

March 21, 1944.

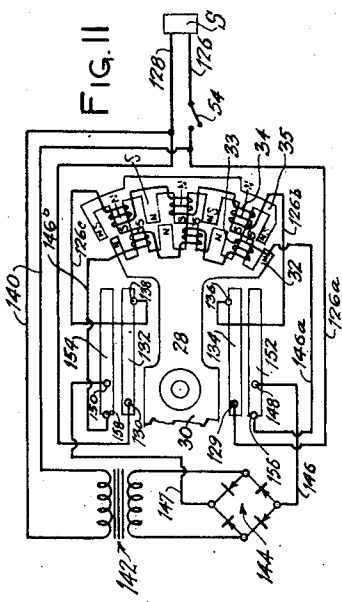
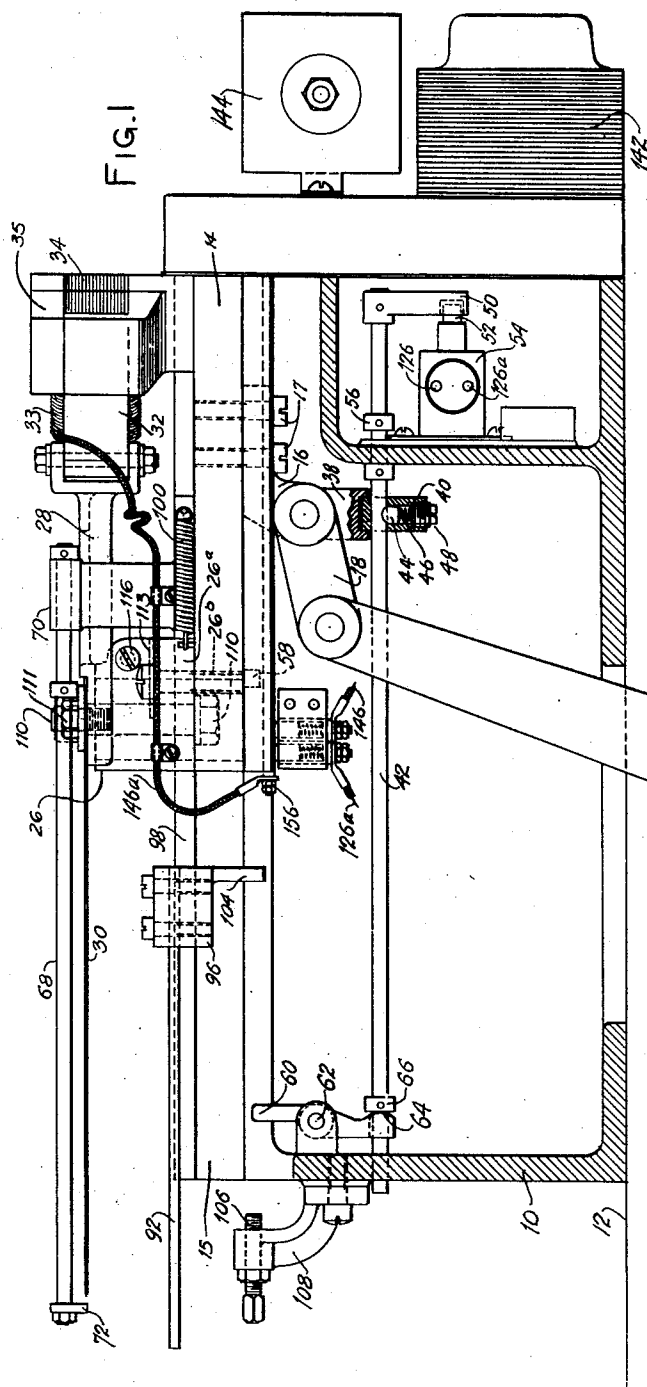
H. H. WHEELER

2,344,928

OSCILLATING KNIFE MOTOR

Filed Aug. 9, 1941

4 Sheets-Sheet 1



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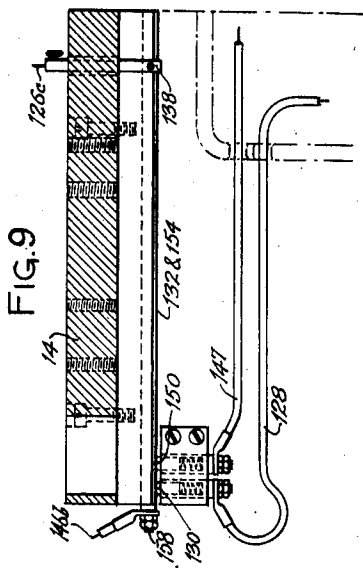
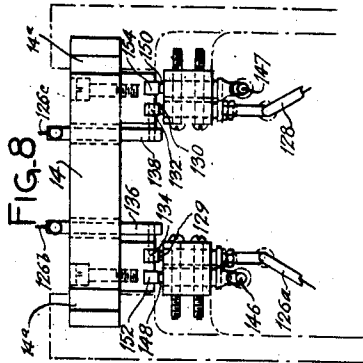
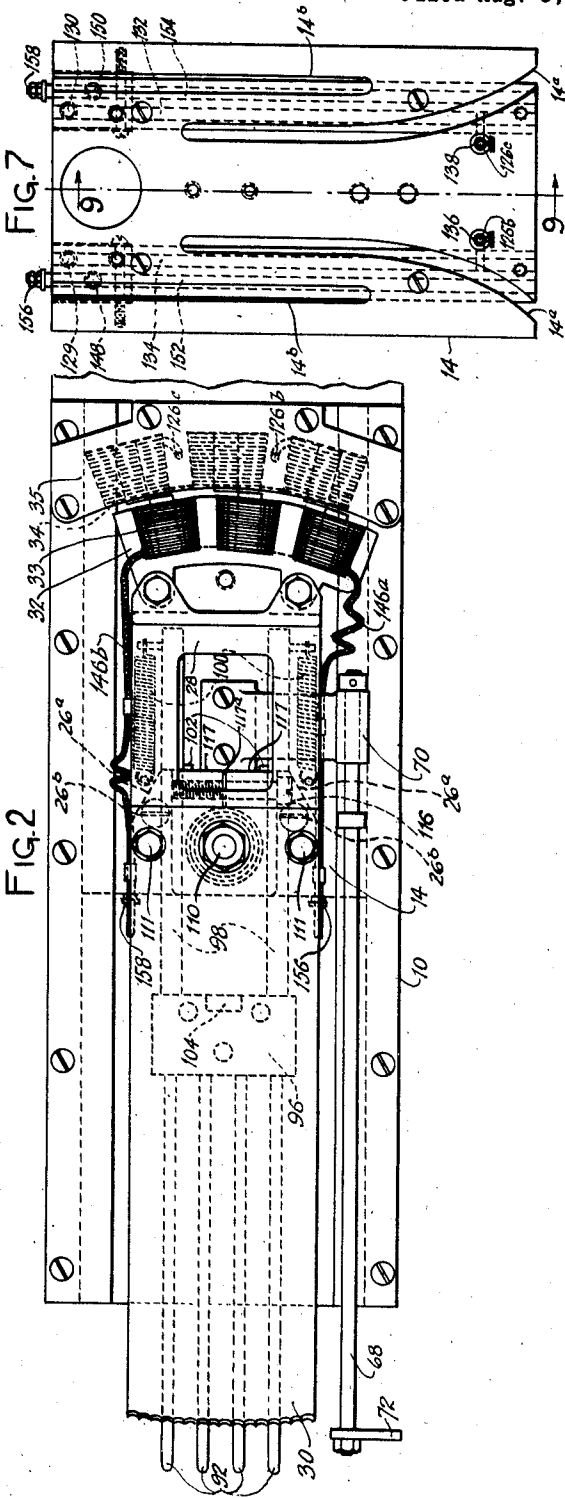
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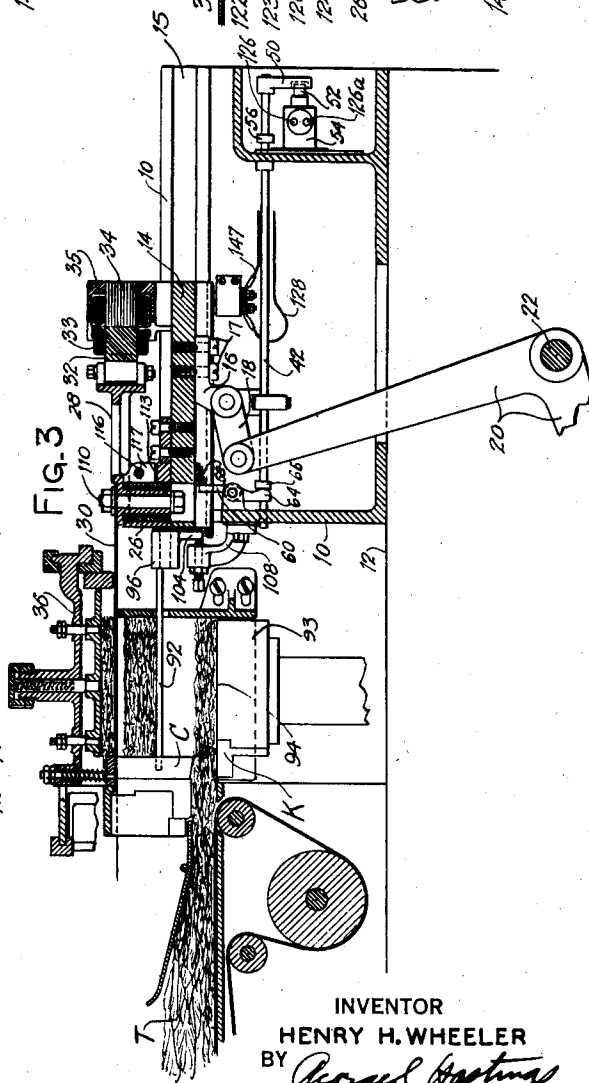
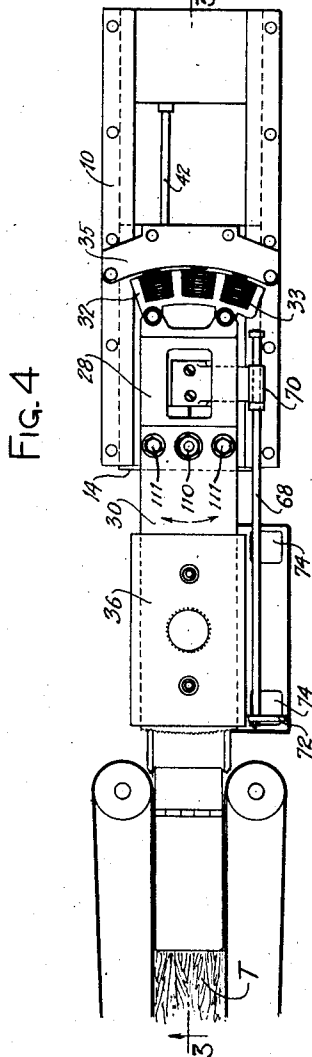
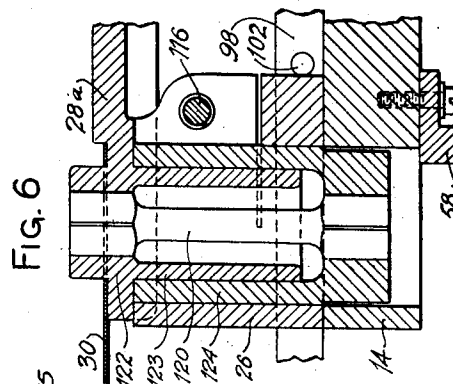
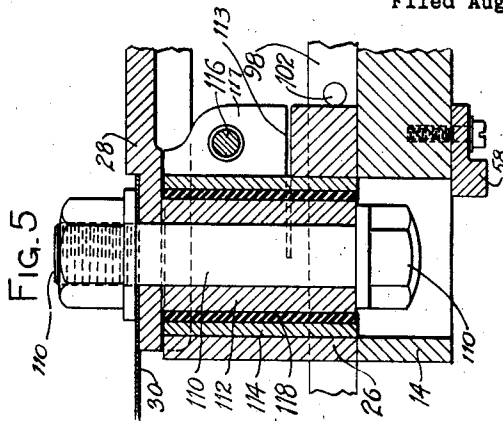
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OSCILLATING KNIFE MOTOR

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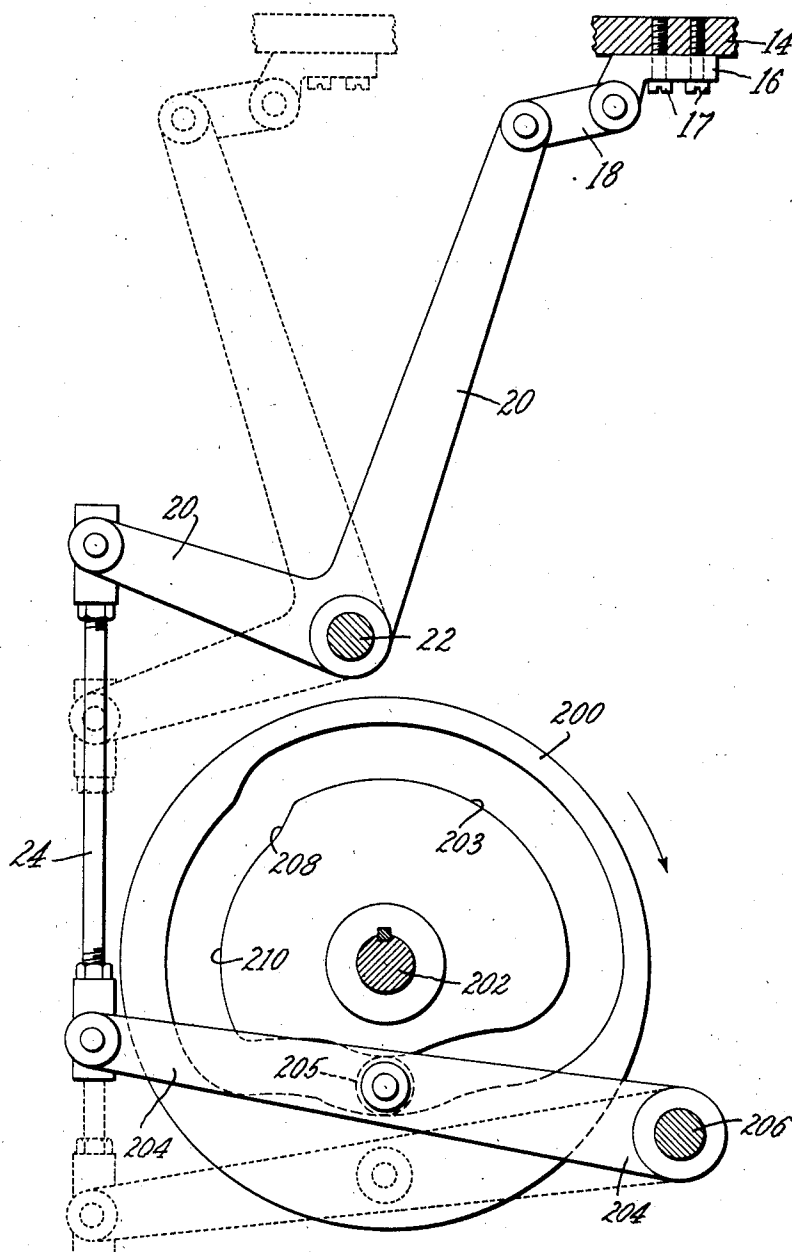
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FIG. 12



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2,344,928

OSCILLATING KNIFE MOTOR

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Application August 9, 1941, Serial No. 406,104

9 Claims. (Cl. 131—42)

This invention relates to cigar machines, more particularly to the charge separating mechanism thereof. In prior types of charge separating mechanism such as shown in my co-pending application, Serial No. 304,299, filed November 14, 1939, on which Patent No. 2,311,011 was issued February 16, 1943, there were required numerous mechanical connections for vibrating the knife on its pivot on a platform or slide which advanced the knife into the column of tobacco for separating a charge therefrom.

One of the objects of the present construction is to dispense with all these connections and to provide instead an electric motor, which is carried on the slide, for vibrating the knife. In the particular embodiment of the invention exemplified herein the motor may consist of electromagnets connected to the knife and energized by direct current and opposed by electromagnets on the slide which are connected to an alternating current. Thus the knife is oscillated rapidly with each reversal of the alternating current, due to the attraction and repulsion of the electromagnets on the knife by the electromagnets on the slide. Moreover the present construction is capable of being operated at higher speeds and eliminates the losses in the amplitude of the stroke due to the back lash and yielding of the mechanical connections employed heretofore.

A further object of the invention is to provide the bearing of the pivotal mounting of the knife with a connecting element between the pivot and the bearing which will be stressed during the movement of the knife in one direction in order to assist its return movement in the opposite direction. For this purpose in the particular embodiments of the invention illustrating this feature the pivotal mounting of the knife may be connected to a rubber bushing fastened to the bearing, or may consist of a steel rod having its ends fastened in the knife and bearing respectively.

Still another object is to terminate the oscillation of the knife when the separation of the charge is completed so that the knife will be stationary while it is being retracted from the column. For this purpose a "Micro" switch may be connected in the circuits to the electromagnets which will be tripped and thus break the circuits through the electromagnets when the knife has severed the charge.

In the charge separating mechanism shown in my above mentioned Patent No. 2,311,011, the surplus tobacco remaining after separation of

the charge from the column, is supported by fingers which enter slots in the compressor platform and underlie and thereby support the surplus tobacco during the descent of the platform following compression of the column during the separation of the charge. These fingers are then lowered to deposit the surplus tobacco upon the stream of tobacco advanced upon the platform while the latter is at its lowermost position, and then withdrawn and elevated and re-inserted in the slots of the platform to again support the surplus tobacco during the descent of the platform. Another object of the present invention is to simplify the construction of these fingers, and to this end they are secured to the slide on which the knife is pivotally mounted to be moved horizontally only in and out of said slots.

Still another object is to maintain the supporting fingers stationary in their position underlying the surplus tobacco on the compressor platform while the slide is slightly retracted with the knife to provide clearance for the bunch length cutter which is raised to permit feeding of the stream of tobacco on to the platform, and would strike the knife if the latter were not retracted. For this purpose the fingers may be urged forwardly on the slide by tension springs connected between the fingers and the slide, so that a stationary abutment disposed in the path of the fingers will interrupt their forward movement, when their forward ends arrive under the transverse edge of the tobacco at the inner end of the platform, while the knife continues advancing to the limit of its forward movement. Thus, while the knife is retracted slightly to provide clearance for the bunch length cutter, the supporting fingers will remain in their forward position until the fingers are disengaged from the abutment during the subsequent return of the slide with the knife to its initial position.

Still another object is to provide mechanism for disposing of tobacco dust which is formed during the separation of the charge and may be expelled by the oscillation of the knife at one side of the column. For this purpose the slide carrying the knife may be equipped with a pusher arranged to push the dust off a collecting channel arranged to catch the particles expelled by the oscillation of the knife, into suitable suction ducts.

With these and other objects not specifically mentioned in view the invention consists in certain constructions and combinations hereinafter fully described and specifically set forth in the claims hereunto appended.

In the accompanying drawings which form a part of this specification and in which like characters of reference indicate the same or like parts:

Fig. 1 is a front elevation, with the front wall omitted, showing the general arrangement of the improved mechanism for oscillating the knife and controlling the movement of the supporting fingers;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a sectional elevation on line 3—3 in Fig. 4, showing the oscillating knife severing a charge from the compacted tobacco column;

Fig. 4 is a plan view of Fig. 3;

Fig. 5 is an enlarged sectional view of a portion of Fig. 3 showing one type of bearing construction of the pivotal mounting of the knife;

Fig. 6 is a sectional view showing an alternative construction of the pivotal mounting;

Fig. 7 is a plan view showing a preferred construction of the slide on which the oscillating knife is mounted;

Fig. 8 is an end elevation of the slide shown in Fig. 7;

Fig. 9 is a sectional view on line 9—9 of Fig. 7;

Fig. 10 is an end elevation, showing wires from the oscillating motor unit as they emerge and pass through a "Micro" switch which controls the oscillation of the knife;

Fig. 11 is a wiring diagram;

Fig. 12 is a detail view of the cam, and the connection thereof to the slide for reciprocating the same to advance the knife mounted thereon into charge-cutting position.

Referring to Figs. 1 to 4 inclusive, the device is shown mounted in a box-shaped frame 10 which is attached to the top of the table 12 of a cigar machine. A platform 14 is slidably mounted in slideways 15 of frame 10, and to the bottom of platform 14 is attached a lug 16 by screws 17 threaded into the platform (Figs. 1 and 3). This lug 16 is connected by a link 18 to a bell-crank lever 20 which is pivotally mounted on a stud 22 in the frame of the cigar machine. The lever 20 is actuated by a cam-operated rod 24 which advances the platform 14 to the position shown in Fig. 3.

Secured to the forward end of platform 14 is a vertical bearing block 26 in which is shown mounted in Fig. 3 a yielding pivot of the type illustrated in Fig. 5, although the modified form of pivot shown in Fig. 6 may be used as will be hereinafter fully described. The bearing block 26 provides a fulcrum for the knife support 28 on which the cutting knife blade 30 is fastened. At the rear end of the knife support 28 is attached a sector 32 having radial slots providing a number of teeth constituting a series of electromagnets 33 arranged opposite a series of electromagnets 34 on a toothed sector 35 secured to the platform 14. The coils or windings of the electromagnets 33 may be wound about alternate teeth on sector 32 and connected to a source of D. C. current and the coils or windings of electromagnets 34, which are wound about alternate teeth of sector 35, may be connected to a source of A. C. current whereby the repulsion and attraction of the magnets 33 from the magnets 34 will oscillate the knife blade as it is being advanced to cut the tobacco which has been lodged in the transfer pocket 36 (see Figs. 3 and 4). Preferably, the electromagnets 33 will be connected as shown in Fig. 11 to provide alternate north and south poles (indicated as N and S respectively) at the ends of all the teeth of sector

32 adjacent the electromagnets 34. The coils or windings of the latter are wound about alternate teeth of sector 35 to provide alternate north and south poles at the ends of all the teeth adjacent the electromagnets 33 and indicated in Fig. 11 as N and S respectively. Thus the alternate north poles of the electromagnets 33 will be attracted to the alternate south poles of electromagnets 34, and the alternate south poles of electromagnets 33 will be repulsed from the alternate south poles of electromagnets 34 and attracted to the north poles of the latter. Thus the sector 32 will be displaced to the left, as viewed from the right hand end of Fig. 11. Then with the next reversal of the flow of alternating current through the coils of the electromagnets 34 the alternate north and south poles of electromagnets 34 will become south and north poles respectively, as indicated with a phantom or dotted S and N in Fig. 11, and the attraction and repulsion of these poles to the alternate north and south poles of electromagnets 33 will return the sector 32 to initial position. In this manner there will be produced oscillations of the knife to and fro. In Fig. 5 is illustrated a suitable type of construction of the pivotal center of the cutting knife. The cutting knife 30, which is of a suitable thickness and provided with a serrated cutting edge, is attached to the support 28 by a bolt 110 passing through a sleeve 112 arranged in the bearing block 26 and by cap screws 111 positioned laterally of the bolt 110. Another sleeve 114 fits into the bearing block 26 and is clamped therein by a bolt 116. The block 26 has a horizontal semi-circular slot 113 (Figs. 1, 3 and 5) and a vertical slot 117a (Fig. 2) extending upwardly from slot 113 to the upper edge of block 26 and thereby forming separate flanges 117 which are clamped together by screw 116 to hold block 26 on the sleeve 114. At the base of the block 26 there are provided flanges 26a (Fig. 2) which are secured by screws 26b to the platform 14 (Figs. 1 and 2). Between sleeves 112 and 114 is fitted, and cemented to the sleeves, a rubber bushing 118, which permits of a certain amount of angular stretch as the oscillating support 28 swings in one direction; and the tension thus stored in the bushing 118 will assist in starting the oscillation in the opposite direction.

The operation of the mechanism is as follows:

The transfer pocket 36 having been loaded from the cross-feed, in a manner as disclosed in my above mentioned Patent No. 2,311,011, the lever 20 is actuated to advance the knife 30 from its position as shown in Figs. 1 and 2 to the position shown in Figs. 3 and 4.

An extension 38 from lug 16 straddles a friction device consisting of a block 40 which has a hole fitted on a rod 42. In another hole of block 40, perpendicular to the rod 42, is mounted a plunger 44 which is pressed against the rod by a spring 46 backed up by a threaded plug 48. The latter may be turned to regulate the pressure of plunger 44 on rod 42 and produce sufficient friction between the plunger and rod to impart a sliding motion to rod 42 as the knife starts advancing. The initial movement of rod 42 causes an arm 50 to press a push button 52 of a "Micro" switch 54 which closes the circuit leading to the electromagnets 33 and 34. Thus the electromagnets 34 will be energized to attract and repulse the electromagnets 33 and the cutting knife 30 will start to oscillate. As the platform continues advancing the friction of the plunger 44 travelling along the rod 42 will continue to hold the "Micro" switch closed, the movement of the rod being

limited by a stop collar 56 which prevents undue pressure by arm 50 on push button 52.

As the knife reaches its forward limit of movement a pin 58 on the underside of the platform 14 contacts a lever 60 pivoted at 62. Thus the lower projection 64 of lever 60 bearing against a collar 66 on rod 42, will be sufficiently displaced to return the rod 42 to its original position and arm 50 will retreat from the push button 52, opening the "Micro" switch, de-energizing the motor, and thus stopping the oscillation of the knife blade during the return movement.

A rod 68 slidably mounted in a bracket 70 attached to platform block 14, and provided at its front end with a block 72, advances and returns with the knife unit and pushes any tobacco dust, expelled by the knife 30, into the inlets 74 of suction ducts 74, arranged in a collecting channel at one side of the knife, whence they are carried away by the suction. Since the stroke of the platform 14 is greater than the distance between ducts 74, the necessary lost motion of the rod 68 results when the block 72 strikes the end of the collecting channel at the left of the left duct 74 (Fig. 4), the rod 68 then being held back while the bracket 70 slides forwardly on rod 68 to the position shown in Fig. 4. Then, when the bracket 70 moves rearwardly, it carries rod 68 back until the block 72 engages the right hand end of the collecting channel, the bracket 70 then sliding backwardly on the rod until the relative position of the bracket 70 and rod 68 shown in Fig. 1 is re-established. Then when the bracket 70 moves forwardly again the same cycle of operations is repeated. When the knife traverses the tobacco column for separation of a charge, the oscillating cutting edge of the knife separates particles which form dust from any tobacco leaves which may extend across the path of cutting edge of the knife.

While the tobacco column T is in a raised position in the charge transfer pocket 36 and the knife 30 is proceeding to cut the charge from the top of the tobacco column, fingers 92 are advanced with the oscillating knife and enter slots 93 formed in the upper face of the compressor platform 94 and advance underneath the tobacco column. The construction of the platform and slots is similar to that shown in my above mentioned application, Serial No. 304,299. When the cutting operation is completed and the compressor platform is lowered, the portion of the tobacco column remaining after cutting of the charge comes to rest on the fingers 92, thus permitting the compressor platform 94 to take on another bunch length of tobacco which is delivered by an intermittently operating cross-feed such as disclosed in my prior Patent No. 2,311,011 above referred to. When the new bunch length has been delivered on the compressor platform, the cutting knife and with it the fingers 92, are withdrawn, allowing the tobacco, which had rested on the fingers, to settle on the new bunch length as the same is elevated on the compressor platform.

It will be noted that the fingers 92 are initially disposed slightly in advance of the cutting edge of the knife 30. The fingers 92 are clamped to a holder 96 which is attached to two bars 98. These bars pass through bearings in the bearing block 26 and are urged to their outermost position by springs 100. The pins 102 on bars 98 engage the base of the bearing block 26 (Figs. 5 and 6) and limit the forward position of bars 98, and rib 104 depending from holder 96 is checked by adjustable set screw 106 in bracket 108, the set screw constituting an abutment to hold back the

fingers 92 while the knife continues advancing to the limit of its forward movement. Accordingly when the slide 14 is moved back to retract the knife slightly to provide clearance for the upward movement of the bunch length cutter C (Fig. 3), which is raised as described in my co-pending application mentioned above, while the stream of filler tobacco is advanced on to the compressor platform 94 which is then at its lower position, the fingers will remain in their forward position. Thus the fingers will support the surplus tobacco until the slide 14 has moved back sufficiently to disengage the holder 96 from the set screw 106, the springs 100 urging the holder forwardly against the set screw until the pins 102 on bars 98 re-engage the base of the bearing block 26 during the rearward movement of the slide 14. In this manner the fingers and the knife are returned to initial position from which they are again advanced to sever a charge from the top of the column of tobacco compacted during the ascent of the compressor platform 94. During the ascent of the platform the cutter C, which has been previously lowered to clamp the tobacco against the cutter K fastened on the platform, coacts with cutter K to sever the bunch length of tobacco previously fed on to the platform.

It will be noted that the platform 14 has suitable slats 14a and 14b as shown in Fig. 7, to provide a configuration thereof resembling a hair-pin spring, whereby it may be compressed to an extent approximating .010 inch when it is inserted in the slide-ways 15 in frame 10, and providing a spring mounting to keep vibration from being transmitted to the platform 14 and the machine bed. Thus the wearing of the platform will not affect its fit within the slide-ways 15 until the wear exceeds the extent to which the platform has been compressed.

In Fig. 6 is illustrated a preferred construction of pivot for knife 30, in which a torsion rod 120, of spring steel, is substituted for the rubber bushing 118, shown in Fig. 5. One end of rod 120 is secured in the hub 122 of frame 28a which is provided with a cylindrical hub 123 fitting the sleeve 124 which fits into the bearing block 26 and is clamped to it by bolt 116, and the other end of rod 120 is secured to sleeve 124. The oscillation of the frame 28a in one direction will produce a torsion of the rod 120, which will assist in starting the oscillation in the opposite direction.

The wiring diagram of the circuit connected to the electromagnets is shown in Figs. 7 to 11 inclusive. In the case here illustrated it has been assumed that only alternating current was available and for this reason a rectifier has been included in this electrical circuit. Moreover by supplying the rectifier with current from a step-down transformer as shown, there is less danger of electric shock from the connections of the circuit to the electromagnets 33. When both A. C. and D. C. currents are available the A. C. current can be connected to the electromagnets 34 and the D. C. current can be connected to the electromagnets 33, and the electrical equipment and construction would be simplified accordingly.

The wiring diagram (see Fig. 11) shows the supply lines 126 and 128 on which A. C. current is impressed, connected in series to the electromagnets 34. The supply lines 126, 128 are plugged in at the terminals S of a source of A. C. current (Fig. 10) and the "Micro" switch 54, which is

connected to the line 126, is automatically closed when the button 52 is depressed as described above. The "Micro" switch 54 is connected by lead 126a with a stationary contact maker 129 on which slides an electrically conductive bus bar 134 fastened to the bottom of the platform 14 (Fig. 8). A contact 136 mounted in the platform 14 and connected to the bar 134 (Fig. 10) is connected by lead 126b to one of the windings of the electromagnets 34 which are connected in series with each other and by the lead 126c to the contact 138 which is mounted on platform 14 and connected to the bus bar 132 fastened to the platform (Fig. 8). The bar 132 slides on a stationary contact maker 130 which is connected to line 128.

A branch circuit 140 is connected from the line 128 and the lead 126a to the primary of a step-down transformer 142 whose secondary is connected to a full wave rectifier or inverter 144. The direct current delivered from the inverter is conducted by lead 146 to the stationary contact maker 148 which engages the bus bar 152 fastened to the platform 14 (Fig. 8). A contact 156 mounted on one end of bar 152 (Figs. 2, 7 and 9) is connected by a lead 146a to the winding of one of the electromagnets 33 which are connected to each other in series and connected through lead 146b to a contact 158 fastened on one end of the bus bar 154 (Figs. 2 and 7) which is fastened to the platform 14 (Fig. 8) and slidingly engages the stationary contact maker 150 which is connected by lead 147 to the inverter 144.

When the machine is started, the plate cam 200 (Fig. 12) on the cam shaft 202 has a track 203 which operates a cam lever 204 having a cam roller 205 engaging said track and fulcrumed on a shaft 206 supported from the table 12, to operate the rod 24 connected through bell-crank lever 20 and link 18 to the lug 17 of platform 14, and thereby advance platform 14 and automatically close Micro-switch 54, as before described. The circuits through the A. C. magnets 34 and through the D. C. magnets 33 are thus closed. Due to the constant polarity maintained in the D. C. magnets 33 and the varying polarity of the A. C. magnets 34, an oscillating motion is imparted to the sector 32. This oscillation is continued during the advance of the knife 30 but will be discontinued when the knife 30 reaches its forward limit the "Micro" switch 54 being opened as described above. The knife 30 will thus be oscillating during the cutting operation thereof but will not continue to oscillate while it is being retracted from the tobacco column. The platform is first retracted slightly to move the knife into a position wherein it will not interfere with the ascent of the bunch length cutter C, then dwells at this position during the cutting of the charge from the top of the tobacco column. For this purpose the cam track 203 has a reentrant portion 208 producing this slight retracting movement of platform 14, and merging into the concentric portion 210 which produces the described dwell of the platform. After leaving portion 210, the cam roller 205 is displaced inwardly until it reaches the full line position shown in Fig. 12 which corresponds to the full line position of platform 14 fragmentarily shown at its initial position. From this full line position the cam roller is displaced inwardly by the cam track to advance the platform, as described above, in each cycle of the machine.

What is claimed is:

1. In a cigar machine, having means for assembling sections of long filler tobacco as laminations in a column, the combination with a support movable toward and away from said column, a knife pivotally mounted on said support in position to traverse the column as said support approaches the column, electromagnetic means for oscillating said knife on its pivotal mounting on said support as the latter approaches the column to sever a charge from the column, and a device for automatically interrupting the oscillation of the knife during the entire interval in which it is retracted from the column.

2. In a cigar machine having means for assembling sections of long filler tobacco laminations in a column, the combination with a support movable toward said column, a knife pivotally mounted on said support in position to traverse the column as the support approaches the column, an electric motor mounted on said support and connected to said knife for oscillating the same on its pivotal mounting on said support, an electric circuit connected to said motor, a switch adapted to close said circuit and thereby energize said motor, and a member on said support adapted to engage and actuate said switch to close said circuit as the support approaches the column.

3. In a cigar machine having a charge transfer provided with an open bottom, a platform on to which a continuous layer of long filler tobacco may be fed, and a bunch length cutter adapted to sever a bunch length from the continuous layer of tobacco advanced on to the platform, said platform being provided with slots in its upper face and being vertically reciprocable to elevate the severed bunch length into the charge transfer through the open bottom thereof and compact the same; the combination with a support movable horizontally toward and away from the compacted bunch length, a knife mounted on said support and adapted to separate the tobacco in the charge transfer from the remainder of the compacted bunch length as the support approaches the latter, fingers mounted on said support and arranged to enter the slots in said platform to support during the descent of the platform the surplus tobacco remaining after separation of the tobacco filling the charge transfer from the remainder of the compacted bunch length, and means for moving said support toward the compacted bunch length to cause said knife to traverse the same and cause said fingers to enter the slots in the platform, and retracting said knife slightly without retracting said fingers.

4. In a cigar machine having means for assembling tobacco sections as laminations in a column and an oscillating knife for separating a charge from the column, the combination with a suction conduit having an inlet at one side of said knife, and a member for pushing tobacco dust ejected from said column by said knife into said inlet.

5. In a cigar machine, the combination with a frame, of a platform slidably mounted in said frame, a charge-separating knife pivotally mounted on said platform, an electric motor on said platform for oscillating said knife, an electric circuit connected to said motor for energizing the same, and including a stationary switch having a push-button whereby said circuit will be closed when the push-button is depressed, a rod slidably mounted in the frame, a finger mounted on said rod and arranged to engage and depress said push-button, a collar fastened to said rod,

and a bifurcated member on said platform straddling said collar and operating to advance the rod with platform when the latter is moved forwardly on the frame, and thereby cause said finger to depress said push-button and energize said motor.

6. In a cigar machine having means for assembling sections of long filler tobacco as laminations in a column, the combination with a support movable toward said column, a knife pivotally mounted on said support in position to traverse the column as said support approaches the column, and electromagnetic means for oscillating said knife on its pivotal mounting on said support, said means including a set of stationary electromagnets mounted on said support, and a set of electromagnets connected to said knife in a position opposite the stationary electromagnets, a circuit for impressing direct current on one set of magnets, and a circuit for impressing alternating current on the other set of electromagnets, whereby the changing polarity of the alternating current electromagnets will attract and repulse the direct current electromagnets to cause oscillation of the knife on its pivotal mounting, and a yielding member mounted on said support and connected to said knife and adapted to be stressed by oscillatory movement of the knife in either direction for assisting the return movement of the knife in the opposite direction.

7. In a cigar machine having means for assembling sections of long filler tobacco as laminations in a column, the combination with a support movable toward said column, a knife pivotally mounted on said support in position to traverse the column as said support approaches the column, and electromagnetic means for oscillating said knife on its pivotal mounting on said support to sever a charge from the column, said means including a set of stationary electromagnets mounted on said support, a set of electromagnets connected to said knife in a position opposite the stationary electromagnets, a circuit for impressing direct current on one set of magnets, and a circuit for impressing alternating current on the other set of electromagnets, whereby the changing polarity of the alternating current electromagnets will attract and repulse the direct current electromagnets to cause oscillation of the knife on its pivotal mounting, said support having a bearing support thereon, a sleeve secured in said bearing, a rubber bushing secured to the

interior of said sleeve, and said knife having a pivot disposed within said bushing and secured thereto whereby said bushing will be stressed as the pivot turns in one direction and will assist the return movement of the pivot in the opposite direction.

8. In a cigar machine having means for assembling sections of long filler tobacco as laminations in a column, the combination with a support movable toward said column, a knife pivotally mounted on said support in position to traverse the column as said support approaches the column, and electromagnetic means for oscillating said knife on its pivotal mounting on said support to sever a charge from the column, said means including a set of stationary electromagnets mounted on said support, a set of electromagnets connected to said knife in a position opposite the stationary electromagnets, a circuit for impressing direct current on one set of magnets, and a circuit for impressing alternating current on the other set of electromagnets whereby the changing polarity of the alternating current electromagnets will attract and repulse the direct current electromagnets to cause oscillation of the knife on its pivotal mounting, said support having a bearing support thereon, a sleeve secured within said bearing support, and said knife having a pivot loosely mounted within said sleeve, a resilient member having one end fastened in said sleeve and the other end fastened to said pivot whereby said member will be stressed as the pivot turns in one direction and will assist the return movement of the pivot in the opposite direction.

9. In a cigar machine having means for assembling sections of long filler tobacco as laminations in a column, the combination with a support movable toward and away from said column, a knife movably mounted on said support in position to traverse the column as said support approaches the column, an electric motor mounted on said support and movable therewith and connected to said knife for moving the latter to and fro as the support approaches the column to sever a charge from the column, and a device for automatically interrupting the operation of said motor and thereby terminating the motion of said knife as it is retracted from said column.

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