

Oct. 21, 1924.

1,512,484

E. M. PORTER
ROTARY CUTTER KNIFE

Filed June 11, 1923

2 Sheets-Sheet 1

Fig. 1.

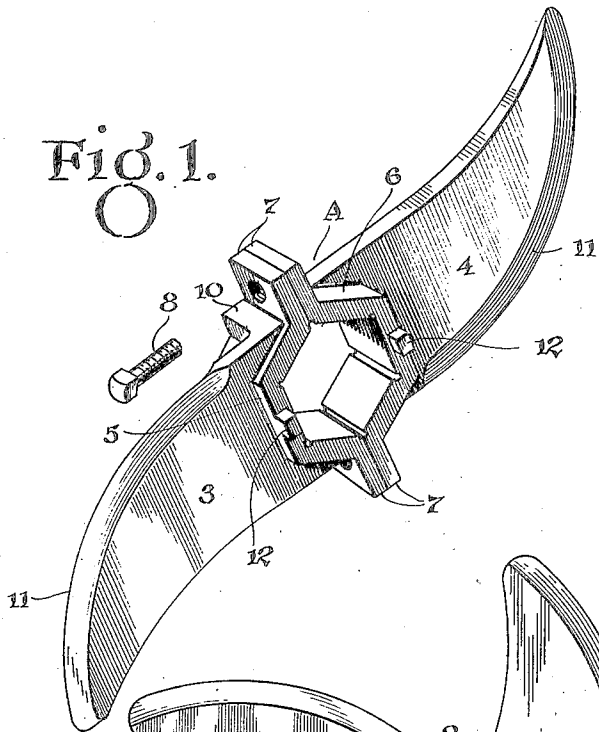
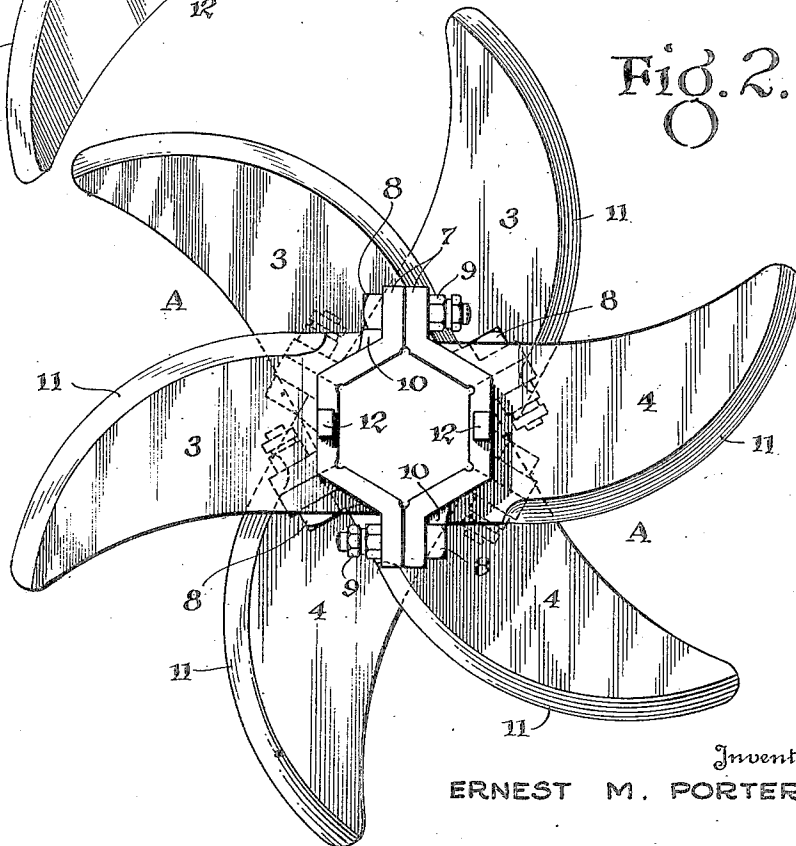


Fig. 2.



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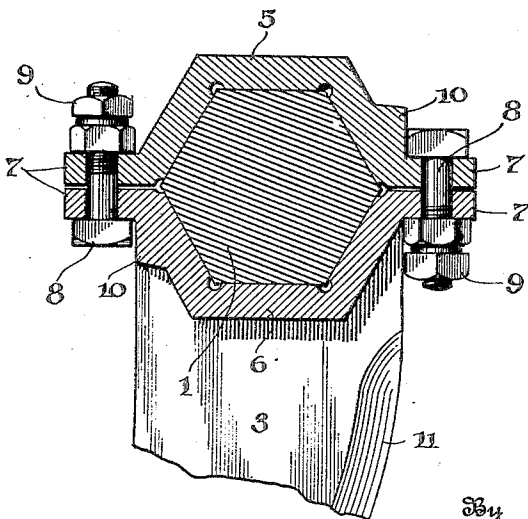
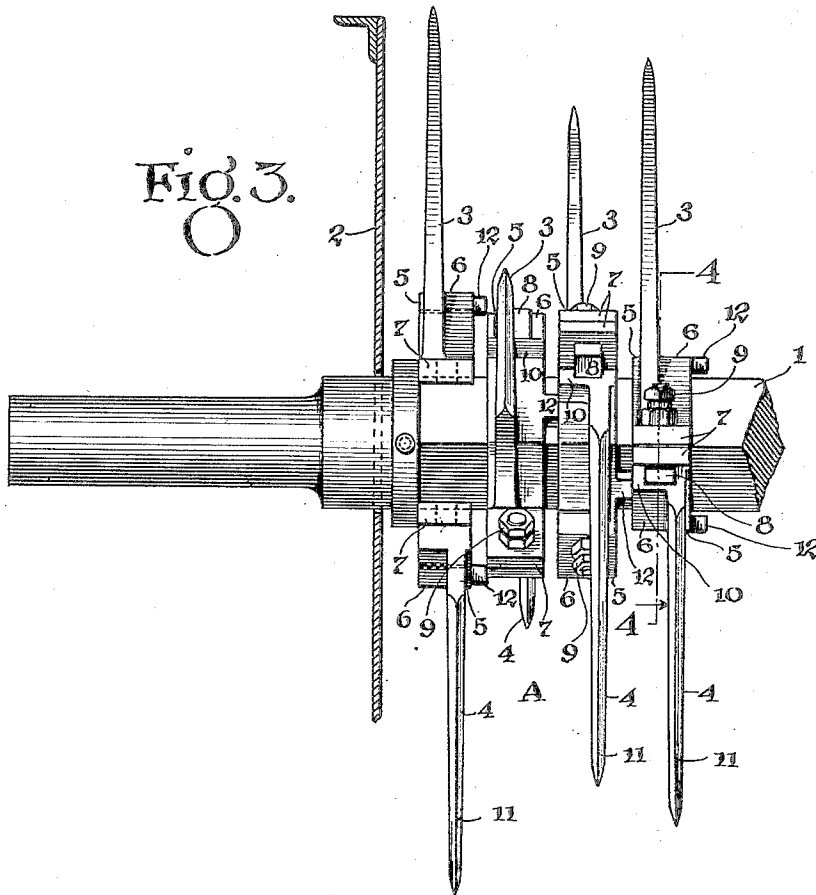


Fig. 4.

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UNITED STATES PATENT OFFICE.

ERNEST MORGAN PORTER, OF HONOLULU, TERRITORY OF HAWAII.

ROTARY-CUTTER KNIFE.

Application filed June 11, 1923. Serial No. 644,709.

To all whom it may concern:

Be it known that I, ERNEST MORGAN PORTER, a citizen of the United States, residing at Honolulu, Territory of Hawaii, have invented certain new and useful Improvements in Rotary-Cutter Knives; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to rotary cutters for sugar cane and the like, and has for its object the provision of a strong, durable, simple and efficient device of the character indicated, comprising a shaft and a plurality of radially arranged knives secured thereto, and spaced apart by means permitting ready removal and replacement of the knife blades, and which effectually prevent any distortion of the knife blades under the heavy stresses to which they are subjected during the cutting operations.

The cane cutting knives at present on the market, are usually provided with double blades, oppositely positioned on the operating shaft, and rotating or cutting in the same plane. Such knives are ordinarily used to cut the cane on a traveling conveyor passing adjacent the knives, and, assuming the knife units to have a two and a half inch center, the speed of the operating shaft about seven revolutions per second, and the speed of the conveyor one foot per second, all of which dimensions and speed ratios being, in common practice, approximately as stated, it is obvious that one of said knife blades is likely to follow the path of the preceding blade into the cane mass on the conveyor, which mass is usually from four to six inches thick. One of the objects of the invention, therefore, is the provision of knives of this character, having cutting blades on opposite sides of the shaft and each blade rotating in a different plane, whereby the cane may be cut into the shortest possible lengths and not crushed under the knives, such cutting resulting in a greater extraction of the cane juices at the first set of crushing rolls, and better total extraction.

Other objects of the invention will be made apparent in the following specifications when considered in connection with the

drawings forming a part thereof, in which drawings:

Fig. 1 is a perspective view showing two cutting blades arranged in knife forming position.

Fig. 2 is a plan view, longitudinally of the operating shaft, showing a plurality of the assembled knives.

Fig. 3 is a front plan view of the knives positioned on the operating shaft, and

Fig. 4 is a section through line 4—4 of Fig. 3.

Now referring specifically to the drawings, 1 indicates a shaft which, as will be understood, extends transversely of the cane conveyor, not shown. The knife carrying portions of the shaft may be square, hexagonal, octagonal, etc., so long as squared surfaces are oppositely provided thereon, being here shown as hexagonal. The ends of the shaft may pass through the side plates 2, of the cane conveyor, and be provided with a driving pulley, gear, coupling or other means whereby power may be applied to the shaft and rotary motion imparted thereto.

The knives, as a whole, are indicated by A, each knife being composed of blades 3 and 4, and since the blades are identical, a description of one will suffice. The blades are preferably composed of manganese steel castings, subsequently subjected to heat treatment, whereby to increase the resistance of the blades to tensile strains. Each blade, in the casting operation, is formed with a hub section 5 on one side, and a thicker hub section 6 on the opposite side, as clearly shown in Fig. 1. More specifically, during the casting operation, one half of a hexagon, in the form here shown, is formed integral with the blade, the sections of the hub projecting laterally on each side of and from the body of the blade. It will be noted from an inspection of Figs. 1 and 3, that the portion 6 of the hub section, on the right hand side of the blade, projects further than does the portion 5, on the other side of the blade, the blade, therefore, being laterally offset with respect to the transverse axis of the hub section.

Each blade is provided with integrally formed vertically extending flanges 7, provided with cored holes adapted, when the blades are brought into knife forming posi-

tion on the shaft, to receive screw-threaded, headed bolts 8, said bolts being secured to position by means of suitable lock nuts 9, of approved design, each hub section 6 carrying a base 10, positioned for contact by the heads of the bolts 8, whereby to retain the bolts in position.

The blades 3 and 4 are assembled around the shaft 1, provided with properly squared portions, and positioned as shown in Fig. 1, the bolts 8 passed through the cored holes in the flanges 7 and secured in position, whereby the hub sections are clamped firmly around the squared portion of the shaft. It will be noted that, because of the difference in lateral extent of the portion 6, of the hub sections of the blade 4, with respect to the portion 5, of the blade 3, the outer vertical surfaces of said portions lie in the same plane, but that the bodies of the blades are laterally and oppositely offset from the transverse axis of the hub sections. This construction results in a rotation of the blades 3 and 4 in laterally separated vertical planes, when the blades are positioned upon the shaft, as will be understood.

The blades 3 and 4 are of course provided with sharpened cutting edges 11, which are preferably curved backwardly, as shown in Fig. 1. Since the blades are identical for any installation, they may be used interchangeably.

When the blades are assembled upon the shaft 1, as shown in Fig. 3, the thick portion 6 of one hub section, may rest directly against the relatively thin portion 5 of the hub section of the next adjacent blade, whereby said portions serve to effect the necessary spacing of the blades, as will be understood. I have here shown studs 12 cast integral with and extending laterally from the portions 5 and 6, and affording means for effecting a wider separation of the blades, where desired in certain installations.

In the operation of my device, as explained, the blades are secured, as described, upon the opposite flat faces of the operating shaft. If the shaft is squared, there will be two double-bladed knives; if hexagonal, there will be three double-bladed knives, etc., each blade of each knife operating in a plane laterally separated from the plane of rotation of any other blade of the installation. In case of rupture of any blade, it

may obviously be easily removed without disturbing any other knife of the installation.

The invention is not limited to the use of manganese steel, or to the use of any alloy, as the material of which the blades are composed. Manganese steel, as herein stated, is preferred, because it may be bent without fracture, and will better stand the shocks and wear to which cutter blades are always subjected in this art. It is to be understood, however, that the blades may be constructed of any suitable material, without departure from my invention, if such construction falls within the spirit and scope of the appended claims. Each blade and its associated hub section may easily be produced by the casting operation, and the cutting edges of the blades thereafter ground to a fine edge. Since the blades are interchangeable, as has been before stated, the structure may be cast in molds which are identical.

The formation of hub sections which are integral with the blades, and so disposed with respect thereto that the blades are laterally offset from the transverse axis of said sections, manifestly obviates the necessity of the devices ordinarily utilized in fastening the blades to the shaft, or to the hubs carried thereby. The laterally offset position of the blades insures that each blade will effect a new cut in the cane mass, on each revolution.

I claim:—

1. A knife adapted to be mounted on a rotative shaft, comprising two blades each provided with a hub section complementary to the hub-section of the other blade, said sections being adapted for connection each to each and to engage opposite portions of the periphery of the shaft, each said blade being laterally offset from the transverse axis of its associated hub section.

2. A rotary cutter adapted to be mounted on a rotative shaft, and comprising a plurality of double-bladed knives each integrally provided with a hub section extending longitudinally of and adapted to embrace the shaft, and means carried by said hub section adapted to engage the hub section of the adjacent knife, whereby to space said knives, substantially as described.

In testimony whereof I affix my signature.

ERNEST MORGAN PORTER.