

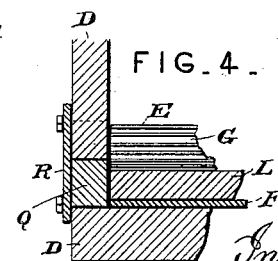
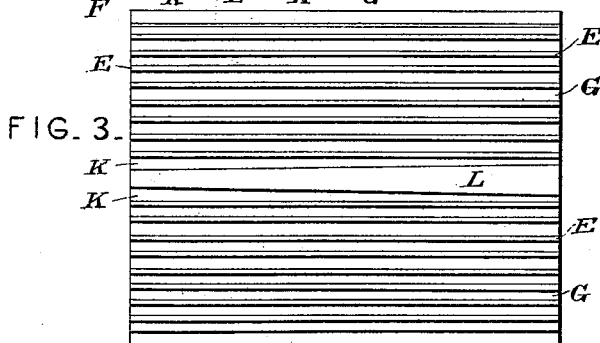
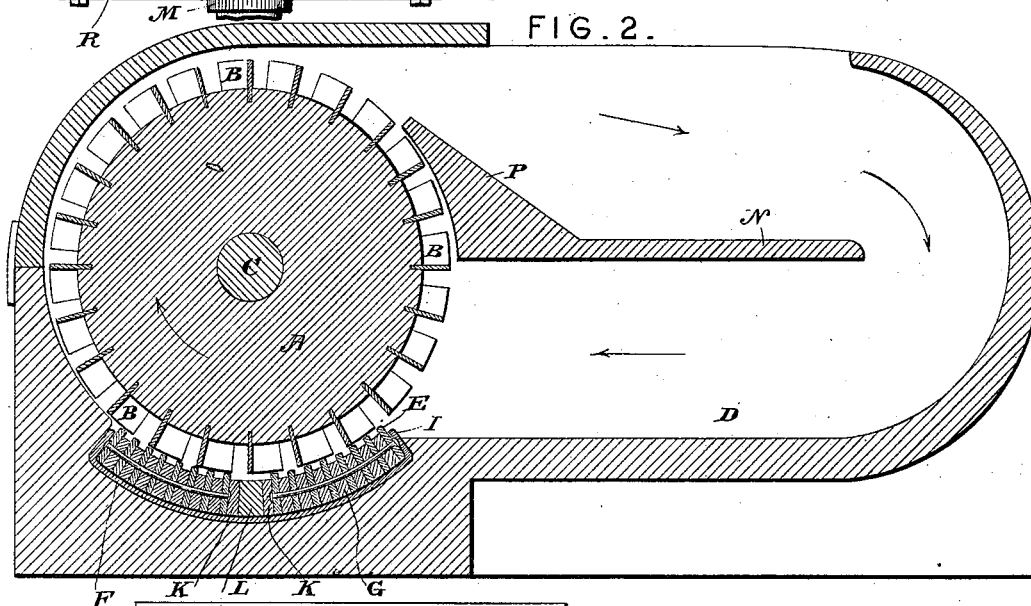
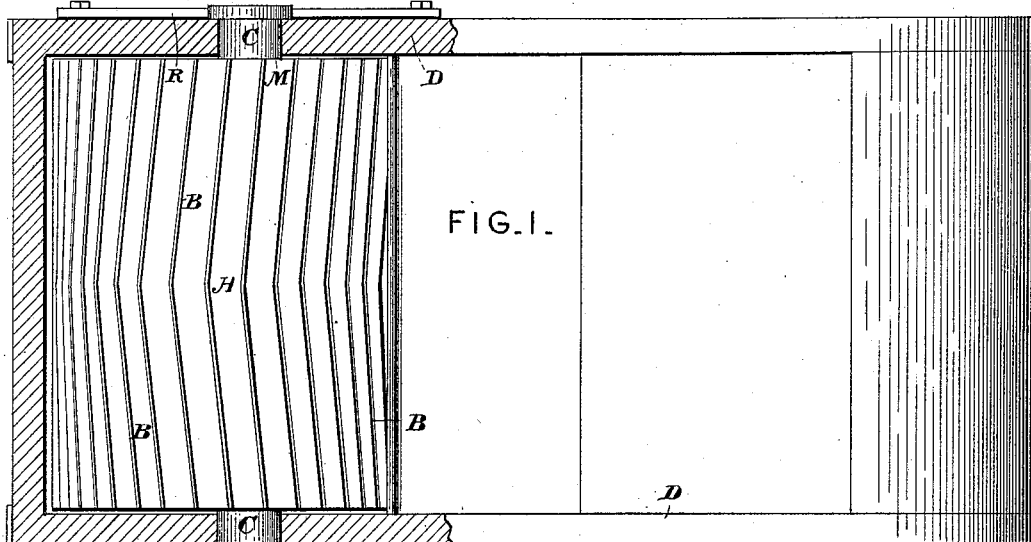
(No Model.)

J. HOYT.

RAG ENGINE FOR PAPER MAKING.

No. 303,374.

Patented Aug. 12, 1884.



Attest. { Geo. T. Smallwood.
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Inventor:
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UNITED STATES PATENT OFFICE.

JOHN HOYT, OF MANCHESTER, NEW HAMPSHIRE.

RAG-ENGINE FOR PAPER-MAKING.

SPECIFICATION forming part of Letters Patent No. 303,374, dated August 12, 1884.

Application filed June 21, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN HOYT, of Manchester, in the county of Hillsborough and State of New Hampshire, have invented a new and useful Improvement in Rag-Engines for Paper-Making, which improvement is fully set forth in the following specification.

This invention relates to engines for beating rags and similar fibrous material into pulp for the manufacture of paper. In these machines a beater-roll set with knives around its periphery is used, in combination with a bed-plate also set with knives, the said parts being placed in a tank or vessel in which a constant circulation of the material to be pulped is maintained.

Heretofore ordinarily the material has been circulated horizontally around an upright partition termed a "mid-fellow," and the beater-roll and bed-plate have been placed in the alley or channel between this mid-fellow and one side of the tank. The beater-roll lifted the material over a sort of dam, (termed a "back-fall,") and the material then flowed by the action of gravity around the mid-fellow and entered again between the beater-roll and the bed-plate. It has, however, been proposed to dispense with the mid-fellow and have the material returned under the back-fall and bed-plate. In either case, however, the circulating force is that of gravity due to the piling up of the liquid or semi-liquid on the side of the back-fall opposite from the beater-roll. Consequently the flow is comparatively feeble, and it is necessary to use a large quantity of water in order to prevent the fiber in suspension from depositing. In the present invention a much more rapid and vigorous circulation is maintained. The beater-roll is placed at one end of the vat, which is of a depth sufficient to contain it, and the other part of the vat is divided by a horizontal partition or division which extends from the beater-roll nearly to the other end. The material to be pulped is carried around by the beater-roll and is delivered into the upper section above the partition. It flows over the partition, then passes down around the end of the same and returns through the lower section of the vat to the beater-roll. The bed-plate is placed at the bottom of the vat under the beater-roll. The beater-roll not only draws in the material, creating a partial

vacuum in the lower section of the vat, but delivers it into the upper section with considerable force, impelling it forward very rapidly. By the aid of this more rapid as well as more vigorous circulation not only is the material returned more quickly, and therefore acted upon more often by the beater-roll in the same time, but it may be worked with a much less quantity of water, and thereby very important advantages may be secured. These advantages are, first, in the improved quality of the product, for when a considerable body of the fibrous material is drawn between the knives the different pieces are rubbed together and thus disintegrated without destroying the length and felting quality of the fiber, whereas when the pulp is thin the pieces are ground individually, as it were, between the knives, and the integrity of the fiber in large measure destroyed; secondly, in the greater quantity of pulp which can be prepared in a medium of given size, owing to the larger proportion of fibrous material in the charge, and thirdly, in avoiding the liability of the fibrous material depositing out of the liquid and lodging in the channels.

The invention consists in the new mode of and apparatus for circulating the fibrous material and water, and it also comprises certain particular constructions and combinations of parts, as hereinafter set forth.

The accompanying drawings represent a rag-engine constructed in accordance with the invention.

Figure 1 is a plan with a part of the casing or vat removed; Fig. 2, a vertical longitudinal section; Fig. 3, a plan of the bed-plate; Fig. 4, a partial view in cross-section.

The cylindrical roll A, provided with knives B set radially in the periphery, is mounted concentrically on the shaft C, which is journaled in the sides of the vat D. The vat is of any suitable length, and in depth about equals the diameter of the roll, which is set in the vat close to one end of the same. The ends of the vat are rounded. The beater-roll is slightly eccentric to the curvature of the end of the vat, in order to give a clearance (see Fig. 2) and allow the crude pulp to be lifted with less difficulty.

The bed-plate knives E are set in the shoe F, which is fixed in or to the bottom of the

vat under the beater-roll. The knives are separated by strips or blocks G of wood or other suitable material, and a number of these knives and strips are fastened together by a curved bolt or rivet, H. As shown, the knives on each side of the middle are fastened together. The shoe F has flanges I, which are radial with respect to the axis of the beater-roll and form a dovetail. The two sets of knives with their spacing-strips are placed in the dovetail and are spread apart by the wedges K and L. Those marked K are of wood, the wedge L of iron. The wedges K are first inserted and the wedge L is driven between them. When the bed-plate knives become worn they can be set out by withdrawing the wedges, and placing strips or pieces under the knives. As they are set out the two sets are drawn toward each other, owing to the inclination of the flanges I, and it is necessary therefore to plane off a little of the wooden wedges L before replacing them and the iron wedge. The bed-plate knives are placed radially with respect to the axis of the beater-roll, and are adjusted in nearly radial planes. The shaft of the beater-roll turns in close boxes, and they are further provided with collars M, in order to make the joint liquid-tight. Any ordinary or suitable means can be used to adjust the shaft of the roll. Between the beater-roll and the opposite end of the vat is the horizontal partition N, which extends to within a short distance of the end of the vat. There is an upright inclined plate, P, which is brought at the upper edge into close proximity to the beater-knives, but does not touch the same. The vat is provided with the usual valve for withdrawing the pulp and also with the pipe for supplying water. In the sides of the vat opposite the ends of the bed-plate knives are curved slots, through which the knives and wedges can be inserted and withdrawn. In operation these slots are closed by blocks Q of corresponding shape so as to fit the hole. The blocks are held in place by the plates R, which are bolted over the slots after the blocks have been put in place.

The operation of the engine is as follows: The beater-roll and bed-plate knives being adjusted properly, the vat is filled with the rags or fibrous material to be pulped and the

proper quantity of water. The beater-roll being revolved at the proper speed—say, for a roll four feet in diameter, at the speed of one hundred and twenty revolutions per minute—the rags and liquid are drawn between the knives, are carried up by the beater-roll, and thrown over the edge of the plate P. They flow around the partition N with considerable velocity and return again and again to be acted upon by the knives. The roll is revolved until the pulp is properly reduced.

Modifications may be made in details of construction without departing from the spirit of the invention, and parts thereof can be separately used if desired.

Having now fully described my said invention, and the manner of carrying the same into effect, what I claim is—

1. The improvement in beating rags to pulp in a rag-engine having a beater-roll and bed-plate knives, consisting in circulating the fibrous material and liquid in vertical planes, drawing the same between the knives at the bottom of the vat, carrying it around and over the roll and delivering it into the upper section of the vat, substantially as described.

2. A rag-engine for paper-making, comprising the vat, the beater-roll mounted on a horizontal shaft in one end of the vat, and the horizontal partition dividing the body of the vat into an upper and a lower section or passage, the fibrous material and liquid being carried from the lower section between the knives and delivered over the top of the beater-roll into the upper section or passage, substantially as described.

3. The combination of the bed-plate knives, the flanged shoe and the wedges, substantially as described.

4. The combination, with the beater-roll, of the bed-plate knives arranged radially with respect to said roll, and the means for adjusting the position of said knives, substantially as described.

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

JOHN HOYT.

Witnesses:

PHILIP MAURO,
C. J. HEDRICK.