No. 706,985. Patented Aug. 12, 1902.

F. P. MILLER.

BEATING ENGINE.

(Application filed June 6, 1902.)

(No Model.)

Fig. 1.

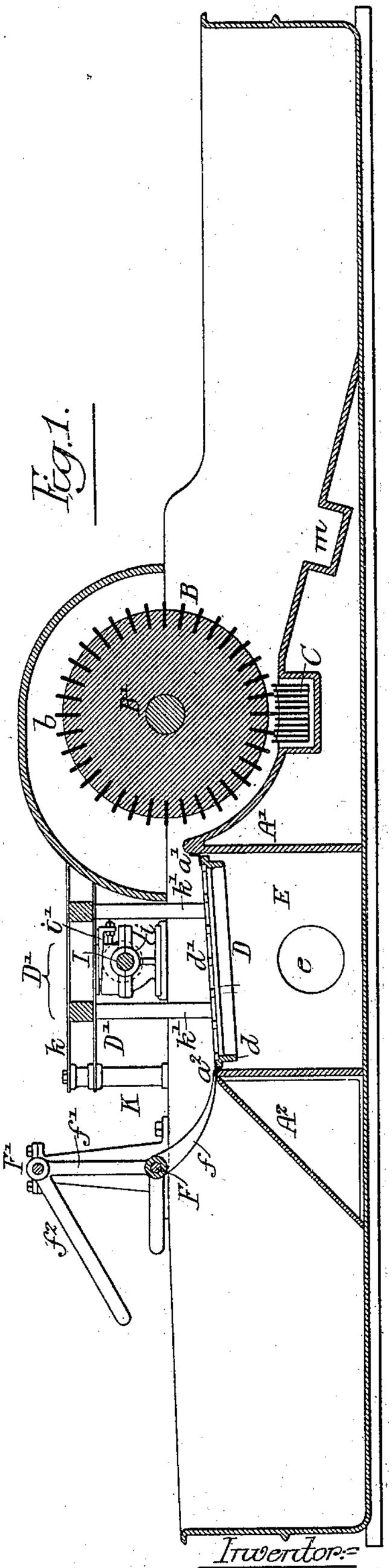


Fig. 2.

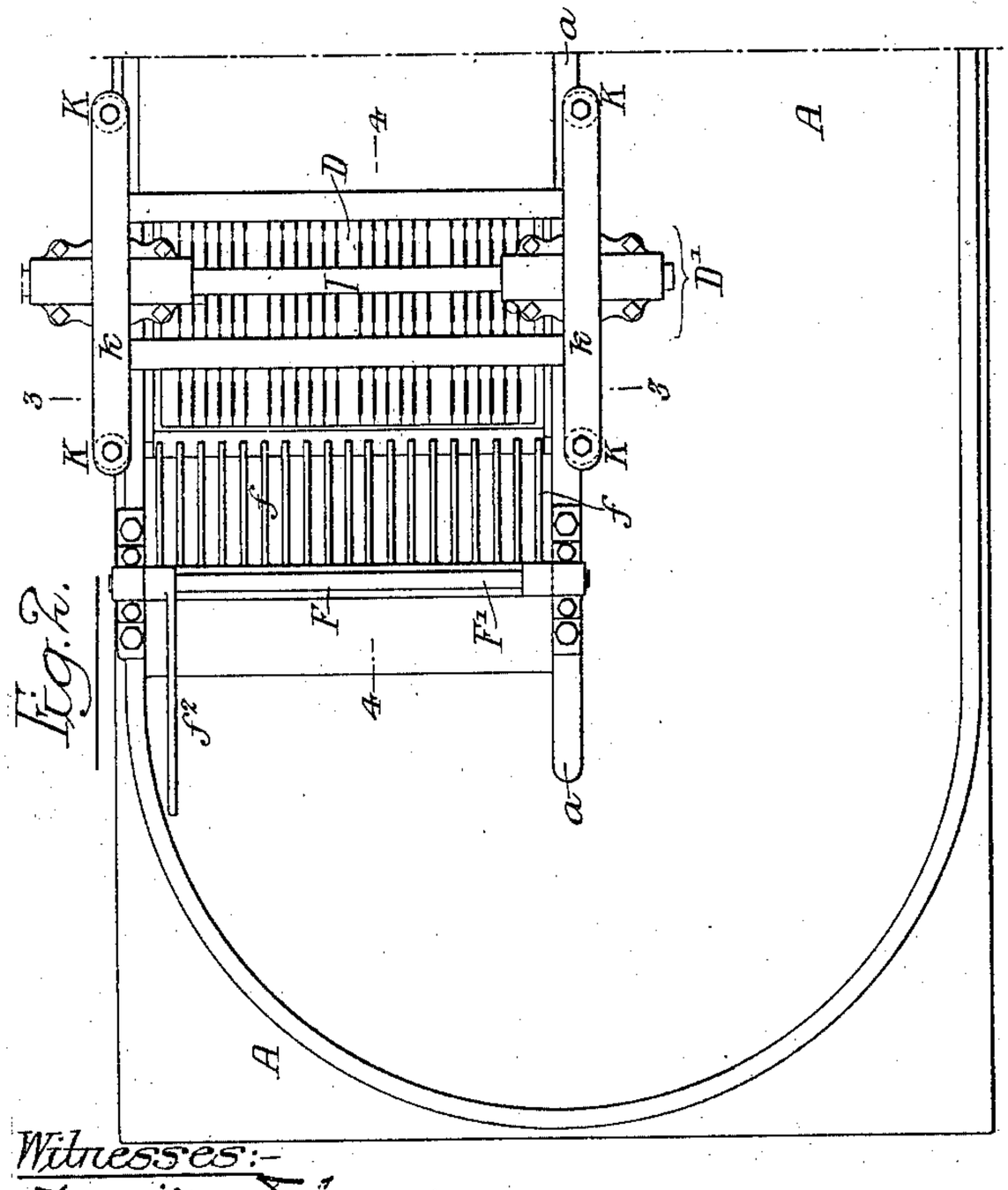


Fig. 3.

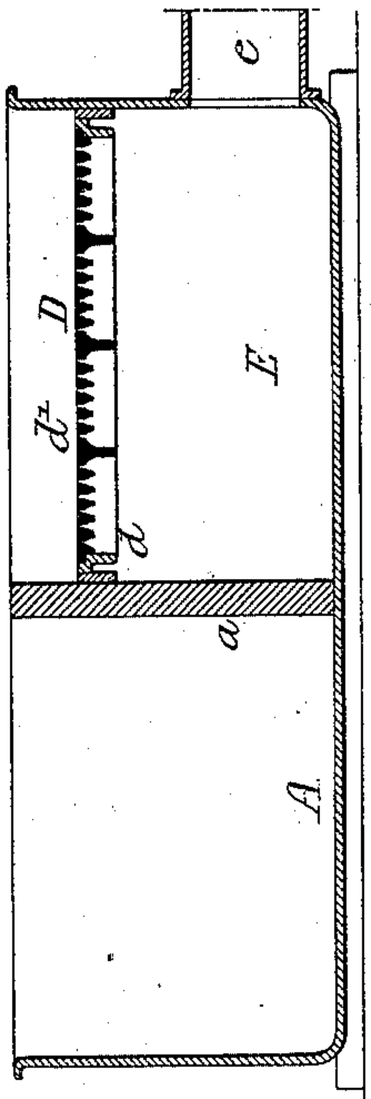
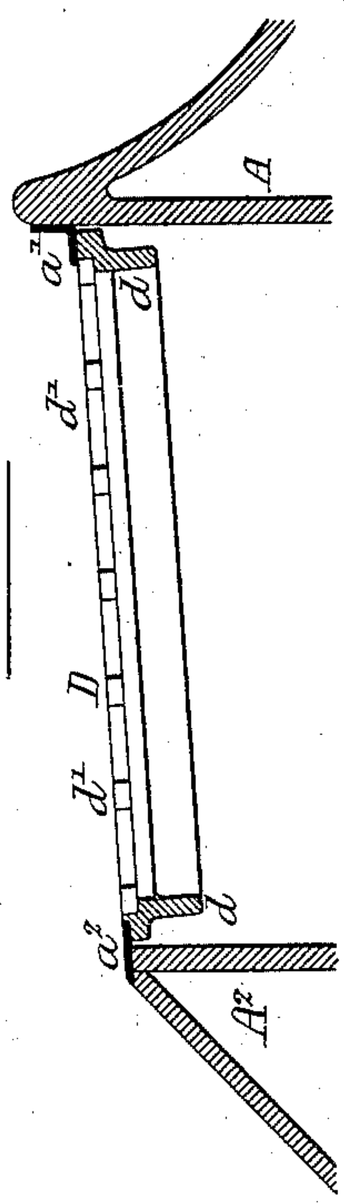


Fig. 4.



Witnesses:-
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UNITED STATES PATENT OFFICE.

FRANK P. MILLER, OF DOWNINGTOWN, PENNSYLVANIA.

BEATING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 706,985, dated August 12, 1902.

Application filed June 6, 1902. Serial No. 110,523. (No model.)

To all whom it may concern:

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

The object of my invention is to so construct a beating-engine that paper-stock can be properly reduced and the ground stock separated from the material in circulation without interrupting the flow of the said material, so that the finished stock can be carried from the machine and new stock added, making the process of reducing the paper in the beating-engine continuous.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of my improved beating-engine. Fig. 2 is a plan view of one end of the engine. Fig. 3 is a sectional view on the line 3 3, Fig. 2; and Fig. 4 is an enlarged sectional view on the line 4 4, Fig. 2.

A is a vat separated by the usual midfeather *a*, forming two channels through which the paper-pulp is traversed. In one of these channels is the beating-roll B, mounted on a shaft B′, carried by suitable bearings, and having knives or blades *b*.

C C are the knives, mounted in the frame of the machine, between which and the beating-roll the pulp is passed.

A′ is the backfall, over which the pulp is carried by the beating-roll B, and directly back of the backfall is a screen D. (Shown clearly in Figs. 3 and 4.) This screen is suspended from a shake-frame D′, which can be constructed in any suitable manner, and any means may be provided for shaking the frame so as to agitate the screen. The screen in the present instance consists of a frame *d*, in which are assembled a number of plates *d′*, each plate being recessed at each side, so that when the plates are assembled they form narrow slots for the passage of the pulp, as shown in Fig. 3. This screen may be perforated with circular holes or slots of any shape, and the slots may be formed in any manner without departing from the main feature of my invention. The perforations are of such size as to allow the finished product of the machine to readily pass through the screen into the chest E, which is directly under the screen and from which the product is withdrawn either by gravity or by means of a pump through the outlet-passage *e*. Beyond the screen D is a continuation A^2 of the backfall A′. The unfinished product passes over the screen and over the backfall and circulates through the channels, to be acted upon again by the beating-roll. In the present instance the screen D is arranged on an incline from the backfall A′, so that the unfinished material will more readily pass over it; but it will be understood that it may be horizontal or at any incline desired, depending greatly upon the material being treated.

When certain classes of paper-stock are being treated, particularly old paper, cardboard, books, &c., I provide means for catching the strings and like material, and this means consists in the present instance of a transverse shaft F, having a number of curved forks *f* arranged directly back of the screen D, and in the present instance having their tips resting upon the upper portion of the continuation A^2 of the backfall. These forks are so arranged and shaped that the ordinary stock will pass between them, while the strings and similar material will be caught by the forks, and when these strings accumulate the operator simply turns the shaft F and raises the forks and removes the strings, which can either be collected for other paper-stock or reduced in the machine.

The shaft F in the present instance is suspended from the shaft F′ by arms *f′*, and this shaft is operated by a lever f^2, so that the shaft F and its forks can be moved out of the way when desired.

While any suitable means may be provided to shake the screen D, in the present instance I have shown one form of shaking means which I will now proceed to describe. Mounted on pedestals K K on each side of the vat are spring members *k*, from which is suspended by bars *k′* the screen D. I is a driven shaft having cams *i* thereon, which act against plates *i′*, carried by the spring members *k k*. The shaft I is mounted in suitable bearings and may be driven from the beater-shaft B′, if desired, or may be independently driven.

I have shown in Fig. 4 a yielding lip *a′* on the backfall A′, which will overlap the frame of the screen D, so as to prevent the material from entering the chest E except through the screen. A like lip a^2 may be provided at the opposite end of the screen, which will overlap the portion A^2 of the backfall.

The material to be reduced into paper-pulp is placed in the vat with a sufficient amount of water. The beating-drum is set in motion, so that the material will circulate in the channels of the vat and between the beating-roll and the knives. The material is reduced by passing between the beating-roll and the knives until it is in condition to be removed from the engine. In its passage through the vat the material passes over my improved screen, and there is sufficient suction caused by the agitation of the screen to draw certain particles of the material through the screen. These particles are those that have been reduced to the desired condition, and they pass into the chamber E under the screen and are drawn out through the pipe, which is connected to any suction device, either gravity or pump, as desired. The balance of the stock circulates through the vat, passing under the roll until it is finally reduced to the desired condition, when it will pass through the screen into the chamber E.

It will be seen that when my improved machine is once set in motion the process is continuous, and new stock can be added without stopping the mechanism. In fact after the machine is once charged with paper-stock the finished stock can be removed and additional stock added from time to time.

The rags, strings, and similar material can be collected by the forks *f*, while wires, nails, and other heavy foreign matter will collect in the bottom of the vat and in the pocket *m*, which is provided for this purpose.

My improved beating-engine is especially adapted for grinding and reducing old paper and paper-stock; but it will be understood that it may be used in connection with any material which can be ground to a pulp to form paper.

In reducing some classes of paper-stock it has been the practice to work the beating-engine until all the stock is reduced to such a consistency that it can be transferred to a paper-making machine. It has been found in reducing the paper-stock in this manner that a great portion of the material was reduced to such an extent that the fiber was destroyed, and consequently the paper which was made from the pulp was not strong. This is entirely obviated by my improved machine, and the pulp as soon as it is in condition to be removed from the machine passes through the screen and away from the pulping mechanism. The machine can be either used as a continuous machine or as an intermittently-operating machine, according to the desire of the operator.

The process of reducing paper-stock consisting in passing the stock through a beating-engine and separating the ground stock from the material in circulation without interrupting the flow of the said material is set forth and claimed in a separate application for patent filed by me on the 13th day of March, 1902, Serial No. 98,011.

I claim as my invention—

1. The combination in a beating-engine, of a beating-roll, a screen back of the beating-roll, and a chest under the screen, substantially as described.

2. The combination in a beating-engine, of a vat, a beating-roll, a backfall, a screen at the rear of the backfall, and a chest under the screen so that the material will pass over the screen and the finished product will pass through the perforations of the screen and into the chest, substantially as described.

3. The combination in a beating-engine, of a beating-roll, a screen back of the beating-roll, a chest under the screen, and means for agitating the screen, substantially as described.

4. The combination in a beating-engine, of a beating-roll, a backfall, a screen at the rear of the backfall and below the level of the liquid in the vat, a chest under the screen, and means for agitating the screen, substantially as described.

5. The combination in a beating-engine, of a beating-roll, a backfall, an inclined screen at the rear of the backfall and below the level of the liquid in the vat, a chamber under the screen, an outlet for said chamber, spring members from which the screen is suspended, and a cam for actuating the spring members to agitate the screen, substantially as described.

6. The combination in a beating-engine, of a beating-roll, a backfall, a screen at the rear of the backfall, and a fork back of the screen upon which strings and like material will collect, substantially as described.

7. The combination in a beating-engine, of a beating-roll, a backfall, a screen at the rear of the backfall, and a fork back of the screen, with means for raising the fork, substantially as described.

8. The combination in a beating-engine, of a beating-roll, a backfall, a screen at the rear of the backfall consisting of a frame, with notched plates forming slots when assembled, and a chamber directly under the screen, substantially as described.

9. The combination in a beating-engine, of a beating-roll, a backfall, a screen at the rear of the backfall, a lip on the backfall overlapping the screen, and means for agitating the screen, substantially as described.

10. The combination in a beating-engine, of a beating-roll, a backfall, a screen at the rear of the backfall, a continuation of the backfall beyond the screen, a flexible lip on the backfall overlapping the screen, and a flexible lip on the screen overlapping the continuation of the backfall, substantially as described.

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

FRANK P. MILLER.

Witnesses:
WILL. A. BARR,
JOS. H. KLEIN.