J. NUTTALL.

PULP BEATING ENGINE.

APPLICATION FILED MAY 14, 1917.

1,250,632.

Patented Dec. 18, 1917.

3 SHEETS—SHEET 1.

Fig. 1.

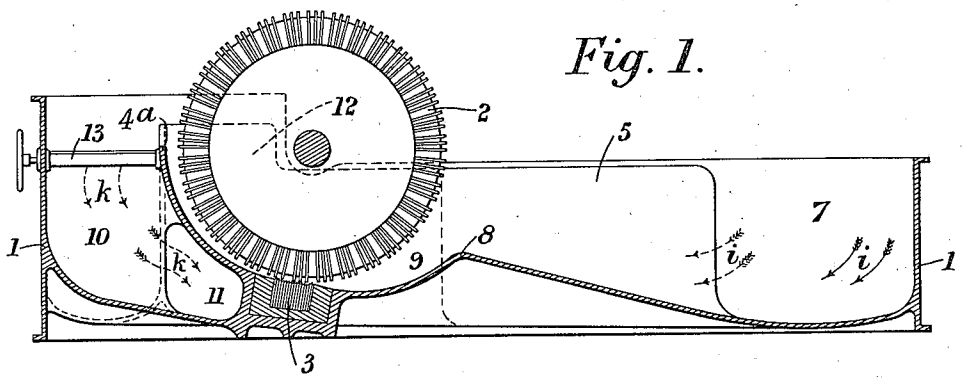
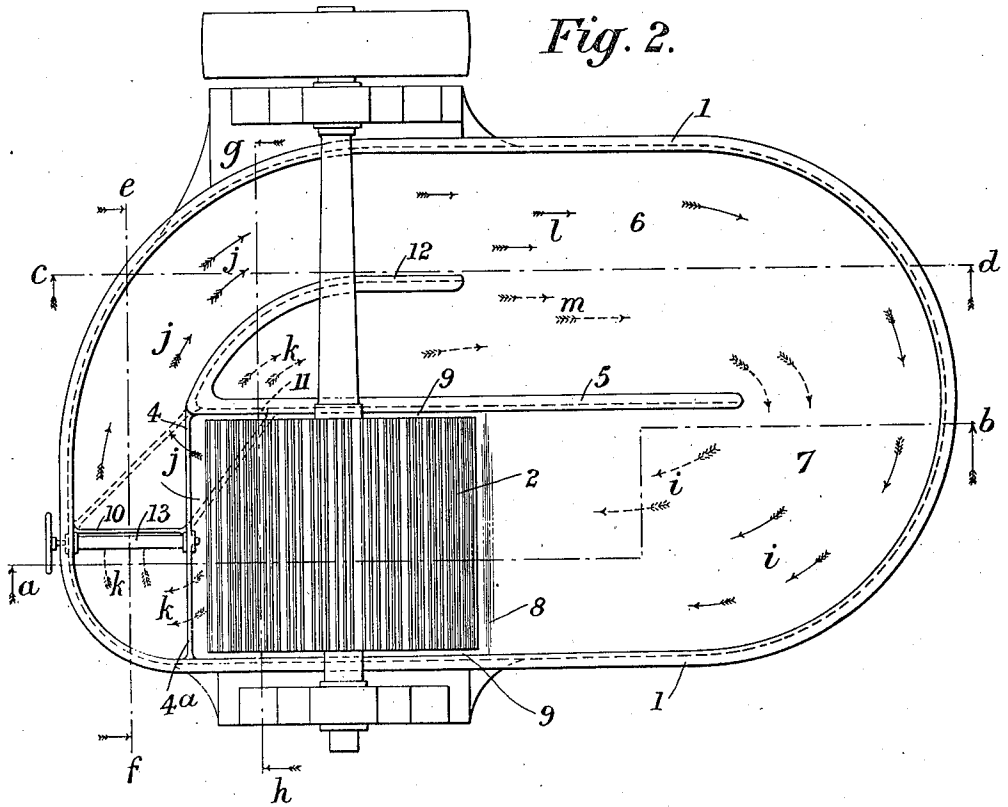



Fig. 2.




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3 SHEETS—SHEET 2.

*Fig. 3.*

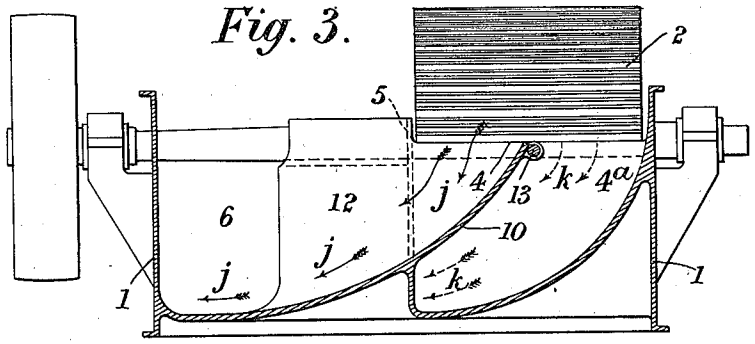



*Fig. 4.*

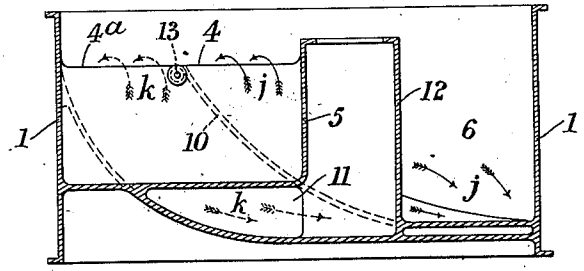
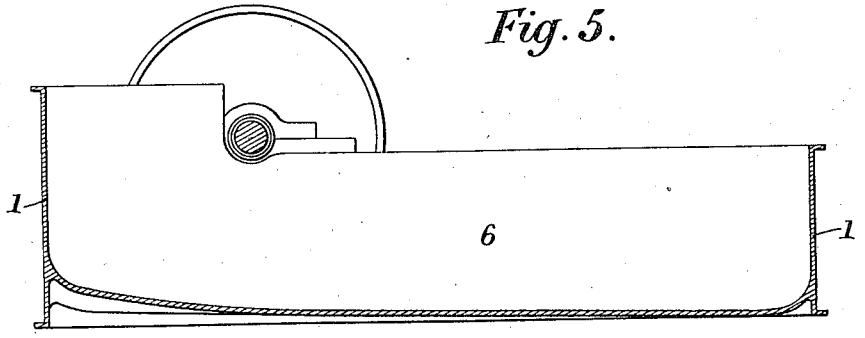



*Fig. 5.*




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3 SHEETS—SHEET 3.

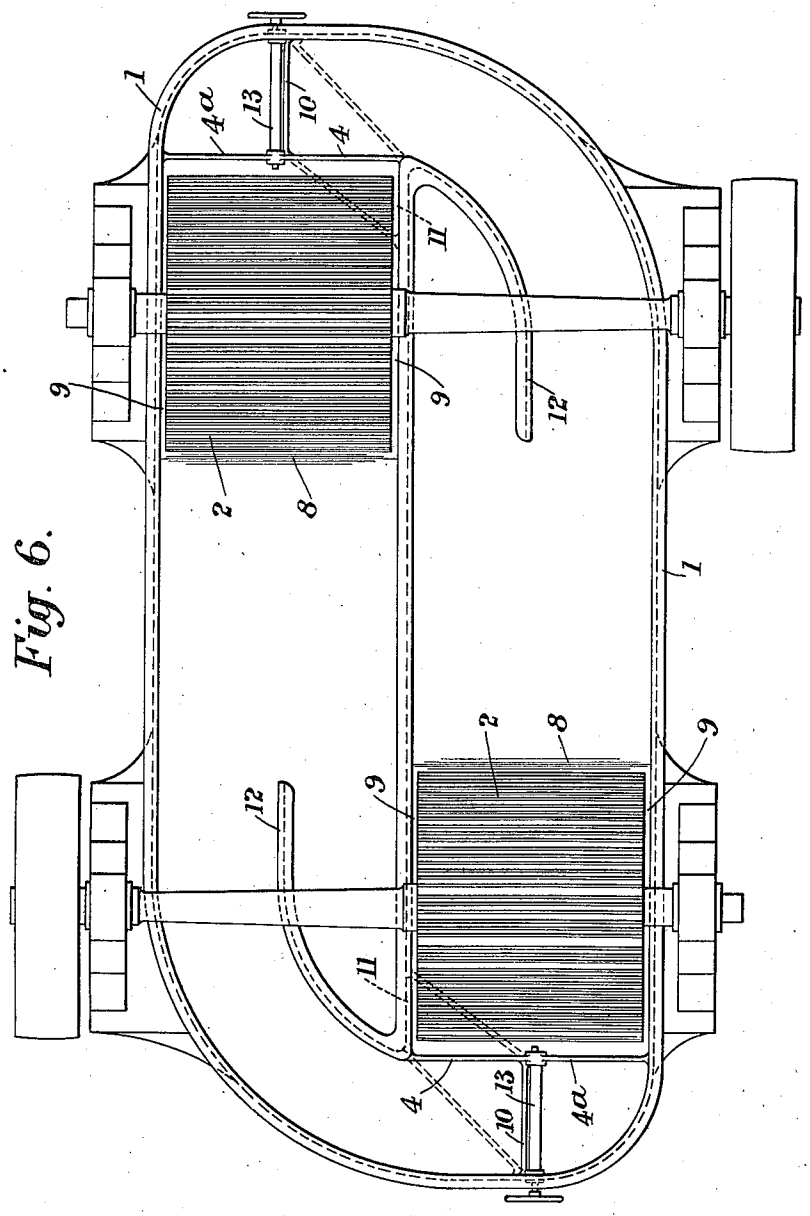



Fig. 6.

INVENTOR

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# UNITED STATES PATENT OFFICE.

JAMES NUTTALL, OF BURY, ENGLAND.

## PULP-BEATING ENGINE.

1,250,632. Specification of Letters Patent. Patented Dec. 18, 1917.

Application filed May 14, 1917. Serial No. 168,508.

*To all whom it may concern:*

Be it known that I, JAMES NUTTALL, a subject of the King of Great Britain, residing at Park View, Walmersley Road, Bury, in the county of Lancaster, England, have invented new and useful Improvements in Pulp-Beating Engines, of which the following is a specification.

The object of my invention is to provide an improved pulp-beating engine which will cause better mixing, and also better beating, and circulation, of the pulp and consequently a greater output of better pulp than is the case with engines as hitherto made, the improved effect being due to the pulp being very efficiently and more frequently, in a given time, acted upon by the bars, knives, or blades, of the roll and bedplate, or rolls and bedplates, as well as being better mixed than hitherto.

My invention relates to that type of pulp-beating engine in which the pulp is passed under the beating roll and over a divided back-fall so that the pulp passes thereover in two streams which join each other and pass back to beneath the beating roll. I provide parts so shaped and combined as to constitute an engine in which the pulp is very efficiently subjected to the action of the roll and bedplate and circulates in such a way that there is practically no impediment to its flow and liability to clogging by the pulp is practically done away with.

At the part of an engine in accordance with my invention where the pulp approaches the beating roll and bedplate (or each roll and bedplate) I provide a raised part, or weir extending across the whole width of the pulp-circulating channel, the top of the said raised part, or weir, being higher than the top of the bedplate, and I provide also a recess at the bottom, and forward, of the weir in front of the bedplate, the chamber, constituted, by this recess, between the weir and the roll, being of such form that the head of pulp, in conjunction with the revolving bars, knives, or blades, of the roll, will press the mass being pulped to the lower part of the aforesaid chamber and into the space between the bars, knives, or blades, of the roll and the bedplate.

I may arrange the bedplate immediately beneath the center of the roll, or, in order to give a longer space, and to have the bars, knives, or blades, of the roll in a position more nearly vertical when they nearly reach the bars, knives, or blades, of the bedplate I may arrange the bedplate at an inclination so that it or its operating portion, is out of the vertical plane in which the center of the roll is situated and between that plane and the backfall.

In order to still further improve the circulation of the pulp, and thereby obtain improved mixing thereof, I arrange openings and channels for the passage of the pulp, (after it passes from the roll and over the backfall), so curved and directed that the pulp which is divided as it passes over the backfall passes thence through the openings and channels provided for it and circulates in an easily flowing manner in streams which meet and pass along the return channel back to the bedplate and breaking roll (or to a succeeding bedplate and breaking roll) in the required different, or reversed, relative positions as hereinafter explained.

I will now describe, with reference to the accompanying drawings a pulp-beating engine constructed in accordance with my invention, Figure 1 being a longitudinal section taken on the line *a b* Fig. 2, which is a plan, Figs. 3 and 4 are transverse sections respectively taken on the lines *e*, *f*, and *g*, *h*, Fig. 2, Fig. 5 is a longitudinal section on the line *c*, *d*, Fig. 2 and Fig. 6 is a plan of an engine with an arrangement, or construction, according to my invention at each end.

The trough of the engine is marked 1. It has rounded ends as shown. The breaking roll is marked 2, the bedplate 3, and the backfall 4, $4^a$. The midfeather 5, as usual, separates the return channel 6, from the channel 7, in which the roll 2, and bedplate 3, act upon the pulp.

At the part of the engine where the pulp passes in the direction of the arrows *i*, and approaches the roll 2, and bedplate 3, is the aforesaid raised part, or weir, 8, the top of which is higher than the top of the bedplate 3, and between this raised part, or weir, 8, and bedplate 3, is the recess or chamber 9, to assist in passing the pulp to the roll 2, and bedplate 3. The bedplate 3, is shown arranged at an inclination and is between the backfall 4, $4^a$, and a vertical plane in which the axis of the roll 2, is situated.

To divide the pulp into portions as aforesaid and effect the reversal of the relative positions of these portions of pulp before they pass along the return passage to be again acted upon by the roll 2, and bedplate

3 so that the flow is practically unimpeded and there is practically no liability to clogging, the construction is as follows:—By means of the partition 10, I divide the opening at the rear of the backfall into two portions of equal, or any other desired, relative extent, these portions being marked 4, and 4ª, respectively. The pulp passes over the backfall down through the divided opening and in the parts shown to the return channel 6, through the two channels separated by the partition 10, the portion of the pulp which goes over the part 4, of the backfall passing down the one channel as indicated by the arrows *j*, and the other portion of the pulp passing down the other channel as indicated by the arrows *k*, and passing from this channel through an opening 11, in the midfeather 5, into the return channel 6. The additional feather, or separating plate 12, extends opposite the opening 11, in the midfeather 5, to any required distance along the main return channel 6, the construction, or arrangement, being such that the two portions of pulp passing from the roll and down over the parts 4 and 4ª, of the backfall and through the two openings and channels as aforesaid meet in the return passage side by side as indicated by the arrows *l* and *m*, but in relative positions different from those they occupied in passing over the backfall from the roll 2, and bedplate 3, this being repeated at frequent intervals as the pulp circulates through the paths shown, and so more equal beating and better circulation and mixing, of the pulp as a whole are obtained. I may provide rollers, or other cleaning devices, such as flat strips capable of being turned on an axis, above the upper edges of the partition 10, which rollers, or other devices, can be operated to remove any pulp which may lodge on, or adhere to, the said edges. I have shown a roller for this purpose at 13.

Although I have mentioned but one beating roll and bedplate I may use more than one. For instance, in an engine with a beating roll and bedplate at each end of the trough, I may provide a raised part or weir, and a recess, as described, before each roll and bedplate, and I may also provide at each end of the trough a backfall and divided opening and channels for the pulp to pass through in temporarily separated portions as hereinbefore described. Such an arrangement is illustrated in Fig. 6 where the parts at each end are similar to those hereinbefore described and shown in the other figures and are marked with the same reference numerals.

If desired in an engine with a beating roll and bedplate at each end the arrangement at one end only may be in accordance with my invention that at the other end being of the ordinary, or any other suitable kind.

What I claim is:—

In a pulp-beating engine, a trough substantially semi-circular at each end, a longitudinal feather dividing the trough into a feed channel and a return channel, a beating roll and bedplate in the feed channel, the bottom of the feed channel being upwardly inclined to form a weir in front of the roll and dipping from the said weir to the bedplate to assist the feed of the pulp to the acting parts of the roll and bedplate, together with a divided back-fall, and delivery passages leading the discharge in divided streams from the said back-fall to the return channel, the delivery passage adjacent the return channel leading to the outer side of the dividing partition, and the other delivery passage passing partially beneath the beating roll to the inner side of the said partition to reverse the relative positions of the respective portions of the pulp under treatment; substantially as hereinbefore described.

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

JAS. NUTTALL.

Witnesses:
HY. W. DEARDEN,
HERBERT Y. HILTON.