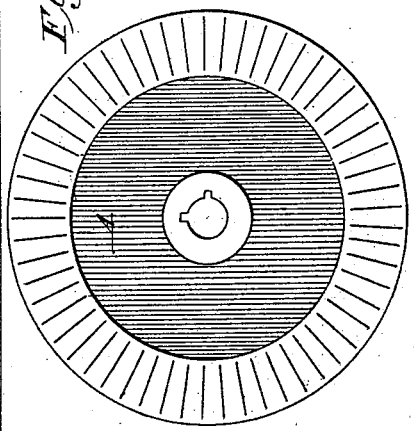

Fig. 3.

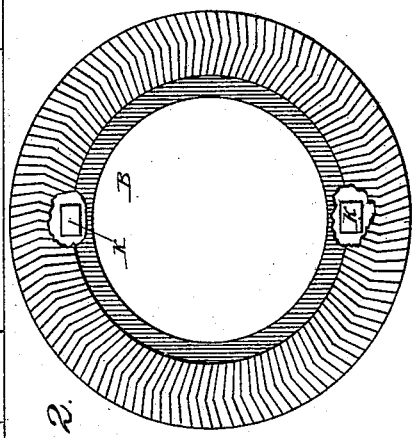

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

# F. J. MARSHALL.

## PULP BEATING ENGINE.

No. 342,802. Patented June 1, 1886.

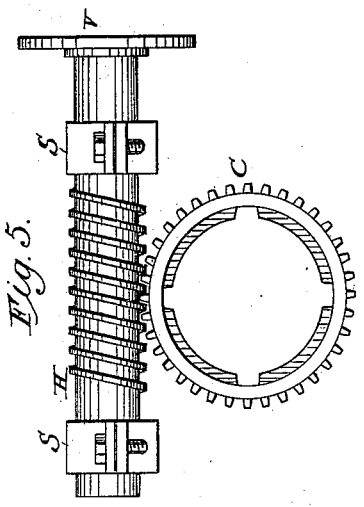


Fig. 5.

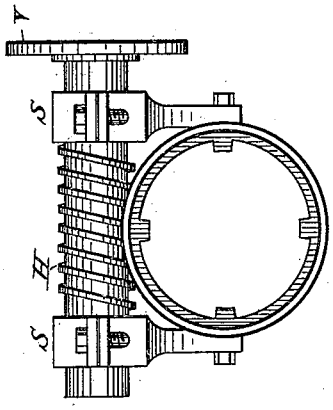


Fig. 6.

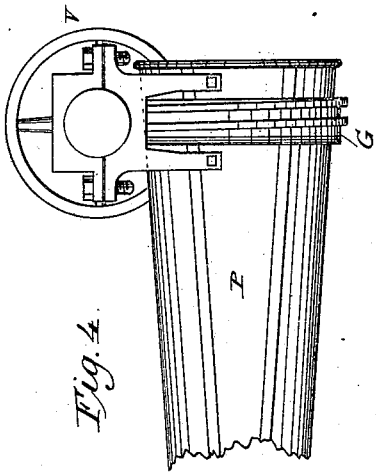


Fig. 4.

WITNESSES:

W. W. Hollingsworth

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INVENTOR:

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# UNITED STATES PATENT OFFICE.

FRANK J. MARSHALL, OF TURNER'S FALLS, MASSACHUSETTS.

## PULP-BEATING ENGINE.

SPECIFICATION forming part of Letters Patent No. 342,802, dated June 1, 1886.

Application filed February 12, 1886. Serial No. 191,746. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK J. MARSHALL, a citizen of the United States, residing at Turner's Falls, in the county of Franklin and Commonwealth of Massachusetts, have invented a new and useful Improvement in Pulp-Beating Engines for Making Paper, of which the following is a true and full specification.

My invention relates to an improvement in that class of engines used in the manufacture of paper in which the pulp is ground or beaten up just previous to its being discharged onto the machine which makes the continuous sheet of paper.

Those at all familiar with the art of paper-making well know the difficulty of perfectly reducing the pulp to the finely-comminuted condition required to make fine and strong paper. Even with the greatest care it is almost impossible with the pulping-engines in common use to get the pulp through and on the screen free from knots and threads, which, not being able to pass through the screen, clog it up, causing delay and considerable waste.

To make the best paper, it is absolutely necessary that the pulp should be ground to the finest degree.

My invention, when attached to one of the engines long in common use, remedies this great defect, and, by a different action of the grinding force, succeeds in most thoroughly comminuting the pulp.

It consists of two circular vertically-placed plates or disks having on their inside faces cutting-knives, one of these plates being fixed. The other revolves, bearing the pulp, as it is forced through the engine, between the plates around and grinding it fine.

The accompanying drawings represent the invention and form part of this specification, Figure 1 being a longitudinal section through engine-case; Fig. 2, an elevation of disk A; Fig. 3, an elevation of disk B; Fig. 4, a side elevation of engine. Figs. 5 and 6 are front elevations of the mouth of the engine.

Similar reference-letters indicate like parts in all the figures.

A is a disk, having knives set on its inside near its circumference, and is revolved by means of the shaft I, to which it is firmly keyed.

B is a stationary disk, which I call a "bed-plate," having also knives around its inner circumference, against which the pulp is ground by the face of the rotating disk A. This stationary disk or bed-plate B, resting on the conical case P of the engine, moves forward and back, guided by keys K, bolted to the case and fitting in slots cut for the purpose on the inner circumference of the disk or bed-plate B. It is also supported and strengthened by the cap L, which forms the front of the machine, to which it is bolted. This cap L has two outlets, E, through either of which the pulp may be discharged. It also has in its center a stuffing-box, M, through which runs the driving-shaft I. The revolving disk A maintains a fixed position on the shaft in its revolution; but to adjust the grinding the disk or bed-plate B is moved forward or withdrawn by the action of a collar and gear-wheel, C, and worm H working on the case P in rear of the bed-plate, so that as the space between this and the revolving disk A is diminished the pulp will be ground finer as desired, and knots and fibers which have passed through between the case P and the plug R within it, both which have also cutting or grinding knives, will be entirely comminuted and refined.

The device for moving the bed-plate B back and forth the short distance required consists of a collar, G, encircling the case P and bolted to it. This has on its outer circumference a coarse thread, which meshes into a similar one on the inside of another collar, C, encircling it.

Bolted on the front side of the collar C is a flange, T, extending around the cone P and fitting into a slot in the rear of plate B, and controlling its movements as brought forward or back.

On the outer circumference of C is a gear, which meshes into a worm, H, on a shaft running across the case P, supported by standards S, bolted to the case, and it is controlled by a hand-wheel, V, which, turned to the right or to the left, actuating the worm H in the gear on the collar C, advances or retracts the collar C, and consequently affects the bed-plate B.

That part of the engine marked P is the

common pulping-machine, formed of a conical case lined with knives, and having revolving within it a "conical plug," so called, with knives on its circumference, which, acting on the others, grind the pulp as it is forced in near the smaller end at the inlet D, and by this and its speed and by centrifugal action the pulp is driven forward out at the front and larger end.

F is a valve for cleaning out the engine when found to be necessary.

N is the bearing of the shaft I, made to slide to and fro on the standard O, having lugs fitting into slots cut around the shaft, allowing the horizontal motion of the shaft at the same time with its rotary movement, the other end of the shaft having its bearing just outside the small end of the case P. The longitudinal action of this shaft is controlled by the hand-wheel and screw J, acting on the box N through a rest on the standard O, so that the plug R, which is keyed on the shaft I, may be moved in or out of the case P, or, as I propose to use it, set at a certain fixed point and revolved, while the bed-plate B is moved the required distance to work the pulp finely up to the revolving-disk A, where it is refined and passes out within the case L, and is at will discharged through the outlets E.

It will be observed that by using my device the pulp need not be ground so fine in the engine as is commonly done, and consequently the knives will last much longer without sharpening, or compelling the chipping out the usual intermediate blocks which secure the knives, often necessary to be done, an operation slow, clumsy, and necessitating stopping the machinery for some time.

The disks A B of my invention, with the knives or grinding-plates, can each be readily removed for replacing knives or cutting out the blocks or the substitution of another disk with knives set nearer each other, in case it is desired to grind the pulp to an extra degree of fineness.

It will be readily seen that the action of my device for reducing and refining paper-pulp is different from that of the engines in common use, where the pulp is simply beaten up, while mine also brushes and refines it from shreds and lumps.

What I claim is—

1. The combination of revolving and stationary disks or plates for grinding paper-pulp, constructed and arranged substantially as described.

2. The fixed and revolving disks for grinding paper-pulp, in combination with the conical-shaped engine in common use, constructed and arranged substantially as described.

3. The worm and gear, in combination with the screw-threaded collars, for moving the bed-plate back and forth, substantially as constructed and described.

4. The fixed and revolving disks, in combination with gear and worm for advancing or withdrawing the fixed disk or bed-plate in its action with the revolving disk, constructed as described.

5. The combination of the circular fixed and revolving disks secured as described with the worm-gear and conical-shaped engine, constructed as described.

FRANK J. MARSHALL.

Witnesses:
O. M. FARWELL,
WM. O. CROCKER.