Aug. 15, 1939. C. F. DAHLBERG ET AL 2,169,522

CANE CLEANING DEVICE

Filed April 11, 1938 3 Sheets-Sheet 1

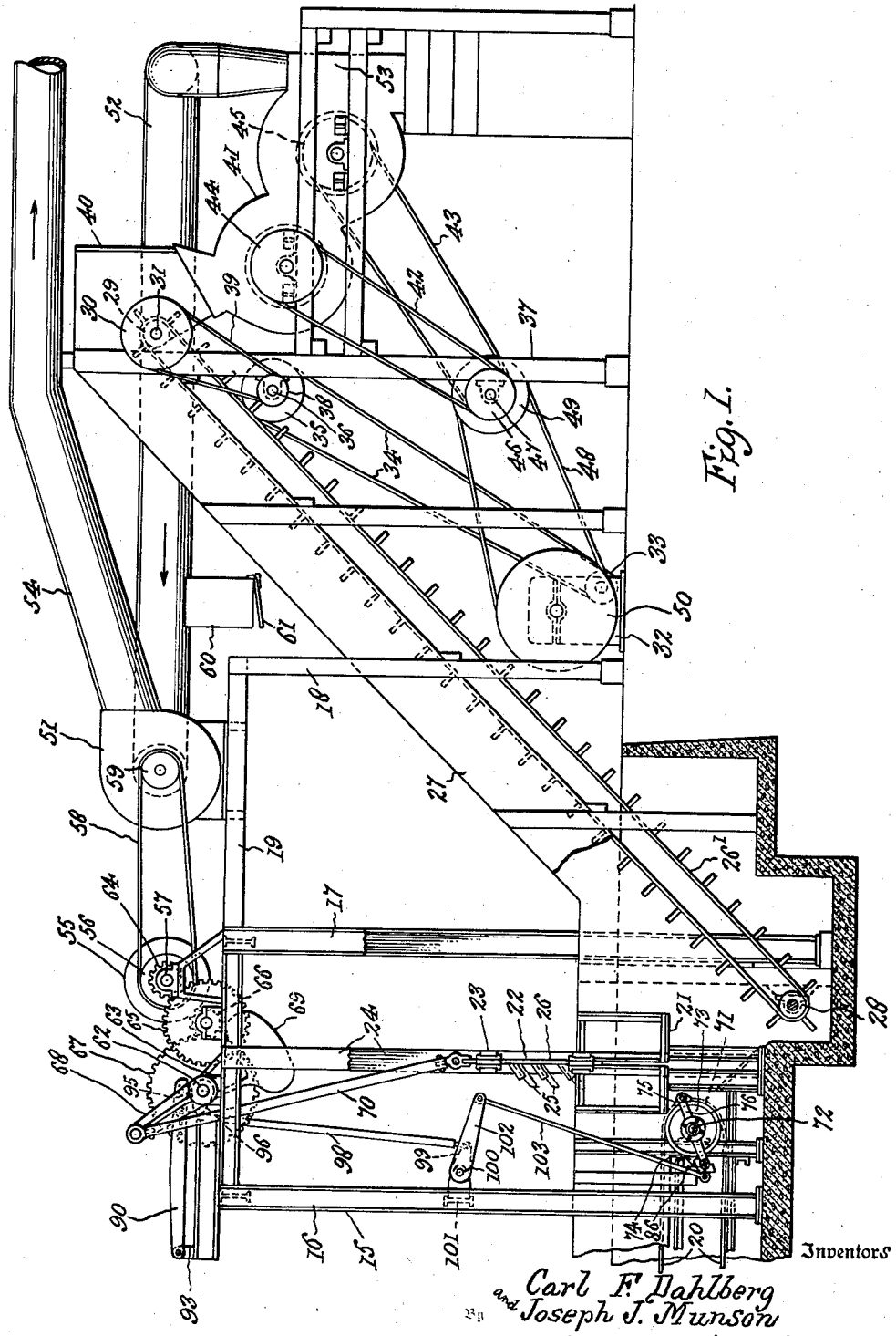


Fig. 1.

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CANE CLEANING DEVICE

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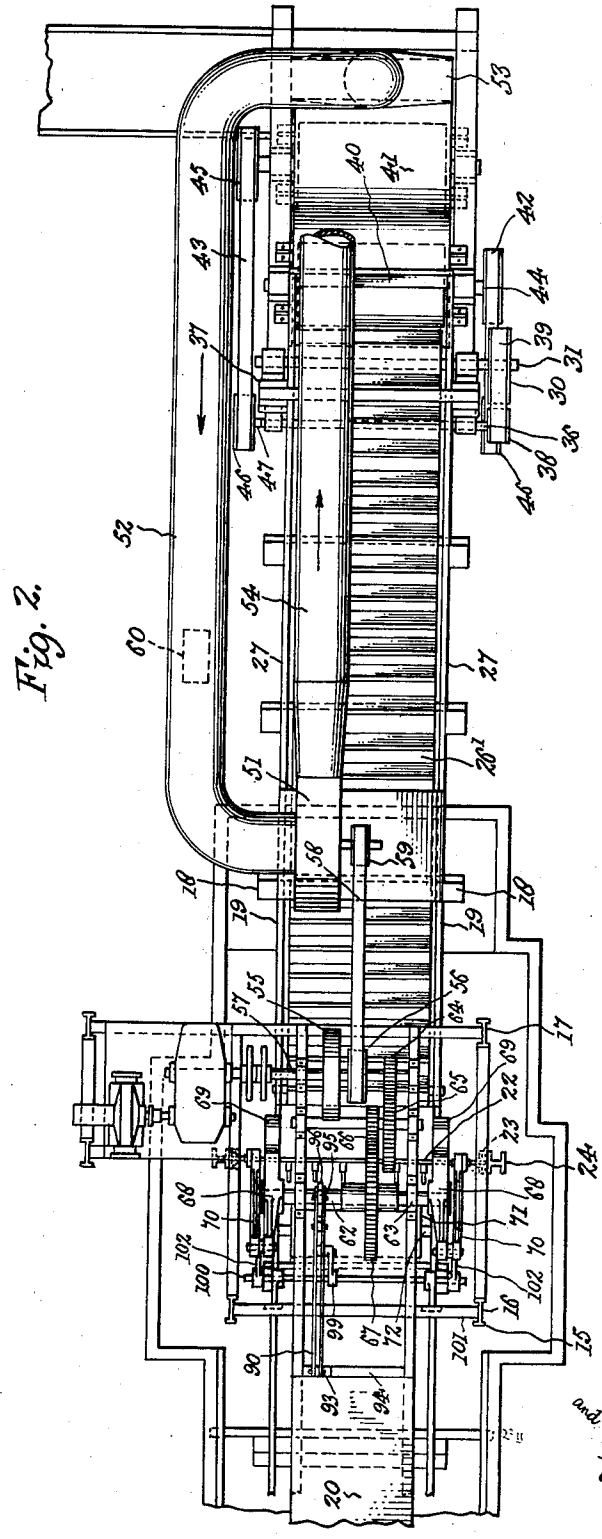


Fig. 2.

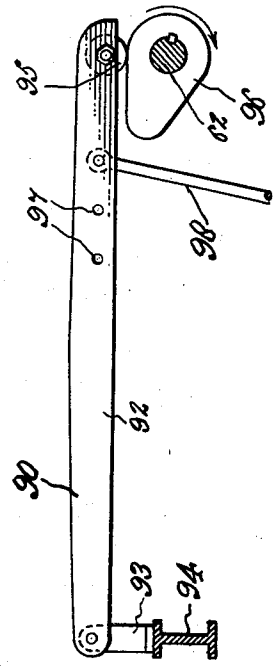


Fig. 4.

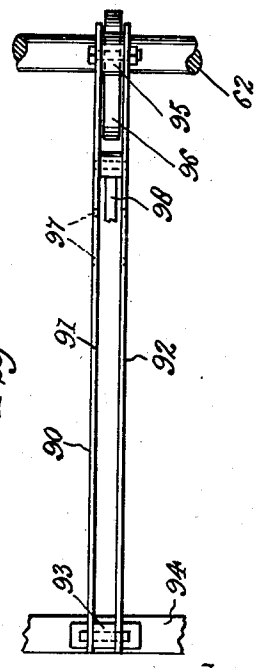


Fig. 3.

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Filed April 11, 1938 3 Sheets-Sheet 3

Fig. 5.

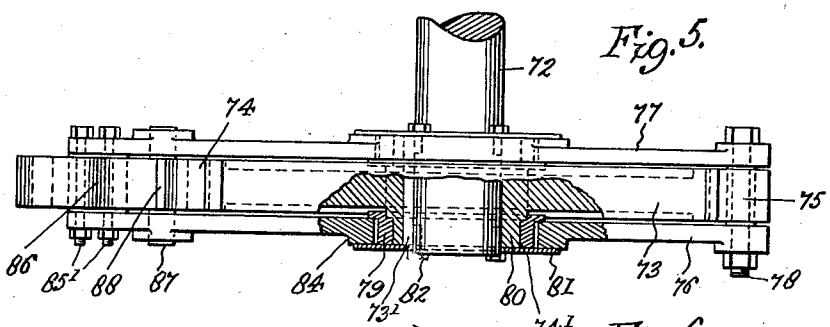


Fig. 6.

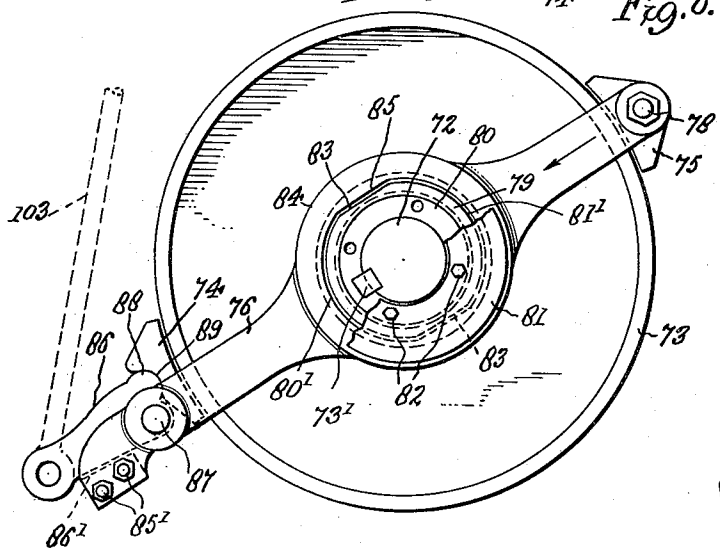


Fig. 8.

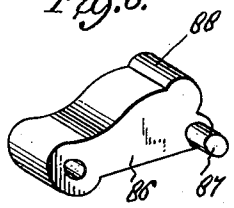


Fig. 9.

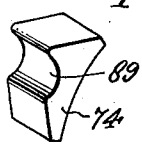


Fig. 7.

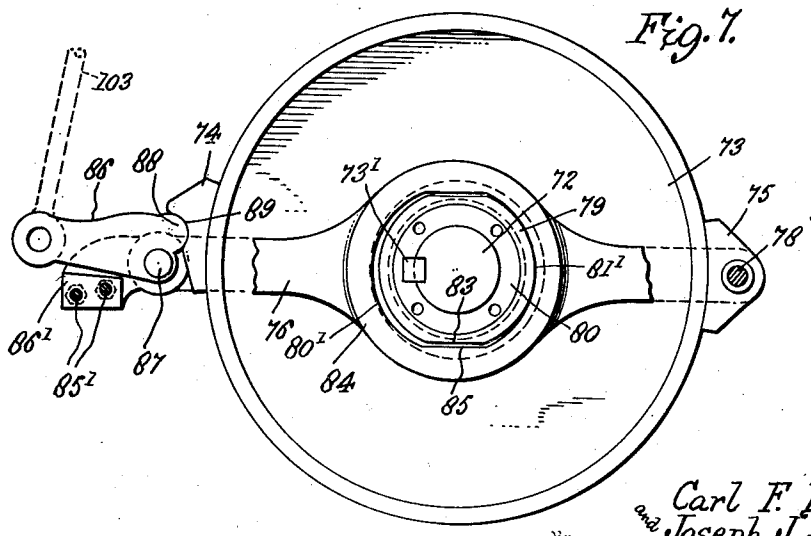
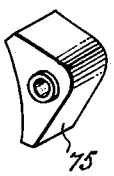


Fig. 10.



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UNITED STATES PATENT OFFICE

2,169,522

CANE CLEANING DEVICE

Carl F. Dahlberg, New Orleans, and Joseph J. Munson, Houma, La.

Application April 11, 1938, Serial No. 201,440

3 Claims. (Cl. 146—155)

This invention relates to cane cleaning and cutting devices and is a continuation in part of our copending application, Serial No. 146,304, filed June 3, 1937.

In our co-pending case above referred to, the driving mechanism for the knife and the conveyor which feeds the cane to the knife are disposed below such knife and conveyor. This required a deep pit, and it was also found that the driving apparatus received the dirt and trash which was obviously undesirable.

It is therefore an object of the present invention to rearrange and reconstruct the apparatus whereby the operating mechanism for the knife and conveyor are disposed above these parts, thus eliminating the deep pit, and moreover maintaining the driving apparatus free from dirt, trash and other foreign matter.

In so rearranging the driving or operating mechanism from the position below to that above the knife and conveyor or carrier, certain reconstructions have been found desirable, and in such reconstruction it has been our object to secure the proper motion uniformly accelerated to prevent excessive strains in the driving mechanism and, at the same time, yield a shorter time for completing each intermittent movement of the conveyor or carrier.

A further object of the invention is to provide an improved intermittent operating device for the conveyor or carrier.

A further object of this invention is to provide an improved feeding means for the cane which is so constructed that the movement of the cane in the direction of the knives may be varied at will so that any desired quantity of cane may be fed to the cutting means.

A still further object of this invention is to provide a counter-balanced knife operating structure so as to eliminate vibration occasioned by connecting the knife structure to a bell crank or the like.

With the foregoing and other objects in view, the invention will be more fully described hereinafter and particularly pointed out in the appended claims.

In the drawings, in which like reference characters denote like or corresponding parts throughout the several views,

Figure 1 is a detail side elevation partly broken away and in section of a sugar cane cutting and cleaning means constructed according to an embodiment of this invention.

Figure 2 is a detail top plan of the device.

Figure 3 is a fragmentary top plan of the feed operating lever for feeding the uncut sugar cane to the cutting means.

Figure 4 is a detail side elevation partly in section of the structure shown in Figure 3.

Figure 5 is a fragmentary top plan partly broken away and in section of the feeding means for feeding the cane to the cutting knives.

Figure 6 is a detail side elevation partly broken away of the feeding structure shown in Figure 5 when the operating lever is at its lowermost or inoperative stroke.

Figure 7 is a view similar to Figure 6 but showing the feeding means when the operator is at the top of its operating stroke.

Figure 8 is a perspective view of the cam lever engaging one of the clamping shoes forming part of the feeding mechanism.

Figure 9 is a perspective view of the clamping shoe engaged with the cam lever shown in Figure 8.

Figure 10 is a perspective view of a second or opposed clamping shoe.

Referring to the drawings the numeral 15 designates generally a frame structure comprising upright posts or beams 16, 17 and 18. A platform structure generally designated as 19 is secured to the upper ends of the uprights or posts 16, 17 and 18.

As viewed in Figure 1, the uncut sugar cane enters from the left, being positioned on a carrier or conveyor generally designated as 20. The sugar cane then moves forwardly with the carrier 20 as will be hereinafter described, and engages on a table 21 positioned forwardly of the adjacent end of the carrier 20. A vertically slidable knife structure 22 is slidable in vertically disposed guides 23 carried by uprights 24. The knife structure 22 comprises a plurality of knives or blades 25 mounted on a frame 26 which is slidable in the guides 23.

The knives 25 are adapted to cut the sugar cane into predetermined short lengths and these cut pieces are then discharged off from the table 21 onto the lower end of an endless conveyor 26'. The conveyor 26' is mounted in a housing 27 which also substantially encloses the table 21 and a portion of the frame structure about the knives 25. The lower end of the conveyor 26' is mounted on a sprocket 28 and the upper end of the conveyor 26' is mounted on a sprocket 29 which is operated by means of a pulley 30 secured to a shaft 31 upon which the sprocket 29 is mounted.

A driving mechanism 32 is provided with a relatively small pulley 33 over which a belt 34

is trained and this belt engages a larger pulley 35 mounted on a shaft 36 which is journalled in bearings carried by a post structure 37. A relatively small pulley 38 is secured to the shaft 36 and a belt 39 is trained over the pulley 38 and over the pulley 30 so that the conveyor 26' will be driven at a relatively slow speed. The upper end of the conveyor 26' discharges into a hopper 40 and a cane cleaning mechanism generally designated as 41 which is similar to the cleaning mechanism embodied in my co-pending application hereinbefore referred to receives the cut cane from the hopper 40. The cleaning mechanism is operated by means of belts or flexible driving means 42 and 43 which engage pulleys 44 and 45 respectively, which are mounted on shafts carrying rotatable brushes or the like. The belts 42 and 43 are connected to pulleys 46 on a shaft 47 which is driven by a belt 48. The belt 48 is trained over a driven pulley 49 secured to the shaft 47 and is also trained over a driving pulley 50 connected to the driving means 32.

A suction fan 51 is connected on the suction side thereof by means of a pipe 52 to the outlet end 53 of the cleaning means 41 and the opposite side of the fan or blower 51 is connected to a discharge pipe 54 which may be carried to a suitable point so that the dirt or other material in the form of grass, leaves or the like, may be carried away from the cleaning mechanism. A motor or driving member 55 is mounted on the platform 19 and a pulley 56 is secured to a drive shaft 57 and a belt 58 is trained over the pulley 56 and also over a pulley 59 secured to the fan so that the fan 51 is operated independently of the conveyor 26' and the cleaning mechanism 41. A nipple 60 is connected to the suction pipe 52 and provided with a flap valve or closure 61 so that sand, dirt or the like, which collects in this nipple or collector 60 may be readily discharged therefrom.

A countershaft 62 is rotatably mounted in bearings 63 carried by the platform 19 and this countershaft 62 is connected to the drive shaft 57 by a train of gears including gears 64, 65, 66 and 67. In this manner, the countershaft 62 is driven at a relatively slow speed as compared to the drive shaft 57. A bell crank or lever 68 is secured to the shaft 62 and a counterweight 69 is carried by the shaft 62 and extends radially in a direction opposite from the crank or lever 68. The crank or lever 68 is connected to the knife frame 22 by means of a connecting link or bar 70 so that rotating of the lever 68 will effect reciprocation of the knife frame 22.

The forward end of the conveyor or carrier 20 is trained over a sprocket 71 which is mounted on a shaft 72. A carrier driving disc 73 is secured to the shaft 72 at one end thereof and this drum 73 is periodically rotated by means of a pair of clamping shoes 74 and 75. The shoes 74 and 75 are disposed between a pair of parallel arms 76 and 77 which are positioned on opposite sides of the drum 73. The shoe 75 is secured to a bolt or shaft 78 at one end of the rock arms 76 and 77.

A pair of collars 79 are rotatably mounted on the hub portion 80 of the drum 73 and are held against endwise movement by means of holding plates 81 which are secured to the hub 80 by means of bolts 82. The collars 79, as shown in Figures 6 and 7, are each provided with diametrically opposed parallel or flat portions 83 and the central portions of the arms 76 and 77 are formed with rings 84 which are also provided with opposed parallel or flat portions 85. The rings 84 are mounted relatively loosely on collars 79 so that the associated arms 76 and 77 may have movement transverse or diametric to the shaft 72. The side arms 76 and 77 are rigidly bolted together at the end adjacent the shoe 74 by means of bolts 85' and a distance piece 86'. A cam lever 86 is rockably mounted by means of trunnions 87 between the levers 76 and 77 and the cam portion 88 of the lever 86 engages in a seat or concave recess 89 provided in the shoe 74. In this manner, rocking of the lever 86 in an upward direction will move the shoe 74 toward the periphery of the drum 73 and in like manner, the pressure of the shoe 74 on the drum 73 will effect reverse movement of the rock levers 76 and 77 so as to simultaneously effect engagement of the shoe 75 with the opposite part of the drum 73. In this manner, the levers 76 and 77 will be locked to the drum 73 so that further upward rocking of the lever 86 will cause the drum 73 and the shaft 72 to be rotated.

The rock lever 86 is pulled upwardly by means of a rock lever or conveyor operating member, generally designated as 90. The operating lever 90, as shown in Figures 3 and 4, comprises a pair of elongated bars or levers 91 and 92 which are pivoted at one end on a bearing 93 carried by a beam structure 94. The two levers 91 and 92 have disposed therebetween a roller 95 at the opposite end thereof which engages a lifting cam 96 mounted on the countershaft 62. The levers 91 and 92 are provided with a plurality of spaced apart holes 97 adjacent the roller 95 and a link or reach rod 98 is pivotally secured to a selected pair of holes 97 and is also secured as at its lower end to a crank 99, secured to a shaft 100. The shaft 100 extends horizontally between a pair of upright posts 16 being secured to a horizontal beam 101. The shaft 100 also has a relatively long crank or lever 102 secured thereto and a second link or reach rod 103 connects the outer end of the crank 102 to the cam lever 86.

Preferably, the crank 99 is relatively shorter than the crank 102 so that a relatively long swinging movement is provided at the outer end of the crank or lever 102 in order to provide the desired rotation of the shaft 72. The lifting cam 96 is constructed with a relatively abrupt cam face so that the lifting movement of the operating lever 90 is effected quickly and this cam is timed with respect to the crank 68 so that the uncut cane is pushed forwardly over the table 21 when the knives 25 are near their upermost position.

In the operation of the device, cane is fed to the knives by the conveyor 20 which is given an intermittent movement by the apparatus above described. In our co-pending application the intermittent movement of the conveyor or carrier was accomplished by means of an eccentric 26. In the present application that eccentric has been changed to a cam 96 for the reason that the cam gives a shorter time for completing the movement of the conveyor or carrier 20. In other words the cam is so arranged that its high point rapidly raises the lifting bar 90 as indicated in Figure 4 and this imparts the desired fraction of intermittent movement to the conveyor 20 in a shorter space of time than would be possible with an eccentric. Moreover the cam yields the proper motion uniformly accelerated to prevent excessive strains in the driving mechanism.

As the cam 96 rotates in the direction of the

arrow in Figure 4, the lifting bar 90 will be raised at its free roller end 95 and about its pivoted end. This action raises the reach rod 98. The reach rod draws upwardly upon the bell crank 99, 102. This bell crank raises the reach rod 103. The reach rod 103 is connected to the friction intermittent operating means shown in Figures 5 to 10 inclusive.

As shown in Figure 7, when the reach rod 103 is pulled upwardly, the rock lever 86 is swung about its pivot 87 causing the cam or nose 88 to force the shoe 74 against the outer periphery of the drum or disc 73 and to also cause a diametric shifting of the yoke constituted by the arms 76 and 77 to a position where the companion shoe 75 at the diametric opposite point from shoe 74 will also be drawn into frictional contact with the outer periphery of the disc or drum 73.

The initial upward movement of reach rod 103 will thus cause engagement of the two shoes with the drum and the further upward movement of the reach rod will cause the drum 73 to be rotated around a suitable angular distance in the direction of the arrow in Figure 6. Figures 6 and 7 indicate an angular distance of the intermittent movement of the carrier or conveyor 20. The drum 73 is keyed to the conveyor shaft 72 as by the spline or key 73'.

The hub of the disc at opposite sides of said disc is machined perfectly round to fit the inside of the collars 79 on which the arms 76 and 77 are mounted. The clearance at 80' in Figure 6 will allow of the floating diametrical movement of the arms 76 and 77 diametrically of the shaft 72 whereby to permit the loosening and the gripping movements of the shoes 74 and 75 upon the drum 73. The clearance is secured by making the bore of the rings 84 a little larger than the outside diameter of the collars 79.

In other words when an upward pull is exerted on the rock lever 86 the shoe 74 will be pressed against the disc, the reaction of which pressure pulls the side arms 76 and 77 or yoke in the direction of the arrow in Figure 6, causing the arms or yoke to slide diametrically on the collars 79 along the flat surfaces 83. This motion carries with it friction shoe 75 and jams the same against the rim of the disc 73. It is clear that this action will immediately lock the friction shoes 74 and 75 to the rim of the disc 73, which will cause disc 73 to rotate and carry with it the shaft 72 as upward movement is continued by the pull upon the reach rod 103. When the extreme upward movement has been completed, the shaft 72 will have turned through a predetermined angle which may be varied by adjusting the reach rod 98 in a selected perforation 97 as shown in Figure 4.

When the motion is reversed by the oscillating bar dropping as a consequence of the passage of the high point of the cam downwardly from the roller 95, it is clear that the pressure of the rock lever 86 against the shoe 74 will be released, which will in turn release the force of the shoe 74 on the rim of the disc 73, as well as that of the shoe 75; and the mechanism will be returned to its original position by the rotation of the collars 79 on the hub of the disc 73 along the smooth machined surfaces 74'. The yoke comprising the arms 76 and 77 and the shoes carried thereby may thereupon oscillate back to the initial position indicated in Figure 6 without communicating any motion in this retrograde direction to the disc 73.

Thus, as an oscillatory motion is imparted to the yoke, intermittent rotation of disc 73 and consequently of shaft 72 will take place, always in the same direction.

Thus the uncut cane, positioned on the carrier 20 is advanced step by step to the knives. The cut pieces of cane will drop downwardly into the carrier 26' which, as shown in Figure 1, is provided with transverse cleats so that the pieces of cane will be moved upwardly and discharged into the hopper 40. From this point the cane with any leaves, grass or other foreign matter entrained therewith are delivered to the cleaning device 41 which is in accordance with the disclosure of the pending application above referred to. The lighter particles including leaves, grass and dust, will then be drawn out of the discharge end of the cleaner 41 by the suction pipe 52. The cleaned and cut cane will fall into a depository provided for the purpose, in connection with which there may be a conveyor, such for instance as the carrier 49, shown in Figure 4 of our copending application.

Rotation of the shaft 62 will cause the cranks or counterweighted arms 68 to be rotated, thus communicating a reciprocating movement to the knife structure 22 through the medium of the links 70. It will be noted therefore that the same shaft 62 controls the knife movement and the intermittent movement of conveyor 20 whereby the movement of the knife structure 22 is timed with respect to the movement of the carrier 20 so that when the knife structure 22 is in the upper position, the carrier will be moved through one of its intermittent actions, and the conveyor will be stationary when the knife descends.

The counterweighted crank arm 68 takes the place of the disc 23 in the pending application as such counterweighted arm contributes to the more uniform action of the knife structure and tends to balance the parts and to eliminate vibration in the operation.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims:

What is claimed is:

1. In a device of the kind described, a path of movement for cane and entrained material including a carrier, a table extending off the delivery end of said carrier, an elevator pit extending off the end of the table at the other side of said carrier, an elevator for raising the cut cane out of said pit, a vertically reciprocating knife device disposed above said table, means wholly above the knife device for vertically reciprocating the same, intermittent means associated with the delivery end of said carrier for imparting step by step movement to the carrier, actuating means for said intermittent means located wholly above said carrier, said knife operating means and said carrier actuating means comprising in common a platform mounted remotely above said carrier and table, a shaft journaled on said platform, means for rotating said shaft, a counter-weighted arm on said shaft, a link connecting said arm with the knife device at the upper portion of the latter, a cam on said shaft, a lever pivoted on said platform and having an end portion riding on said cam and raised and lowered thereby, a link connected to said lever, a short rock arm connected to said link, a long rock arm moved by said short rock arm, and a link connection between said long rock arm and said intermittent drive means.

2. In a device of the kind described, an elevator pit, an elevator for raising the cut cane and entrained matter from said pit, a knife table supported at an elevation above said pit with a delivery end partly overhanging the pit, an endless carrier in line with said table at the other side from the pit for advancing the uncut cane and entrained matter to said table, intermittent drive means for moving the carrier step by step, a vertically reciprocating knife device directly above said table for cutting the cane, actuating means for said knife device, operating means for said intermittent drive means, said actuating and operating means being conjoint and timed in operation and consequently comprising a single operating shaft located at a considerable height above said table and carrier, means to drive said operating shaft, a counter-weighted crank arm fixed to rotate with said shaft, a link connection between said crank arm and the upper end portion of said knife device, a cam fixed on said shaft, a lever positioned to be raised and lowered by said cam, a link adjustably connected to said lever for variable throw, a short rock arm connected also to said last named link, a long rock arm actuated by said short rock arm, and a link connected between said long rock arm and said intermittent drive means at one side of the carrier.

3. In a device as described, a supporting structure, a knife table supported at an elevation above said supporting structure, an elevator pit partly beneath one side of said elevated knife table, an endless carrier at the other side of said table substantially in alinement therewith for delivering the uncut cane and entrained matter to said table, an intermittent drive device for said carrier, a vertically reciprocating knife above said table, and conjoint timed operating means for said knife and for the intermittent drive device, said operating means comprising a single operating shaft, means to rotate said shaft, a cam on said shaft, a lever positioned to be lifted and lowered by said cam, connections between said lever and intermittent drive device for multiplying the lifting motion of said lever to the sweep of said intermittent drive device, said connections being to the side of said carrier and out of the path of the cane and entrained matter, a counterweighted crank arm on said shaft, and a connection between said crank arm and the upper portion of the vertically reciprocating knife device.

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