

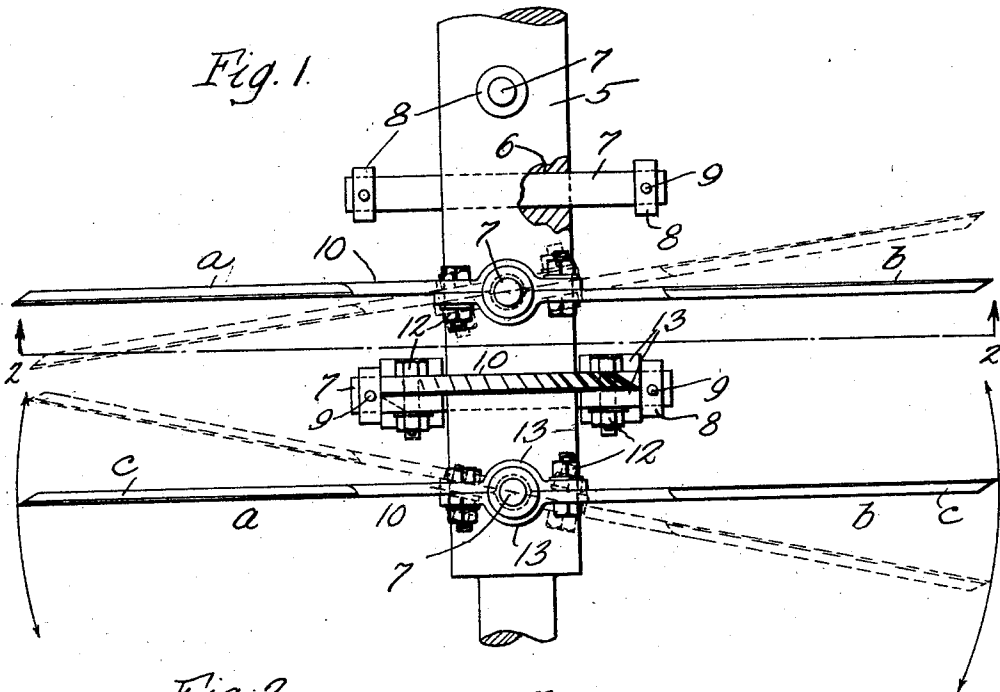
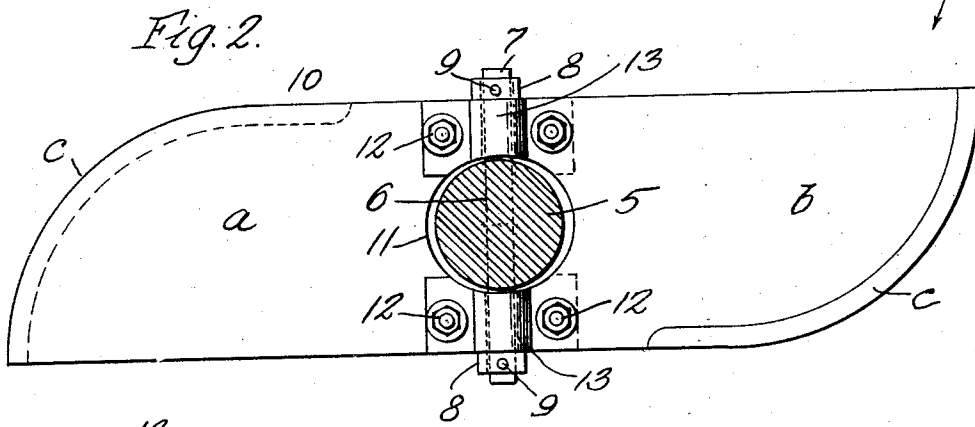
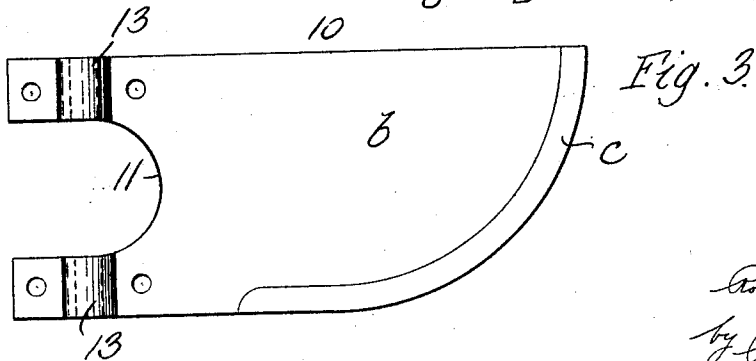
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CANE KNIFE

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CANE KNIFE

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This invention relates to cane knives and particularly to knives utilized for handling, cutting or chipping up sugar cane, or for leveling the sugar cane in the carriers.

In crushing sugar cane, the cane as it comes from the fields is usually dumped upon an endless belt or carrier which conveys it to the crushing rolls in which the juice is extracted from the cane. It is desirable that the cane be distributed evenly over the carrier, so that a layer of uniform thickness will be conducted to the crushing rolls, and to accomplish this a revolving shaft is usually arranged above the conveyer and provided with radially extending blades. The shaft is rotated rapidly so that the blades cut up and break the cane to some extent and also distribute it in a layer of relatively uniform thickness. Formerly the blades were rigidly bolted on the shaft, which was found to be objectionable.

An object of this invention is to provide an improved cane knife in which the blades will have a limited amount of free lateral motion while rotating; with which the blades will be yieldingly urged into normal position with respect to the shaft during their rotary movement; with which the blades will be well balanced so as to avoid vibration at high speeds; with which the blades may be easily and quickly replaced; with which repairs to one of the blades may be made by replacement of a section thereof without discarding the entire blade; and which will be relatively simple, practical, efficient and of low cost of construction.

Another object of invention is to provide an improved cane knife with which the double ended blades may be individually removed from or applied to the shaft in a simple manner and without disturbing the other blades.

Various other objects and advantages will appear from the following description of one embodiment of the invention, and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawings:

Fig. 1 is a plan of a portion of a cane knife constructed in accordance with this invention and illustrating one embodiment thereof;

Fig. 2 is a sectional elevation of the same, the section being taken approximately along the line 2—2 of Fig. 1; and

Fig. 3 is an elevation of one of the sections forming part of the blade.

In the illustrated embodiment of the invention, a rotary shaft 5 is suitably mounted above the carrier, not shown, which conveys the cane to the crushing rolls, not shown, as usual in cane mills. The shaft 5 is provided with a plurality of diametrically extending holes 6 in which pins or studs 7 are secured, such as by means of drive fits or in any other suitable manner. The holes 6 are provided in the shaft at different points, peripherally of and spaced along the shaft, and in the particular example illustrated the holes 6 are arranged crosswise of one another alternately, as shown clearly in Fig. 1.

Each pin 7 projects at both ends from the shaft, so that two projecting ends will constitute stub bearings or studs on which the blades may be rotatably or rockably mounted. Each stud or pin 7 may be provided with terminal collars 8, at least one of which may be removably secured thereon in any suitable manner such as by a pin 9 which passes through the collar and the free end of the stud or pin 7.

A cutting blade 10 is rotatably or rockably mounted on each pin or stud 7, with the blade extending normal to the shaft and having an aperture 11 midway between its ends through which the shaft 5 extends. The aperture 11 is of such size that it permits limited lateral swinging movement of the blade, such movement being limited by the engagement of the aperture wall with the shaft periphery, deflected positions of the blades being shown by the dash lines in Fig. 1.

Preferably each blade 10 is made of two sections *a* and *b* which overlap or overrun one another face to face at their inner or adjacent ends. The overlapping ends are removably secured or clamped together in any suitable manner, such as by bolts 12 which pass thru and draw together the abutting faces of the overlapping ends of the blade sections. The bolts 12 are preferably arranged in spaced relation to one another along the length of the blade and on opposite sides of the midpoint

of the blade, and the abutting faces of the overlapping ends of each blade at opposite sides of the shaft are concavely and oppositely formed as at 13 so as to provide between
 5 them a pair of bearings which surround and rock upon the free ends of the stud or pin 7 between the collars 8 and the shaft 5.

The collars 8 prevent any possibility of stud or pin 7 working out of the shaft. Since the
 10 studs or pins 7 are arranged alternately crosswise of one another and spaced apart along the shaft, the blades will be similarly arranged, and for that reason the blades may be arranged closely to one another if desired,
 15 without danger of the free ends swinging laterally into interfering engagement with one another during their rotation. The forward edges and the ends *c* of each blade are sharpened so that both end portions of each
 20 blade will be effective for cutting the cane.

It will be observed that the blades can be very easily and quickly attached to or removed from the shaft, without disturbing any other blades, and the blades may swing
 25 freely in a lateral direction to some extent, as indicated in Fig. 1. Since each blade comprises two cutting sections rigidly secured together, it follows that the centrifugal force acting on any blade during rotation of
 30 shaft will be twice as great as of a corresponding blade, such as heretofore used which comprised only one section. Consequently, the blades offer twice the resistance to displacement out of their normal positions,
 35 since, of course, only one section of each blade acts upon the cane or other material at one time. This increased centrifugal force also returns the blades more quickly to their normal operating positions shown in full
 40 lines in Fig. 1. Inasmuch as each blade is mounted midway of its ends it will be well balanced and the inertia thereof will tend to hold it in a position normal to the shaft. Because of this the blade is not easily deflected and will therefore cut successfully
 45 at all times. If one section of the blade becomes broken or worn it may be replaced without any necessity of discarding the other blade section.

50 The blade sections may be stamped from sheet metal with the bearing concavities die-formed therein, and the holes for the bolts then drilled. No machining of the shaft and pins 7 is required except for drilling, and the
 55 cost of manufacture is therefore very low.

It will be obvious that various changes in the details, which have been herein described and illustrated in order to explain the nature of the invention, may be made by
 60 those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

Claims:

1. A cane knife comprising a rotary shaft,
 65 and a blade hinged midway of its ends to the

shaft so as to be swingable laterally of itself while rotating with the shaft and which, when the shaft is rotating, is held approximately normal to the shaft by centrifugal action on the parts of said blade at opposite
 70 sides of the axis of the shaft.

2. A cane knife comprising a rotary shaft having axially aligned stub bearings extending radially therefrom, and a blade disposed crosswise of said shaft, and midway
 75 of its ends pivoted on said stub bearings, so as to swing on said bearings thru an arc of a circle while rotating with the shaft.

3. A cane knife comprising a rotary shaft, a pin secured in said shaft radially thereof
 80 and extending in opposite directions from said shaft, and a blade disposed in a plane crosswise of said shaft, pivoted midway of its ends upon the projecting ends of said pin, and having its opposite edges sharpened
 85 to provide cutting edges.

4. A cane knife comprising a rotary shaft, a blade disposed approximately normal to the axis of the shaft and hinged midway of its ends to the shaft so as to be swingable
 90 laterally of itself while rotating with the shaft, said blade being formed of two end sections notched at their inner ends to embrace the shaft and permit removal of the blade from the shaft by separation of the
 95 sections, and to form between them bearings for hinging said blades on said shaft and means for securing together the inner ends of said sections in a manner to permit separation of the sections.

5. A cane knife comprising a rotary shaft, a blade disposed approximately normal to the axis of the shaft, said blade being formed of two end sections notched and overlapping at their inner ends to embrace the shaft and
 100 permit removal of the blade from the shaft by separation of the sections, and means for securing together the inner ends of said sections in a manner to permit separation of the sections, said overlapping ends of the
 105 blade forming a part of a pivotal connection with said shaft to permit the blade to swing laterally of itself while rotating with said shaft.

6. A cane knife comprising a rotary shaft,
 115 a blade disposed approximately normal to the axis of the shaft and hinged midway of its ends to the shaft so as to be swingable laterally of itself while rotating with the shaft, said blade being formed of two end sections
 120 notched and overlapping at their inner ends to embrace the shaft and permit removal of the blade from the shaft by separation of the sections, and means for securing together the inner ends of said sections in a
 125 manner to permit separation of the sections, the abutting faces of overlapping portions having between them cavities to provide pivot bearings through which the blade is hinged to the shaft.

7. A cane knife comprising a rotary shaft, and a blade disposed approximately normal to the axis of the shaft, having midway of its ends an aperture thru which the shaft loosely extends, and a pivotal connection between said blade and said shaft, adjacent the aperture, for permitting said blade to swing about an axis transverse to the shaft.
8. A cane knife comprising a rotary shaft, and a blade disposed approximately normal to the axis of the shaft, having midway of its ends an aperture thru which the shaft loosely extends, and hinged, adjacent the aperture, to the shaft for swinging movement about an axis transverse to the shaft, said aperture having a size to limit the swinging of the blade to a desired arc.
9. A cane knife comprising a rotary shaft having axially aligned stub bearings extending radially therefrom, a blade disposed crosswise of said shaft, and midway of its ends pivoted on said stub bearings, so as to swing on said bearings thru an arc of a circle while rotating with the shaft, said blade being formed of two end sections notched and overlapping at their inner ends to embrace the shaft and permit removal of the blade from the shaft by separation of the sections, and means for securing together the inner ends of said sections in a manner to permit separation of the sections, the abutting faces of overlapping portions having oppositely extending cavities to provide bearings embracing said stub bearings and pivotally attaching the blade to the shaft.
10. A cane knife comprising a rotary shaft, a pin secured in said shaft radially thereof and extending in opposite directions from said shaft, a blade disposed in a plane crosswise of said shaft, and formed of two sections arranged approximately end to end, the adjacent ends of the sections being notched to embrace the shaft and provide between them an aperture thru which the shaft extends, the adjacent ends of the sections having bearing cavities between their abutting faces which receive the outer ends of said pin, and means for securing together adjacent ends of said blade sections.
11. A cane knife comprising a rotary shaft, a plurality of pivot studs projecting radially from said shaft at intervals along the same and at different points around the periphery of the shaft, and cutting elements disposed approximately normal to the axis of the shaft and each extending to opposite sides thereof, said cutting elements being hinged midway of their ends to said studs, whereby said elements may swing laterally on said studs while rotating with said shaft.
12. A cane knife comprising a rotary shaft, a plurality of pivot studs projecting radially from said shaft at intervals along the same and at different points around the periphery of the shaft, said studs being arranged in diametrically aligned pairs, and rigid blades disposed crosswise of said shaft and midway of their ends pivotally mounted, one on each pair of studs, whereby said elements may swing laterally on said studs while rotating with said shaft.
13. A cane knife comprising a rotary shaft, a plurality of pivot studs projecting radially from said shaft at intervals along the same and at different points around the periphery of the shaft, said studs being arranged in diametrically aligned pairs, and blades disposed crosswise of said shaft and midway of their ends pivotally mounted, one on each pair of studs, whereby said elements may swing laterally on said studs while rotating with said shaft, each of said blades having an aperture thru which the shaft extends, of such size considered in the direction of radial length of the blade, that the aperture wall engages with the shaft to limit the swinging movement of the blades to a desired arc.
14. A cane knife comprising a rotary shaft, a blade disposed approximately normal to the axis of the shaft and extending to opposite sides thereof, and a bearing on said shaft on which said blade is mounted midway of its ends to swing laterally of itself while rotating with said shaft.
15. A cane knife comprising a rotary shaft, a blade disposed approximately normal to the axis of the shaft and comprising two parts rigidly secured together and extending substantially at right angles to the shaft and to opposite sides thereof, and a bearing on said shaft on which said blade is mounted and which permits said blade to swing laterally of itself while rotating with said shaft.

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