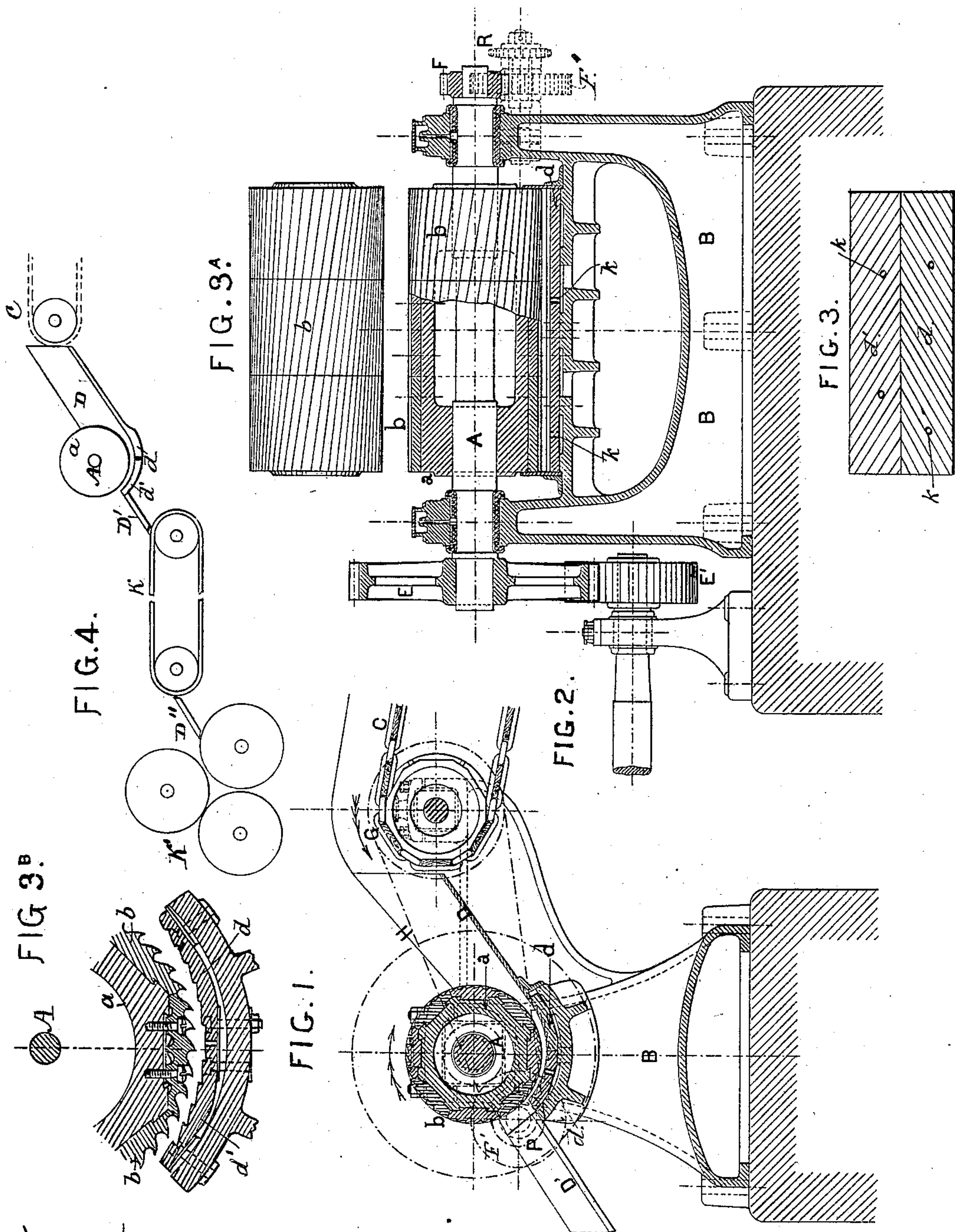


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METHOD OF AND APPARATUS FOR TREATING SUGAR CANE.

No. 250,720.

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WITNESSES—
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METHOD OF AND APPARATUS FOR TREATING SUGAR-CANE.

SPECIFICATION forming part of Letters Patent No. 250,720, dated December 13, 1881.

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To all whom it may concern:

Be it known that I, PIERRE FAURE, of Paris, in the Republic of France, have invented a new and useful Method of and Apparatus for
5 Treating Sugar-Cane to Obtain Juice Therefrom, of which the following is a specification.

This invention relates to the treatment of sugar-cane to extract the juice therefrom, and
10 has for its object, mainly, to augment the product of the juice, and consequently the yield of sugar, without requiring alteration of the mills now in use.

According to the present invention the sugar-cane, before passing through the sugar-mill for expressing the juice, is subjected to a process of laceration, disintegration, or separation of the fibers by a tearing or shredding action, or, as hereinafter designated, of "defibration."
20 tion."

The ordinary mill acts but imperfectly upon the cane, owing to the superposition of cane upon cane, and, as well from this cause as from the resistance offered by the knots and skins
25 of the cane to the crushing force in passing between the rolls, much juice is lost. This disadvantage is obviated and labor is saved by subjecting the cane to the operation of defibration before passing it through the mill. This
30 operation differs essentially from that of cutting the canes with knives, either longitudinally slitting or transversely chopping, inasmuch as the knives merely sever the canes into a certain number of parts, which are liable to become superposed in the mill, and the knots and skins in said pieces offer resistance to the crushing force, as in the whole canes. The structure of the original cane, after cutting, is substantially preserved in the pieces;
40 but by defibration the structure is broken down, and the fibers, torn apart and lacerated, without being reduced to pulp or powder, are brought into the best condition for the operation of the mill.

In order to accomplish the operation of defibration in an efficient, rapid, and economical manner an apparatus, hereinafter described, denominated a "defibrator," is employed. This defibrating apparatus, as well as the combination with a mill of ordinary or suitable construction for expressing the juice from the shredded cane, and the method of treating su-

gar-cane by defibration or by defibration and subsequent expression of the juice, are comprised in and form a part of the present invention.
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In the accompanying drawings, which form a part of this specification, Figure 1 is a cross-section of the defibrating apparatus, showing a portion of an endless cane-carrier; Fig. 2, a
60 longitudinal section of the same apparatus, partly in elevation; Figs. 3, 3^A, and 3^B, detail views; and Fig. 4 a diagram, showing a defibrator combined with the rollers of an ordinary mill.

The same letters of reference indicate like parts on all the figures.
65

A is a shaft, journaled in bearings in the frame B, and carrying a drum or cylinder, *a*, whose surface is provided with teeth running, preferably, in a helicoidal direction, (see Figs. 2 and 3^A,) and extending the length of the drum. These teeth may be made integral with the drum by casting or by cutting out, or they may be attached thereto. As shown, toothed
70 plates *b* are secured by dovetailing to the drum, which is made polygonal. (See Figs. 1 and 3^B.)

Below the drum *a*, and fastened to the frame B, is a double counter-plate formed of two distinct parts, *d d'*, eccentric to the axis of the drum. The front counter-plate, *d*, (placed on the feed side, where the opening is wider,) has the teeth, which are all equal in depth, project in the same direction as those of the drum. These helicoidal teeth have for their object to
80 rectify the position of the canes when presented too much in an endwise direction. The back counter-plate, *d'*, or working counter-plate on the outlet side has the teeth project in a direction opposed to those of the plate *d*. Figs. 1, 3, and 3^B show this arrangement. It is the counter-plate *d'* which effects the defibration of the canes, by causing them to be rolled over and crushed under the pressure of the drum, and to be torn apart or shredded under the
85 action of the opposing teeth.

Motion is imparted from a suitable motor to the drum in the direction of the arrow, Fig. 1, by means of a spur-wheel, E, fixed to the shaft A, and a pinion, E', meshing with said spur-wheel and fixed on a counter-shaft.
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In front of the drum *a* is the cane-carrier C, receiving its motion from the defibrator itself, and capable of being put in and out of gear at

will. A slow motion is communicated to the carrier by means of the pinion F, fixed to the shaft A, the spur-wheel F', meshing with said pinion, the toothed wheel R, keyed to the shaft of the spur-wheel F', the toothed wheel G, fast on the roller over which the endless belt of the cane-carrier runs, and an endless drive-chain, H, connecting the toothed wheels R and G with each other. An inclined plate, D, receives the canes or pieces of cane from the carrier and conveys them to the space between the drum *a* and counter-plate *d*. The canes, after passing between the drum *a* and counter-plates *d d'*, pass in a defibrated condition onto an inclined plate, D', by which they are delivered to a cane-carrier for conveying them to the mill-rolls or machine for expressing the juice.

In the diagram, Fig. 4, K is the cane-carrier, K' the mill-rolls, and D'' an inclined plate, over which the canes pass from the carrier to the mill-rolls. The small quantity of juice which results from the defibration passes through small interstices or holes *k* in the plates *d d'* into a channel provided underneath these plates, whence it is conducted by suitable orifices and pipes to the juice expressed by the mill-rolls.

From the preceding explanation the construction of the apparatus will be understood. A short explanation of the operation will now be given.

The canes in their natural state are conducted by the carrier C onto the inclined plate D, which conveys them into the opening of the defibrator, which is always equally set. Carried away by the teeth *b b* of the drum *a*, they are soon pressed against the helicoidal teeth of the first counter-plate, *d*, which rectifies the position of any canes which might be presented to these teeth in a too endwise position. The canes are then carried onto the back counter-plate, whose teeth project in an opposite direction, where it is crushed, shredded, or defibrated, and they are finally delivered onto the inclined plate D' in the form of long fibrous brooms. By this arrangement the action of defibration is continuous and constant; and by the short development of the counter-plates *d d'*, which limits the working to the lower part, and thus eases the crushing-cylinder, it has been possible to increase considerably the yield, and at the same time to lessen the effects of choking and wedging and to diminish the motion required. By making the bearings of the shaft A to slide horizontally forward toward the plate D, or backward toward the plate D', or simply by arranging screws or wedges under the one or the other of the plates *d d'*, or under both, the space in which the cane is crushed may be increased or reduced at will.

It is obvious that modifications can be made in the construction of the apparatus without departing from the spirit of the invention. For example, the counter-plates *d d'* could be

made concentric with the shaft A, and the drum *a* be placed eccentric, or the plates could be made to form a series of raised or eccentric portions. In this case the action would be intermittent. Such an arrangement is, however, considered inferior to that described, as with it the canes should be presented regularly, and not delivered pell-mell, as they are likely to be in practice. Straight teeth could be used in place of the helicoidal teeth, although at a disadvantage.

Instead of the drive-chain for conveying motion to the cane-carrier C, friction-gearing could be used. It could be thrown into and out of action by suitable clutches or belt-shifting apparatus.

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

1. The method of treating sugar-cane preparatory to expressing the juice by subjecting the same to the operation of defibration—that is to say, by lacerating, tearing apart, or shredding the cane, so as to obtain the same in a disintegrated state with the fibers of a well-defined length, substantially as described.

2. The combination, with a cane-mill or machine for expressing the juice from sugar-cane, of an apparatus, substantially as described, for defibrating the cane—that is, shredding or tearing the same apart before it is subjected to the action of said mill or machine, as set forth.

3. In a defibrating apparatus, the combination, with a toothed drum, of an eccentric toothed counter-plate formed of two parts, with the ratchet-like teeth projecting in opposite directions on the two parts, substantially as described.

4. The combination, with a horizontal drum provided with helicoidal teeth on its periphery extending the full length of the drum, of an eccentric toothed counter-plate surrounding a small portion of the periphery, the teeth on said counter-plate projecting in opposite directions to those on the drum, substantially as described.

5. The combination of the drum with helicoidal teeth on its periphery, the eccentric counter-plate formed in two parts and provided with helicoidal teeth, the teeth on the front part projecting in the same direction as the teeth on the drum, and the teeth on the rear part in the opposite direction, substantially as described.

6. The double counter-plate toothed as explained, in combination with the drum, having its surface formed of plates dovetailed into the body of the drum and provided with helicoidal teeth on their exterior, substantially as described.

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Witnesses:

DU MURAUD,
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