J. E. WARREN, DEC'D.

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BEATING ENGINE.

APPLICATION FILED APR. 29, 1912.

1,160,964. Patented Nov. 16, 1915.

Fig. 1.

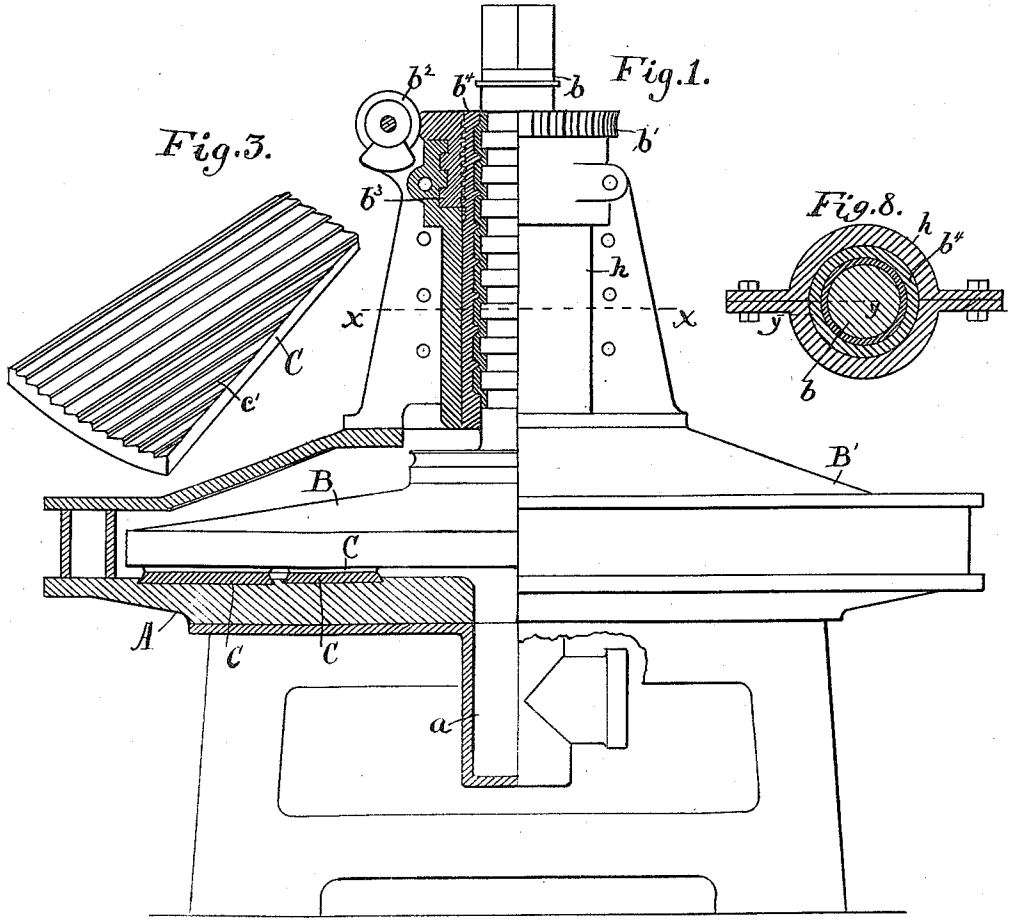


Fig. 3.

Fig. 8.

Fig. 4.



Fig. 5.

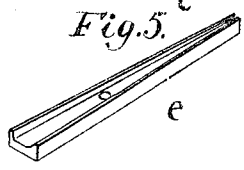


Fig. 2.

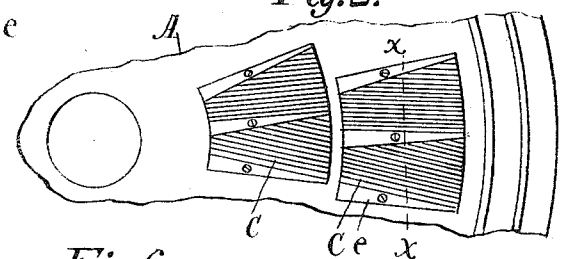
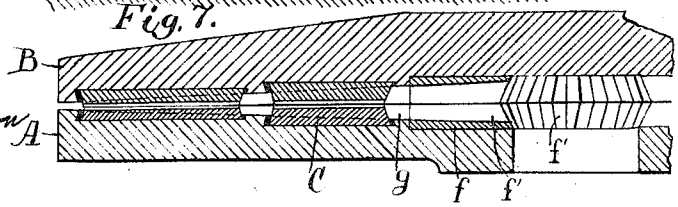


Fig. 6.



Fig. 7.



Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN E. WARREN, OF WESTBROOK, MAINE; JOSEPH A. WARREN, OF WESTBROOK, MAINE, ADMINISTRATOR OF SAID JOHN E. WARREN, DECEASED.

BEATING-ENGINE.

1,160,964. Specification of Letters Patent. Patented Nov. 16, 1915.

Application filed April 29, 1912. Serial No. 693,993.

To all whom it may concern:

Be it known that I, JOHN E. WARREN, of Westbrook, in the county of Cumberland and State of Maine, have invented certain new and useful Improvements in Beating-Engines, of which the following is a specification.

My invention relates to a beating engine for comminuting paper stock and it relates particularly to certain improvements on the beating engines described and claimed in my Letters Patent No. 787,063, dated Apr. 11, 1905, and No. 860,196 dated July 16, 1907, although I desire it to be understood that it is adapted for use in other forms of beating engines.

The type of engine to which my said patents relate consists essentially of a flat fixed bed and a rotating disk or runner revolving on or immediately above said bed. Both the bed and runner are provided with elongated iron or steel grinding teeth which are disposed in a generally radial direction but in such a manner that they will have a shearing action.

The object of my present invention is to provide for the uniform feeding of the paper stock through the plane of action so that it will be distributed evenly over the grinding area.

In the form in which I prefer to embody my invention it consists of grinding surfaces made up of plates of glass, porcelain or other suitable material each plate having formed thereon a plurality of teeth with channels between the plates for admitting pulp to the grinding sections.

My invention may best be understood by reference to the accompanying drawing, in which is shown a beating engine embodying my invention in its preferable form.

Figure 1 is a part elevation and part vertical section through my beating engine, the upper portion showing a section taken on the line *y y* of Fig. 8, Fig. 2 is a plan of a portion of the bed showing grinding surfaces, Fig. 3 is a perspective of one of the grinding plates, Fig. 4 is a cross section showing one plate and the adjacent channels taken on the line *x x* of Fig. 2, Fig. 5 is a perspective view of one of the channel bars, Fig. 6 is a longitudinal section through one of the plates showing the method of securing it to the bed, Fig. 7 is a vertical section through the bed and runner of slightly modified construction, and Fig. 8 is a section on the line *x x* of Fig. 1.

Referring to the drawings, A represents the bed of a beating engine of the class described, B is the runner or rotating disk, b is the vertical arbor to the lower end of which the runner is secured, this arbor being provided with a thrust bearing to resist the upward thrust, and to hold the runner positively in place. As here shown, the thrust bearing is composed of a sleeve b^4 engaging the usual annular flanges on the shaft. The bearing sleeve with the arbor b are made adjustable from and toward the bed A. As shown, the outside of the sleeve is provided with a screw thread which is engaged by a nut b^3 having formed integral therewith a worm gear b' operated by a worm b^2.

The nut b^3 is journaled and rotatable within a supporting cylindrical standard h secured on the top of the casing B′ which forms the upper portion of the body of the engine. The turning of the worm b^2 raises or lowers the sleeve b^4 and so adjusts with great accuracy, the position of the runner with respect to the bed.

The stock is fed in between the bed and runner through an inlet duct a at the center of the bed.

The paper stock is ground or comminuted between grinding surfaces made up of a series of teeth composed of glass, porcelain or other vitreous material.

As herein shown, the grinding surfaces are annular in form and made up of segmental sections or plates C, each of which has a plurality of elongated teeth c' extending in a generally radial direction. In cross section the teeth are ratchet-shaped, each with a vertical face, flat top and rear sloping portion, giving to the teeth great strength to resist breakage. The plates are fastened preferably by being dovetailed into recesses in the bed and runner and are as shown calked at d with lead.

The grinding rings are here shown as being two in number and between the segmental grinding sections there are fastened channel bars e which are gutters open at the ends and extending from the inner edge of each ring to its outer edge but with a gradually decreasing cross section so that the stock will be held back and will overflow evenly onto the grinding sections, passing between

the successive teeth and thence out, following the depressions between the teeth. The teeth of the runner are set at an angle with the teeth of the bed so that the two sets of teeth will have a shearing and cutting action as well as a strictly grinding action. The runner teeth are set as near the bed teeth as they can be set without actually touching and both surfaces are very accurately ground.

In Fig. 7 is shown a modification in which provision is made for the more even distribution of the stock to the inner grinding ring. In this form I show a port ring *f* inside the inner grinding ring. It is made up of two opposing rings, one fastened to the base and one to the runner and it has ports *f'* through which the stock passes and by means of which it is distributed throughout the annular space *g* inside the inner grinding ring.

The combined openings of the channels in the outer ring are somewhat less than those of the inner ring so that there is a tendency to hold back the supply of stock and keep all the passages full.

In operation the stock flows through the inlet duct *a* and thence through the ports *f'* as shown in Fig. 7. It then passes into the channels *e* and also enters between the inner ends of the teeth and is swept by the teeth of the runner across the plane of action. The fibers are cut or sheared on the edges of the teeth and ground or crushed by the rubbing action of the surfaces of the teeth and the stock finds its way out through the depressions between the individual teeth. This process takes place successively in the inner and outer grinding rings and as a result substantially every particle of the stock is acted upon and reduced to a uniform fineness.

The teeth being made of glass or porcelain which is exceedingly hard, wear slowly, they are not subject to corrosion and so do not give off particles of rust. The teeth thus do better work and wear much longer than in the old form of engines referred to where steel teeth were used.

While I prefer to form the teeth in slabs or plates they may be formed separately and each secured to the bed or runner.

The use of the worm gear and screw threaded sleeve enable me to get an exceedingly fine adjustment on the position of the runner and to approach the two grinding surfaces very near together without touching.

I claim:—

1. A beating engine for comminuting paper stock including a disk having a series of grinding sections each section having a series of grinding teeth set at an angle with the radius, said sections being separated by stock feeding channels extending in a generally radial direction and having a cross section at the outer ends less than that at their inner ends, the floors of said channels sloping upward from the inner to the outer end whereby the stock is forced laterally from said channels across said teeth.

2. A beating engine for comminuting paper stock including a disk having a series of grinding sections each section having a series of grinding teeth set at an angle with the radius, said sections being separated by stock feeding channels extending in a generally radial direction and having a gradually diminishing cross section from the inner to the outer ends, the floors of said channels sloping upward from the inner to the outward end whereby the stock is forced laterally from said channels across said teeth.

In testimony whereof I have affixed my signature, in presence of two witnesses.

JOHN E. WARREN.

Witnesses:
S. W. Bates,
Cora B. Creighton.