W. SEARBY.

ROTARY CANE CUTTER.

APPLICATION FILED AUG. 15, 1917.

1,348,751. Patented Aug. 3, 1920.

Fig. 1.

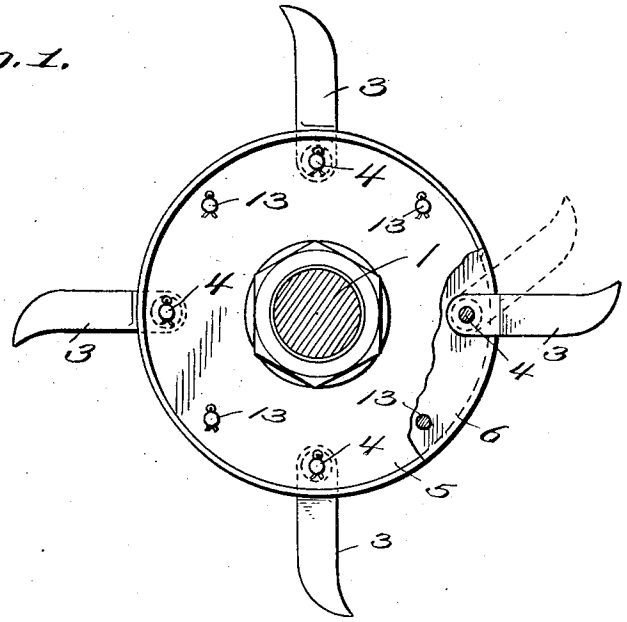
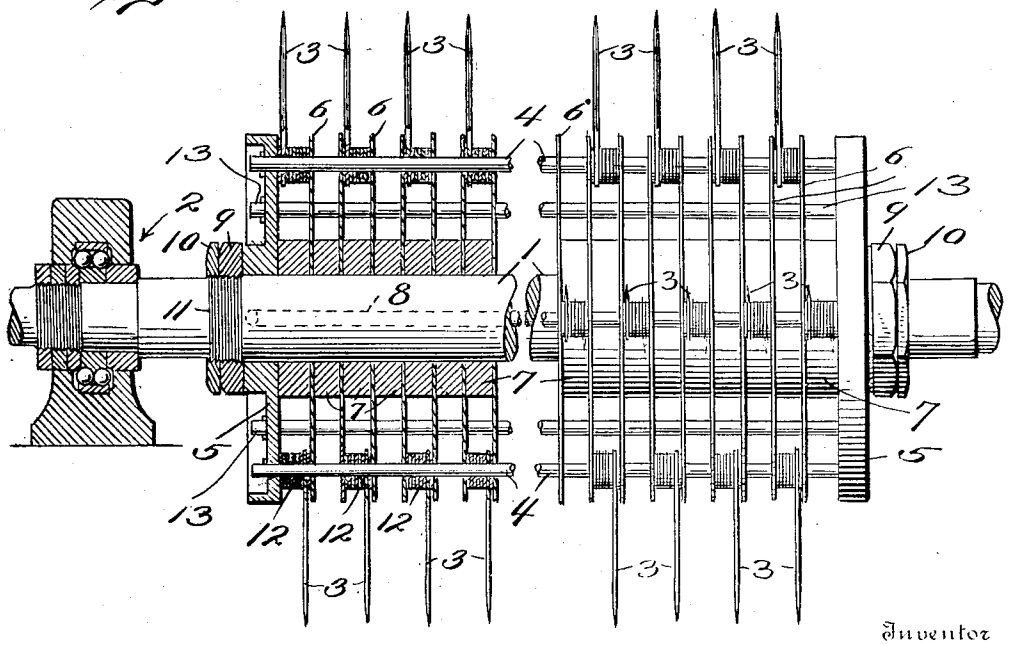


Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM SEARBY, OF PUUNENE, TERRITORY OF HAWAII.

ROTARY CANE-CUTTER.

1,348,751. Specification of Letters Patent. Patented Aug. 3, 1920.

Application filed August 15, 1917. Serial No. 186,380.

To all whom it may concern:

Be it known that I, WILLIAM SEARBY, a citizen of the United States of America, residing at Puunene, Maui, Territory of Hawaii, have invented certain new and useful Improvements in Rotary Cane-Cutters, of which the following is a specification.

This invention relates to improvements in rotary cane cutters such as are used for cutting the cane during its transit to the crushing mill into small lengths for the purpose of reducing its bulkiness and thereby facilitating its feed to the mill and the action of the mill.

The invention may be regarded as an improvement on the construction shown in the U. S. patent to Ramsay, No. 1,209,618, of December 19, 1916, in that its general objects are the same as those of the Ramsay construction. However the invention has, in addition, a number of special objects which are to enable the cutter to be adapted to any number or arrangement of knives, so long as the running balance is maintained, to enable the use of lighter knives with a substantial lessening of the damage in case any of the knives should break and pass through the mill, to enable the cutter to withstand a much higher rotative speed whereby it may be directly driven by a standard speed motor, to facilitate repairs, and to reduce the expense of manufacture.

With the above objects in view, the invention consists of certain features of structure, combination, and relation which will be set forth in detail as the description proceeds.

An embodiment of the invention is illustrated in the accompanying drawing, wherein:—

Figure 1 is an end elevation, partly broken away and in section, of a rotary cane cutter in which the features of the invention are incorporated.

Fig. 2 is a view of the same, partly in side elevation and partly in longitudinal section.

Similar characters of reference designate corresponding parts in both of the views.

The cutter includes in its structure a central shaft 1 which is driven directly or by suitable gearing from the motor (not shown). The ends of the shaft 1 are mounted in bearings suitable for high rotative speed. It is preferred to employ bearings of the structure well known in the mechanical arts under the trade designation "S. K. F." and such a bearing, as 2, is shown in Fig. 2 at the left end of the shaft, it being understood that a similar bearing is provided at the right end of the shaft.

The cutter includes a plurality of knives 3 which are arranged at suitable transverse intervals and are relatively light, being quite thin and of generally reduced dimensions. These knives are free to swing in the direction of their planes, *i. e.* in planes at right angles to the major axis of the shaft 1 and are, therefore, loosely pivoted on rods 4 by which they are supported, said rods being parallel to and radially equi-distant from the shaft 1.

The rotor structure of the cutter includes end plates 5 constituting heads in which the ends of the rods 4 are secured in any suitable manner; for example, and as shown and preferred, said heads are provided with openings through which the ends of the rods 4 project and said rods, adjacent the outer faces of said heads, are provided with cotter pins. The rods 4 are intermediately supported by a number of plates 6 held in determinately and regularly spaced relation by spacing blocks 7 fitted on the shaft 1. The heads 5, plates 6 and blocks 7 are keyed to the shaft 1, as at 8, and are held in clamped relation by clamping pressure applied to said heads. For this purpose nuts 9, backed by lock nuts 10, are employed, the shaft 1 having threads 11 for said nuts.

The position of the knives 3 on the rods 4 is determined by spacing washers or rings 12 which are fitted on said rods in the spaces between the plates 6 and between the end plates 6 and the adjacent heads 5. Said rings are preferably of the same thickness as the adjacent heel portions of said knives and each knife may obviously be arranged in any desired plane in the space occupied by the companion series of rings by suitable arrangement of said rings at both sides of said knife.

The knives 3 are resilient, preferably being made of spring steel and hence they may yield laterally in either direction from their normal planes in consequence of glancing blows upon the hard rind of the cane. It will be obvious that the capacity of the knives for yielding laterally is a substantial measure of protection against breakage. It

is to be noted that the washers or rings 12 are sufficiently loose to provide a certain measure of lateral play of the knives which will be effective in preventing their crystallization in consequence of the laterally directed stresses or, as it is termed colloquially "side swipe" to which they are subjected.

In some cases, and as shown, it may be advisable to employ an added series of rods 13 which are similar both in form and arrangement to the rods 4, being passed through openings in the plates 6 and heads 5 and secured at their ends by cotter pins or other suitable devices. The rods 13 are not, however, used as supports or carriers for the knives but serve to reinforce or brace the rotor, as a whole, and for this purpose are preferably arranged in alternation to the rods 4.

The rotor, constructed as above described, is specially adapted for high rotative speed wherein centrifugal force is developed which, notwithstanding the relative thinness and lightness of the knives, causes them to strike the cane with blows of sufficient intensity to effectively cleave the hard rind. The pivotal mounting of the knives on the rods 4 whereby the knives are free to swing in the direction of their planes provides for the deflection of the knives when an obstacle is encountered. This is advantageous first because the knives when in contact with the cane assume an angle, in opposition to centrifugal force, wherein they produce a draw cut, thereby most effectively reducing the cane, and second because if an obstacle is encountered such as would cause the breakage of a rigid knife, the knives will yield pivotally as far as may be necessary to pass by the obstacle and in this way their breakage, in the large majority of instances, will be avoided. However, should any one of the knives happen to break and to pass with the cane to the mill, the destructive effects on the mill will be very materially lessened owing to the thinness and generally reduced dimensions of the knives.

The capacity of the knives to swing freely in the direction of their planes provides a further advantage in that, in case of an exceptionally heavy feed of cane *i. e.* an overload such as would completely arrest the rotation of the ordinary gang of rigidly fixed knives, the knives 3 will simply be deflected, exercising a draw cut on the cane and the cutter will continue its operation without interruption, utimately freeing itself of the overload.

As shown, the knives are arranged in four rows extending transversely of the cutter. The knives of each row are equidistant from one another and occupy planes different from the planes occupied by the knives of any other row. As shown and preferred, in each row unoccupied spaces between the plates 6 alternate with spaces which are occupied by the knives and their spacing rings 12; but said spacing rings are arranged between each pair of plates 6, their arrangement in each space between adjacent plates being at diametrically opposite points. The construction, however, admits of any desired arrangements of the knives, so long as the running balance is maintained; and it will, therefore, be understood that the knives may be arranged in more than four rows, or instead of being arranged in strictly transverse rows, may, if desired, be arranged spirally in the well known manner.

The construction may be manufactured at comparatively low cost. Practically all the work may be done on a lathe and no elaborate fitting is necessary. For the pivotal mounting of the knives 3 all that is required is to drill a suitably located hole in the heel of the knife, conforming in diameter to the diameter of the rods 4.

It is also to be noted that the number of the knives in any particular cutter may be varied from time to time in accordance with choice or to meet variations in the conditions of work; and that when such a variation is decided upon, the changes may be made with facility, it being only necessary to remove the rods 4 and suitably vary the locations of the knives and their spacing rings 12. The substitution of new knives for broken or dull ones may be made with equal facility, as in obvious.

I claim as my invention—

1. In a rotary cane cutter, the combination with a rotor comprising a driven shaft, a pair of plates, constituting heads, mounted on the shaft, other plates arranged between the heads and disposed at regular intervals, spacing blocks fitted on the shaft between said plates and rods extending between the heads, the plates and heads having openings through which said rods are passed, relatively short and thin resilient knives singly arranged and loosely pivoted on the rods for movements in the directions of their planes, and a series of spacing rings for each knife loosely fitted on the respective rods on each side of said knife and between adjacent plates, said rings having sufficient relative looseness to permit a certain measure of lateral play of the knives.

2. In a rotary cane cutter, the combination with a rotor comprising a driven shaft, a pair of plates constituting heads mounted on the shaft, other plates arranged between the heads and disposed at regular intervals, spacing blocks fitted on the shaft between said plates and rods extending between the heads, the plates and heads having openings through which said rods are passed, relatively short and thin resilient knives singly arranged and loosely pivoted on the rods for movements in the directions of their

planes, and a series of spacing rings for each knife loosely fitted on the respective rods and on each side of said knife and confined between adjacent plates, the knives being staggered on adjacent rods and also between adjacent plates.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM SEARBY.

Witnesses:
RICHARD LILLICO,
H. K. TING.