No. 681,498. Patented Aug. 27, 1901.

R. DIETRICH.

SEPARATOR FOR CELLULOSE.

(Application filed Sept. 26, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig: 1.

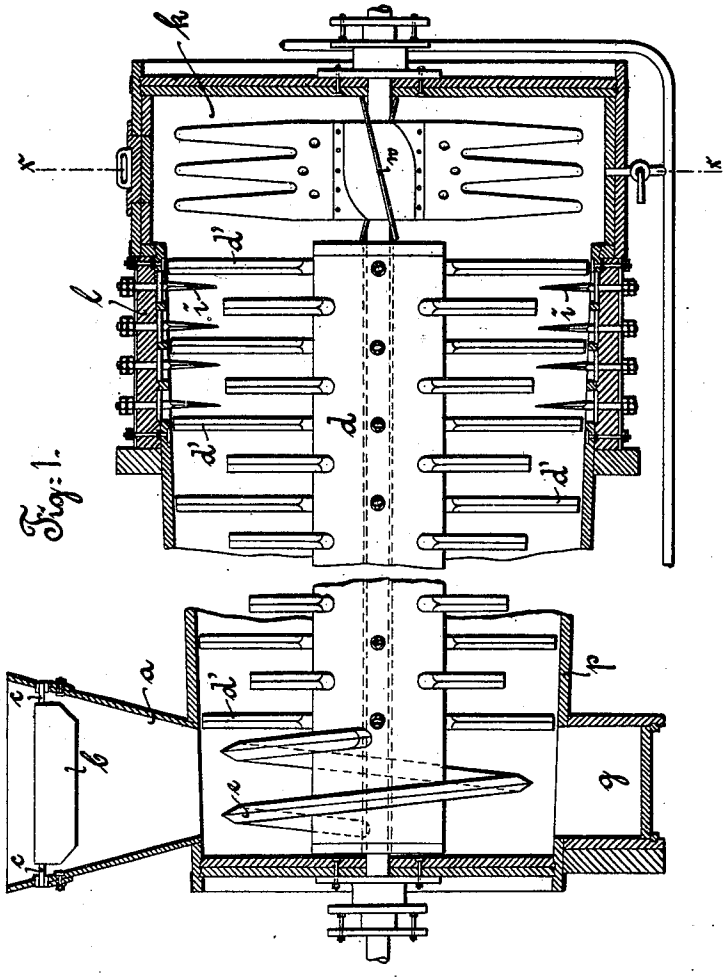
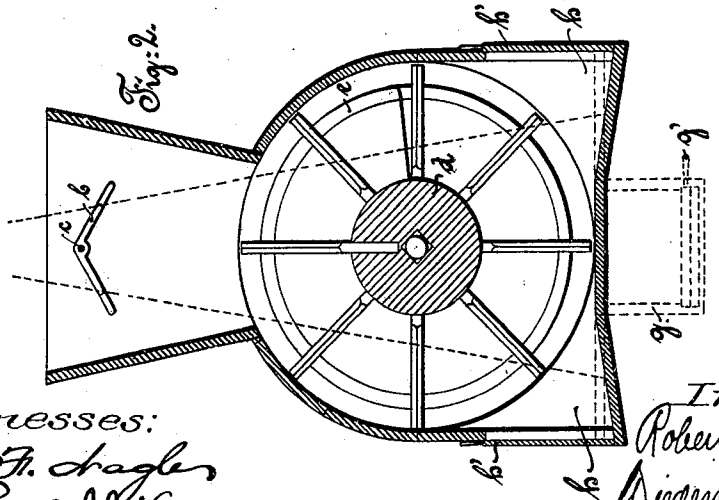


Fig: 2.



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Fig: 1.

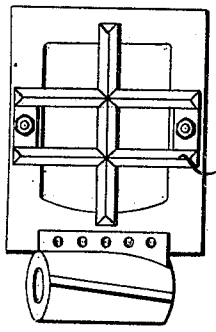


Fig: 5a.

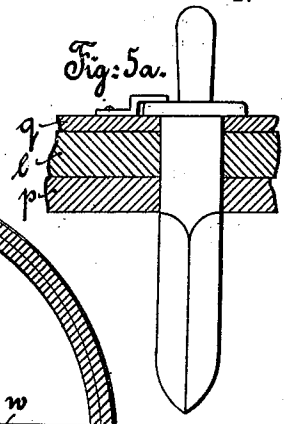
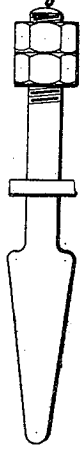


Fig: 3.

Fig: 5.



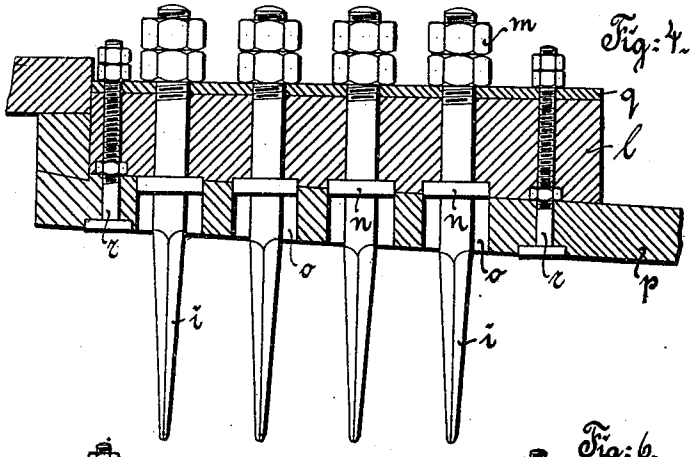
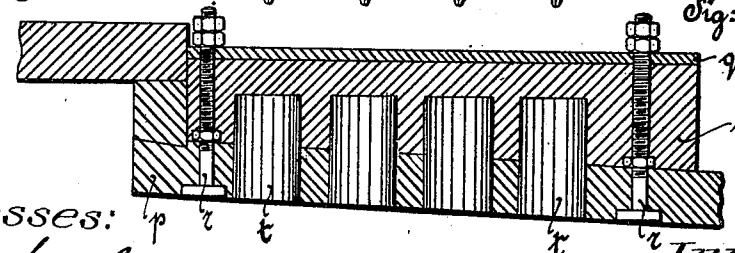


Fig: 4.

Fig: 6.



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UNITED STATES PATENT OFFICE.

ROBERT DIETRICH, OF MERSEBURG, GERMANY.

SEPARATOR FOR CELLULOSE.

SPECIFICATION forming part of Letters Patent No. 681,498, dated August 27, 1901.

Application filed September 26, 1899. Serial No. 731,721. (No model.)

To all whom it may concern:

Be it known that I, ROBERT DIETRICH, manufacturer, a subject of the Emperor of Germany, residing at Merseburg, in the Empire of Germany, have invented certain new and useful Improvements in Refining-Engines for Cellulose, of which the following is a specification.

This invention relates to improvements in separators or refining-engines for cellulose, and more especially to separators or refining-engines of the kind described in the specification of United States Patent No. 617,983, filed May 21, 1898, Serial No. 681,341. The improvements comprise a stone-catcher and means for strengthening the kneading and grinding action of the apparatus when charged with very hard cellulose materials.

In cellulose-boilers in which the metal walls are protected by masonry-work portions or even entire stones sometimes drop from the protecting-lining and are then conveyed with the cellulose material on its way over the elevator into the separator. Such stones when falling upon the beaters mounted upon the separator-shaft either cause the beaters to break or by lodging between the beaters impair the action thereof upon the materials under treatment. Furthermore, a disadvantage arises from the variation in the condition of the cellulose obtained, especially as regards the toughness or softness of the same. This variation in the condition of the cellulose is due to the use of strong or weak lyes or rapid or slow cooking with greater or less steam-pressure. As in most cases all kinds of celluloses are treated in one and the same separator it is difficult to vary the treatment according to the various materials placed in the separator, and it so happens that cellulose of a hard nature receives too little and that of a soft nature too much beating in the separator. The apparatus hereinafter described obviates these defects or disadvantages. This apparatus is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section through the separator, showing the front and rear portion thereof. Fig. 2 is a vertical section through the inlet or charging head of the separator. Fig. 3 is a vertical section through the outlet or discharging end of the separator, taken on the line $x\,x$ of Fig. 1. Fig. 4 shows, on a larger scale, a section of the knives fixed in the walls of the separator casing or shell. Fig. 5 is a detail view of one of the knives. Fig. 5^a shows a modified manner of fixing the knives. Fig. 6 is a separate view of a block for replacing the knife-holding block, Fig. 4, when it is desired to run the apparatus without knives; and Fig. 7 is a view showing one of the kneading-arms which are fixed to the rear end of the separator-shaft.

In Fig. 1 the charging-hopper a of the separator is provided with a tilting board b, fulcrumed at c to the sides of the hopper. The width of the tilting board b is at least equal to the diameter of the separator-shaft d, so as to prevent this latter being damaged by pieces falling on the one or the other side thereof. If a heavy stone drops into the hopper, it first strikes the tilting board b, which it tilts slightly to one side, thereby losing its acquired power so far as to cause its trajectory to be altered to a tangent passing down at the side of the shaft d and between the screw-blades e, which at this end replace the beaters somewhat in the direction indicated by the dotted lines, then falling into the box g. The screw e is provided at its edges with a sharp Λ-shaped sheathing of copper. In addition to the fact that these edges are not so easily damaged as the beaters d' the screw is more useful for conveying the falling cellulose to the beater-drum than separate beaters. Any stones entering the separator are retained therein by the stone-catcher. This latter may consist, as shown in full lines in Fig. 1 and dotted lines in Fig. 2, of a box disposed vertically below the shaft d. A preferred arrangement of stone-catcher is, however, shown at Fig. 2, where two stone-catching recesses $h\,h$, one at each side, are provided. Stones or similarly heavy objects drop or run into these recesses or pockets out of reach of the beaters. The oscillating tilter causes the stones to fall toward the sides directly into the said recesses or pockets $h\,h$, from which they can be removed, even during the working, although, preferably, after the operation, through doors or flaps $h'\,h'$. Fig. 1 also shows the series of knives or blades i in the walls of the separator fixed at the beginning of the kneading-chamber k. The knives or blades

are interchangeable and are arranged to take between the wooden beaters d' in the separator. The walls of the separator-shell are appropriately perforated, so as to enable the knives to be placed in position from the exterior, the knife-blades being set with their flat side between the beaters. Several such rows of knives are distributed over the periphery of the separator-shell. Each row is preferably fixed in a removable holder l. It is essential that the knives remain in their correct position, and thus provision must be made to prevent their turning in the holders or in the holes in which they are held. At their lower ends the knives are provided with a round flange n, adapted to engage in the corresponding circular hole o of the separator-drum p. By strongly tightening the nuts m and providing lock-nuts the turning of the knives is prevented. The holders are protected by an iron plate q, and they are secured in position upon the separator-shell by screw-bolts r. If a separator is provided with this series of blades i, arranged between the beaters d', a very energetic disintegration of the material is effected, and by regulating the knife-fittings the disintegration can be exactly determined. The number of rows of knives and the number of knives in each row, as well as the length of the knife-blades, is the determining factor. The knife-holders can therefore be easily made to suit various requirements, a larger number of long knives corresponding to a high degree of disintegration, while with a small number of shorter knives the result is a lower degree of disintegration. When a different soft kind of cellulose is to be treated in the separator, the knife-holders l are removed from the shell of the separator and replaced by blocks s, provided with wood plugs t in lieu of the blades, and adapted to snugly fit the holes in the shell p for the knife-blades. Thus the plugs t fill up the holes in the shell p of the knives, and the cellulose in the interior of the shell is no longer subjected to the action of the blades.

Although the means for and the manner of fastening the knives i in their holders can be variously effected and as this is not part of this invention it may nevertheless be useful to describe by way of a serviceable example the fastening shown at Fig. 5^a. The knives are of bayonet form and are so arranged as to be inserted direct into the holes in the shell during the working. The flat rectangular shank of the blade prevents the latter turning around. The blade is prevented from falling out by any convenient locking device applied to the flange of the shank. On removing the blades from the apparatus the holes are stopped by ordinary plugs.

Fig. 3 shows in the cross-section through the kneading-chamber of the separator a discharge-pipe u, provided with a valve v, which keeps the water up to the middle of the apparatus and so increases its efficiency. The kneading-arms w, fixed at the end of the separator-shaft in the kneading-chamber, are provided with a fitting z in the form of a sharp-edged grating, Fig. 7, which, together with the knife-fitting i and valve v, helps to increase the efficiency of the apparatus. The position of the valve is ascertained from the exterior by means of a pointer y.

What I claim is—

1. A refining-engine for cellulose, characterized by two inclined stone-catching pockets $h\,h$ one at each side of the apparatus a charging-hopper and an oscillating tilter b in said hopper so arranged as to direct stones or the like falling upon it sidewise direct into the pockets.

2. In a refining-engine, a casing, a kneading-chamber, a series of removable holders mounted in openings in the walls of said casing, and inwardly-projecting knife-blades upon said holders, said knife-blades being disposed near said kneading-chamber for increasing the disintegrating action.

3. In a refining-engine, a casing, a kneading-chamber, holders mounted in the walls of said casing adjacent said kneading-chamber, inwardly-projecting knives mounted upon said holders, and means for removing and replacing said holders.

4. In a refining-engine, a casing, an outlet-pipe, and an adjustable valve in said outlet-pipe adapted to close the lower portion of the latter for the purpose of raising the level of the cellulose materials for the purpose specified.

5. In a refining-engine, a kneading-chamber, a shaft having kneading-arms thereon, said arms being located in said chamber, and a sharp-edged grating or bars for increasing the kneading action.

6. In a refining-engine, a charging-hopper, a shaft under said hopper, a conveyer, screw or worm having sharp edges on the portion of said shaft under said hopper, and beaters attached to the portion of said shaft unoccupied by said worm.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 6th day of September, 1899.

ROBERT DIETRICH.

Witnesses:

GOTTFRIED KRITZLER,

REINHOLD LEHMANN.