

Dec. 6, 1938.

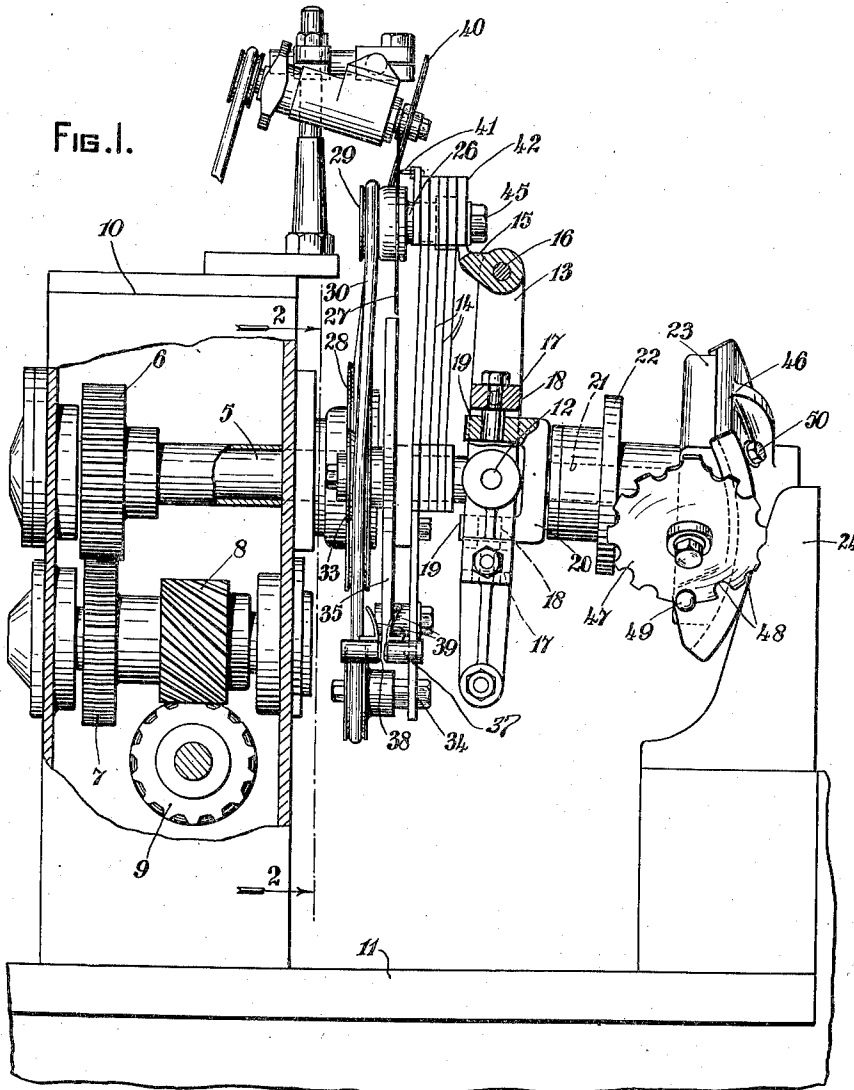
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CIGARETTE MAKING MACHINE

Filed Aug. 24, 1936

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

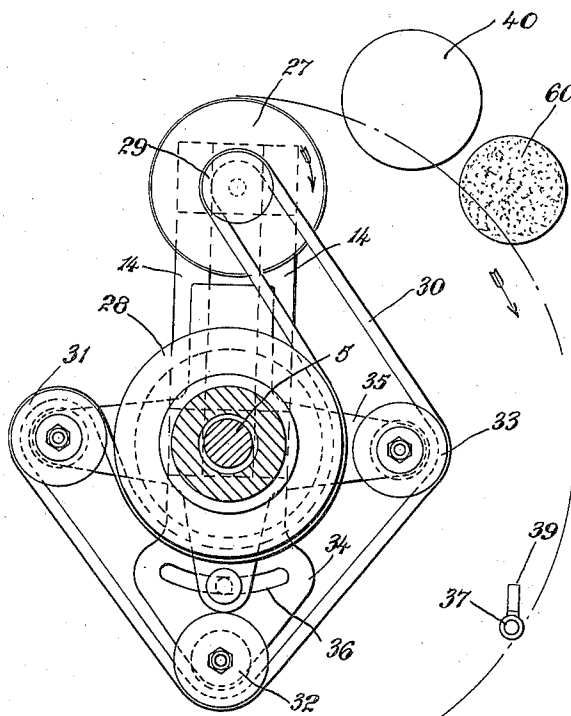


FIG. 2.

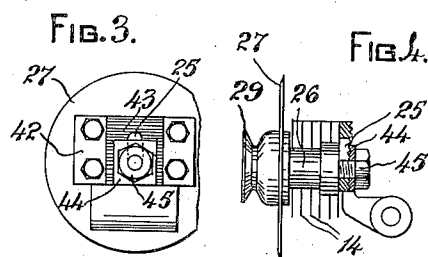


FIG. 3.

FIG. 4.

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CIGARETTE MAKING MACHINE

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12 Claims. (Cl. 164—68)

This invention is for improvements in or relating to devices for severing an axially moving rod into lengths.

The term "axially moving rod" when used in the appended claims is not limited to a "cigarette rod", but is to include any workpiece which is to be severed whilst moving in a lengthwise direction, the severing being transverse to the length of the workpiece.

According to the invention there is provided a device for use when severing an axially moving rod into lengths, comprising in combination a member rotatable or revolvable about a fixed axis and restrained against movement lengthwise of said axis, a knife carrier to rotate or revolve with said member and arranged to carry a knife in a manner such that the cutting edge of the knife carried or to be carried thereby is transverse to the fixed axis, a resilient connection between the knife carrier and said member and means to move the knife carrier lengthwise of the fixed axis during revolution about said axis said movement being possible due to the resilient connection.

Further, according to the invention there is provided a device for use when severing an axially moving rod into lengths, comprising in combination a resilient support or a resilient arm rotatable or revolvable about a fixed axis, said support or arm being at some point (e. g. in the case of an arm, at some point along its length) restrained against movement lengthwise of said axis, a knife carrier supported by said support or said arm to revolve therewith, the knife carrier being arranged to carry a knife in a manner such that the cutting edge of the knife carried or to be carried thereby is transverse to the fixed axis during revolution about said axis, said movement being possible due to the resiliency of said support or said arm.

Still further, according to the invention there is provided a device for use when severing an axially moving rod into lengths, comprising in combination a shaft rotatable or revolvable about a fixed axis, a knife carrier arranged to carry a knife in a manner such that the cutting edge of the knife carried or to be carried thereby is transverse to the fixed axis, a resilient support or a resilient arm supporting the knife carrier and connected with said shaft whereby the knife carrier is revolvable with the shaft, said shaft and support or arm being restrained against movement lengthwise of the fixed axis and a

connecting element pivoted to said shaft and connected with said support or said arm and a member rotatable about an axis inclined to said fixed axis whereby the rotation of said member causes the knife holder to move lengthwise of the fixed axis during revolution about the fixed axis said movement being possible due to the resiliency of said support of said arm.

The invention will be described by way of example with reference to the accompanying drawings in which—

Fig. 1 is a side elevation of a cutting device for severing an axially moving cigarette rod;

Fig. 2 is a section on the line 2—2, Fig. 1;

Fig. 3 is a detail of Fig. 1;

Fig. 4 is an end elevation of a part of Fig. 3.

Like references refer to like parts throughout the specification and drawings.

Referring to the drawings a shaft 5 is rotatable about a fixed axis and is restrained against movement lengthwise of its axis by suitable bearings. The shaft 5 is driven from the main drive of the cigarette making machine through the medium of the intermeshing gears 6 and 7, and the gears 8 and 9. The gearing and the bearings for the shaft 5 are carried in a gear box 10 secured to the bed 11 of the cigarette making machine.

A knife carrier 26 is arranged to carry a knife in a manner such that the cutting edge of the knife is transverse to the fixed axis and the knife carrier 26 is supported by a resilient support or a resilient arm comprising a plurality of flat spring plates 14 the support or arm being fixed to the shaft 5 so that the carrier 26 is rotatable or revolvable with the shaft 5. The plates 14 are arranged with their faces substantially parallel to one another and the ends of the plates 14 which are fixed to the shaft 5 are fixed in a manner such that the end portions of the plates lie in planes which are normal to the fixed axis about which the support or arm together with the shaft 5 is rotatable.

A cross spindle 12 is arranged at the face end of the shaft 5 and a connecting element 13 is pivotally mounted about the spindle 12, the axis of the spindle 12 being at right angles to the fixed axis of the shaft 5.

The connecting element 13 is also connected with the resilient support or arm by an element 15 which is fixed to the resilient support or arm and pivotally connected at 16 with the connecting element 13.

Further, the connecting element 13 is connected with a member 20 which is fixed to a

shaft 21 mounted for rotation in bearings 22, carried in a bearing block 23 adjustably secured to a bracket 24 fixed to the bed 11 of the machine. The axis of rotation of the shaft 21 is inclined to the fixed axis of rotation of the shaft 5. The connecting element 13 comprises two portions held together by bridge pieces 17. Through the centre of each bridge piece 17 is a pivot pin 18 which enters an arm 19 of the member 20.

When the shaft 5 is rotated the whole of the cutting device is rotated, but the connecting element 13, due to the fact that it is secured to the member 20, is caused to oscillate in a plane parallel to the fixed axis of the shaft 5. Due to the resiliency of the knife carrier support, the knife carrier 26 and the knife 27 is given a component of movement in the direction of the moving cigarette rod, because as the connecting element oscillates about the spindle 12 the support or arm formed by the spring plates 14 is caused to flex. The combined movement of the connecting element 13 and the resilient support or arm is such that the plane of the knife 27 is maintained normal to the fixed axis and since the fixed axis is arranged parallel to the axis of the cigarette rod the knife is also normal to the axis of the moving cigarette rod during the period of intersection thereof.

The knife carrier 26 is arranged to rotate in bearings carried by the resilient support or arm and the knife carrier 26 and knife 27 are arranged to be rotated in such bearings whilst the knife carrier is being rotated about the fixed axis of the shaft 5. The knife 27 comprises a disc the periphery of which is a cutting edge. The cutting device is balanced by any suitable means, such, for example, as a counter weight secured to that end of the connecting element 13 which is opposite the end which is connected with the element 15. The knife carrier 26 is rotated in its bearings by a fixed pulley 28 which is disposed about the shaft 5 and fixed to the gear case 10. The fixed pulley 28 is connected by a belt 30 with a pulley 29 secured to the knife carrier 26 and by this means the knife holder 26 is positively rotated in its bearings.

To ensure that the knife 27 rotates in the correct direction during the cutting operation the belt 30 in addition to passing around the fixed pulley 28 and the pulley 29 also passes around jockey pulleys 31, 32 and 33, the jockey pulleys being arranged so as to be freely rotatable about their axes and to be rotated bodily about the fixed axis of the shaft 5.

In the construction shown in the drawings the jockey pulleys 31, 32 and 33 are mounted on the counter weight 34, which balances the cutting device. The pulleys 31 and 33 are carried on an arm 35 which is secured to the counter weight 34 by means of a suitable locking device engaging with a slot 36 in the counter weights 34. The arm 35 can be pivoted about the shaft 5, and the belt 30 is tensioned by adjusting the position of the arm 35 relatively to the counter weight 34.

During the cutting operation the knife 27 cooperates with a ledger tube 37 which moves in the same direction as and at the same speed as the axially moving cigarette rod. To guide the knife 27 to the slit 38 in the ledger tube 37 there is provided a pair of guides 39 which form a passage through which the knife 27 passes to the ledger tube. The ledger tube 37 is of course operated in synchronism with the cutting device. A pair of grinding elements 60 and 40 are ar-

anged to engage with the knife 27, the grinding disc 40 being operative to sharpen the blade, whilst the disc 60 removes the burrs raised by the disc 40. If desired, a knife may be sharpened on both sides and in this case both of the discs 60 and 40 will be operative to sharpen the blade. The knife 27 is usually formed from comparatively thin spring steel, and it is found in such cases that after contacting with the grinding elements the knife is in a state of vibration. To stop or reduce the vibration a damping device is provided. The damping device consists of an adjustable member 41, shown in the drawings as a screw secured to the resilient support or arm. It will be appreciated that other forms of damping device may be provided if desired.

To compensate the knife 27 for wear due to the action of the grinding discs 60 and 40 the bearings for the knife carrier 26 are adjustably mounted in a slot 25, which passes through the resilient support or arm and that portion of the element 15 which is secured to the resilient support or arm and which is radial to the fixed axis of the shaft 5. In order to effect the adjustment and to secure the knife carrier 26 firmly in position after an adjustment has been made, the face 42 of the element 15 is provided with a series of parallel serrations 43, the serrations being arranged transverse to the axis of rotation of the knife 27. To the bearings for the knife carrier there is secured a locking block 44 which is provided with parallel serrations arranged to cooperate with the serrations 43. A locking nut 45 is arranged to bolt the bearings firmly in position when the knife carrier 26 and knife 27 have been adjusted.

In order to adjust the cutting device so as to vary the lengths of the portions cut from the cigarette rod, the bearing 22 in which the shaft 21 of the yoke 20 is mounted is arranged to be adjustable. To effect this adjustment the block 23 is slidable in a curved guide 46, and a rotatable disc 47 is provided with slots or notches 48 arranged to cooperate with a pin 49 secured to the guide 46. The disc 47 is secured to the block 23 and the slots or notches 48 are of varying depths, each slot or notch corresponding with a desired cigarette length. The block 23 is held in its operative position by locking screws 50, which screws are released to enable an adjustment to be effected and are again tightened after the adjustment has been made.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a device for severing an axially moving rod into lengths, the combination with a member rotatable about a fixed axis and restrained against movement lengthwise of said axis, of a cutting element carried by a carrier rotatable with said member, said cutting element having its cutting edge arranged transverse to the fixed axis, means to impart to the carrier during the severing of an axially moving rod a component of movement in the direction of movement of the rod and a resilient connection between the carrier and said member, whereby said component of movement may be imparted to the carrier.

2. A device for severing an axially moving rod into lengths, comprising in combination a resilient support rotatable about a fixed axis, a part of said support being restrained against movement lengthwise of said axis, a cutting element, a carrier therefor supported by said support for rotation therewith, the cutting edge of the cutting element being arranged transverse to the

fixed axis, and means to impart to the carrier during the severing of an axially moving rod a component of movement in the direction of movement of the rod, said component of movement being possible due to the resiliency of said support.

3. A device for severing an axially moving rod into lengths, comprising in combination a shaft rotatable about a fixed axis, a cutting element whose cutting edge is transverse to the fixed axis, a carrier for the cutting element, a resilient support supporting the carrier and connected with said shaft, whereby the carrier is rotatable with the shaft, said shaft and that part of the support which is connected with the shaft being restrained against movement lengthwise of the fixed axis, a connecting element pivoted to said shaft and connected with said support, and a member engaging said connecting element and rotatable about an axis inclined to said fixed axis, whereby the rotation of said member imparts to the carrier during the severing of an axially moving rod a component of movement in the direction of movement of the rod, said component of movement being possible due to the resiliency of said support.

4. A device for severing an axially moving rod into lengths, comprising in combination a resilient support rotatable about a fixed axis, said support comprising a plurality of spring plates arranged with their faces substantially parallel to one another, the end portions of said plates being disposed in a plane normal to said fixed axis and restrained at one end against movement lengthwise of said axis, a cutting element, a carrier therefor supported by said support for rotation therewith, the cutting edge of the cutting element being arranged transverse to the fixed axis, and means to impart to the carrier during the severing of an axially moving rod a component of movement in the direction of movement of the rod, said component of movement being possible due to the resiliency of said support.

5. A device for severing an axially moving rod into lengths, comprising in combination a resilient support rotatable about a fixed axis, a part of said support being restrained against movement lengthwise of said axis, a cutting element, a carrier therefor supported by said support for rotation therewith, the cutting edge of the cutting element being arranged transverse to the fixed axis, said carrier being rotatable in bearings carried by the support, means to effect rotation of the carrier, and means to impart to the carrier during the severing of an axially moving rod a component of movement in the direction of movement of the rod, said component of movement being possible due to the resiliency of said support.

6. A device for severing an axially moving rod into lengths, comprising in combination a resilient support rotatable about a fixed axis, a part of said support being restrained against movement lengthwise of said axis, a cutting element, a carrier therefor supported by said support for rotation therewith, the cutting edge of the cutting element being arranged transverse to the fixed axis, said carrier being rotatable in bearings carried by the support, means to effect rotation of the carrier, means to adjust the axis of rotation of the carrier relatively to the fixed axis, and means to impart to the carrier during the severing of an axially moving rod a component of movement in the direction of movement of the

rod, said component of movement being possible due to the resiliency of said support.

7. In a device of the class described, a flexible cutting element, a carrier for the cutting element, said carrier being rotatable about a fixed axis, and a damping device movable in the same direction as and in timed relationship with the carrier to reduce vibration of the knife due to the latter impinging against a body disposed in the path thereof.

8. In a device of the class described, a flexible cutting element, a carrier for the cutting element, a support for the carrier, said support being rotatable about a fixed axis, and a projection carried by the support and directed towards the cutting element to dampen vibration thereof due to the cutting element impinging against a body disposed in the path thereof.

9. In a device for severing an axially moving rod into lengths, a member rotatable about a fixed axis and restrained against movement lengthwise of said axis, a carrier rotatable with said member, a knife journaled for rotation in said carrier and having its cutting edge arranged transverse to the fixed axis, means to move the carrier lengthwise of the fixed axis during rotation about said axis and means operative during rotation of the carrier to effect rotation of the cutting element about its axis of rotation, said means including a fixed pulley concentric with said fixed axis, a pulley connected with the knife, a belt connecting the fixed pulley and the knife pulley, jockey pulleys disposed between the fixed pulley and the knife pulley and around which the belt passes and a jockey support in which the jockey pulleys are journaled, said support being concentric with and rotatable about said fixed axis and movable relatively to the fixed pulley in an angular direction to adjust the tension on the belt.

10. In a device for severing an axially moving rod into lengths, a member rotatable about a fixed axis and restrained against movement lengthwise of said axis, a carrier rotatable with said member, a knife journaled for rotation in said carrier and having its cutting edge arranged transverse to the fixed axis, means to move the carrier lengthwise of the fixed axis during rotation about said axis and means operative during rotation of the carrier to effect rotation of the cutting element about its axis of rotation, said means including a fixed pulley concentric with said fixed axis, a pulley connected with the knife, a belt connecting the fixed pulley and the knife pulley, jockey pulleys disposed between the fixed pulley and the knife pulley and around which the belt passes, two jockey supports each of which is concentric with and rotatable about said fixed axis, said supports being movable relatively to one another and to the fixed pulley in an angular direction to adjust the tension in the belt, and means to lock the supports in their desired relative positions.

11. A device for severing an axially moving rod into lengths, comprising in combination a first shaft whose axis is parallel with the axis of the moving rod to be severed, a second shaft whose axis is inclined relatively to the axis of the first shaft, a universal coupling joining first and second shafts, means to rotate said first shaft, a knife support pivotally mounted on the first shaft and connected with the universal coupling, a bearing block for said second shaft, a curved guide in which the bearing block is movable to adjust the relative inclination between the first

and second shafts and means to retain the bearing block in an operative position.

12. A device for severing an axially moving rod into lengths, comprising in combination a first shaft whose axis is parallel with the axis of the moving rod to be severed, a second shaft whose axis is inclined relatively to the axis of the first shaft, a universal coupling joining said first and second shafts, means to rotate said first shaft, a knife support pivotally mounted on the first shaft

and connected with the universal coupling, a bearing block for said second shaft, a curved guide in which the bearing block is movable to adjust the relative inclination between the first and second shafts, a peripheral slotted disc rotatably mounted on the bearing block, a projection on said guide to cooperate with a slot in said disc and thereby to locate the bearing block.

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