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Labbe et al.

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[54] **ROD MAKING MACHINES**

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Related U.S. Application Data

[63] Continuation of Ser. No. 190,496, Oct. 19, 1971, abandoned.

[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **83/310,** 83/327

[51] **Int. Cl.** **A24c 5/28**

[58] **Field of Search** 83/310, 311, 328, 327

[56] **References Cited**

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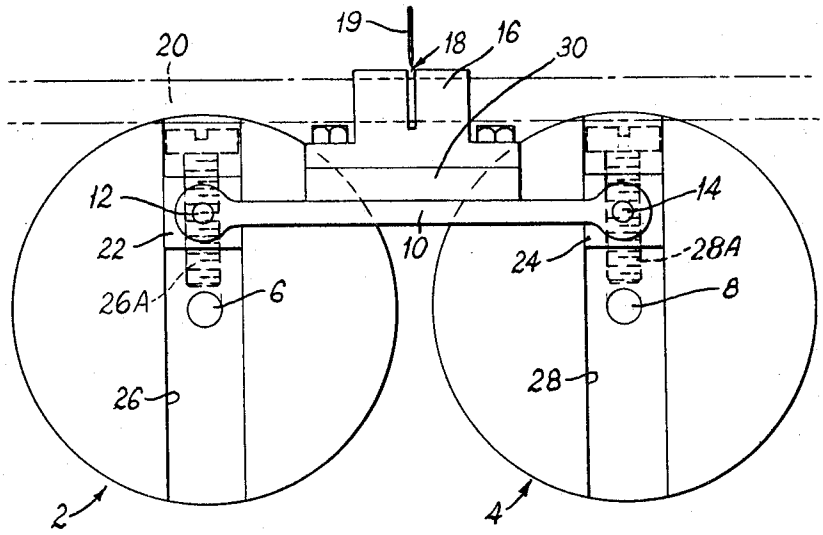
[57] **ABSTRACT**

A ledger for a rod-making machine, especially a cigarette or filter making machine, comprises two rotary members arranged to rotate at the same speed about parallel axes and a connecting member which is pivotally connected to both of the rotary members and carries a rod support which supports the rod during each cutting stroke.

9 Claims, 4 Drawing Figures



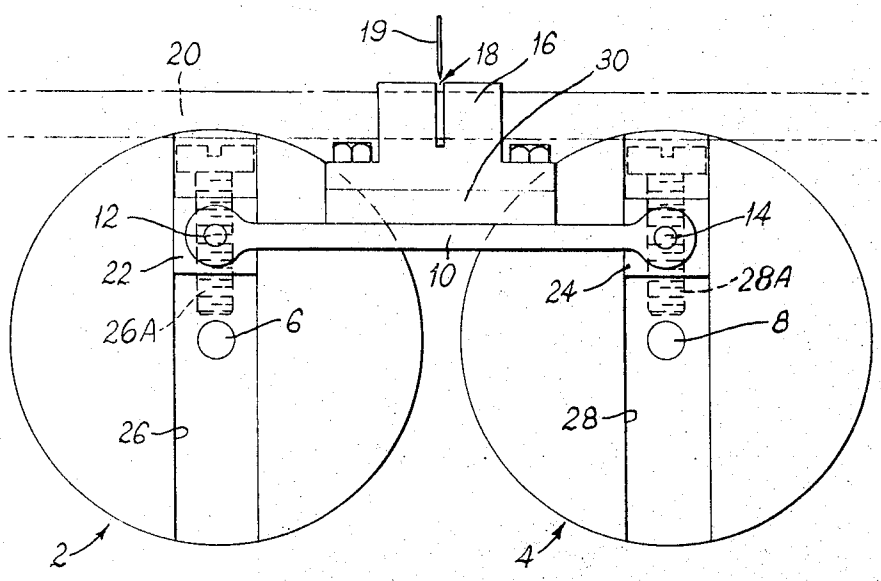


FIG. 1

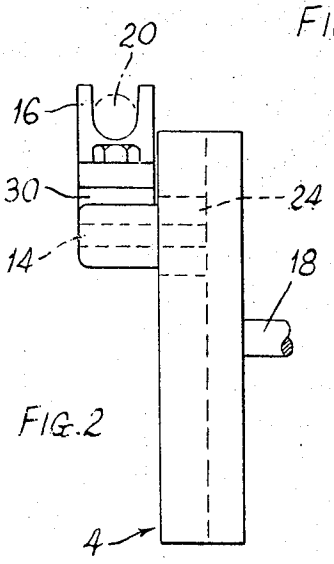


FIG. 2

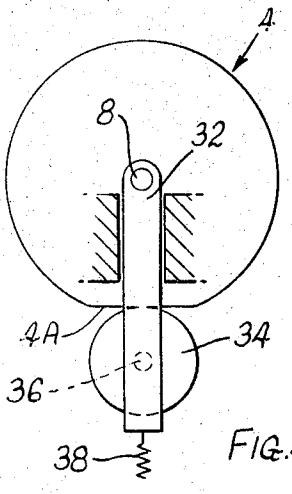


FIG. 4

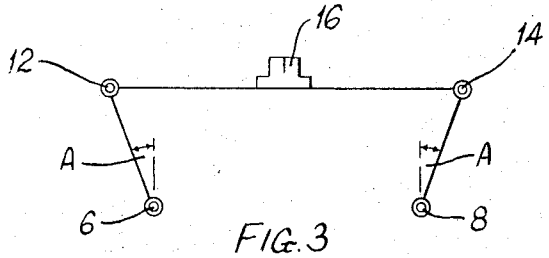


FIG. 3

ROD MAKING MACHINES

This application is a continuation of application Ser. No. 190,496, filed Oct. 19, 1971, now abandoned.

This invention is concerned with rod-making machines, especially machines for making cigarettes and cigarette filter rods, in which a continuous rod is cut into short rod sections while moving axially.

While the continuous rod is being cut, it is commonly supported by a reciprocating ledger. The present invention is concerned with a new form of ledger.

A ledger according to the present invention comprises two rotary members arranged to rotate at the same speed about parallel axes and a connecting member which is pivotally connected to both of the rotary members and carries a rod support which supports the rod during each cutting stroke.

Examples of ledgers according to this invention will now be described with reference to the accompanying diagrammatic drawings. In these drawings:

FIG. 1 is a side view of one ledger;

FIG. 2 is an end view of the ledger;

FIG. 3 is a line drawing showing the relevant lines of a modified form of ledger; and

FIG. 4 shows a different possible modification.

For convenience, in the description and claims, the ledger is described in terms of the rotary members having horizontal axes of rotation, but it should be understood that the axes of rotation could both be inclined to the horizontal.

The ledger shown diagrammatically in FIGS. 1 and 2 includes two wheels 2 and 4 which are driven by parallel horizontal shafts 6 and 8 at the same speed. A connecting member 10 is pivoted at opposite ends to the wheels 2 and 4 by pivot pins 12 and 14 and carries above it a rod-supporting U-sectioned part 16 which has a transverse slot 18 through which a knife 19 passes to cut the rod 20 while the rod support 16 is supporting the rod. It will be understood that the rod support 16 moves along a circular path while maintaining its orientation with respect to the rod 20. Along the top of its path of movement it supports the rod during cutting.

The pivot pins 12 and 14 are fixed to slidable blocks 22 and 24 which are located in grooves 26 and 28 formed in the wheels 2 and 4. Thus the distance of each pivot pin from the axis of the wheel can be adjusted. This adjustment may for example be achieved by mounting on each wheel a captive screw 26A, 28A which extends radially along the groove and passes through a correspondingly threaded bore in the associated block 22 or 24. Thus rotation of each screw moves the associated block along the groove. During use each pivot pin is set at the same distance from the shaft 6 or 8. Thus the length of the rod sections cut from the continuous rod can be adjusted, since the rod section length depends upon the crank radius (i.e., the distance of the pivot pins from the axis of rotation), being equal to 2π times the pivot pin radius. The rod section length may, for example, be adjustable over a range of 45 mm to 150 mm.

In order to arrange that the top position of the rod support 16 is always immediately below the cigarette or filter rod 20, the shafts 6 and 8 may be carried by a member which is vertically adjustable. Preferably, however, adjustment is achieved by using a variable amount of packing 30 between the rod support 16 and the member 10. FIG. 1 shows a relatively thick packing piece 30. A thinner packing piece is used if the crank radius of the pivot pins is increased to increase the rod section length. Alternatively, if shorter rod sections are needed, the blocks 22 and 24 can be screwed radially further towards the shafts 6 and 8, and a thicker packing piece can be used in place of the packing piece 30 to return the top position of the rod support 16 to the desired level.

The knife 19 may be in the form of a part of a helix on a rotary member which is inclined to the rod 20 so that the knife always lies at right angles to the rod 20 while it is cutting.

As the rod support 16 moves along a circular path, it moves vertically to a slight extent while each cut is being made. This is particularly so when the rod section length is small. To compensate to some extent for this rise and fall of the rod support 16, the two wheels 2 and 4 may be set slightly out of phase with one another, as shown in FIG. 3. FIG. 3 shows schematically the positions of the shafts 6 and 8 and pivot pins 12 and 14. It will be seen that the radial lines between the shafts and the pins are not parallel but are inclined away from one another when the rod support 16 is at its top position. Each radius arm is at this stage inclined to the vertical by the angle A. With this arrangement, as one end of the connecting member 10 drops (i.e., the left-hand end if the direction of rotation is anti-clockwise), the other end of the member 10 rises slightly. This compensates slightly for the dropping of the left-hand end. The angle A is shown large for the purpose of illustration, and may in practice be somewhat smaller. The angles of inclination of the two radial lines need not in fact be the same (i.e., when the rod support 16 is at its top position), and as a further alternative the inclination of the radial lines may be in the opposite sense, that is to say towards one another.

With the arrangement shown in FIG. 3, it is necessary to allow for a slight freedom of sliding motion of the connecting member 10 with respect to one of the pivot pins 12 or 14 in the direction of the connecting member 10. This is because the distance between the pivot pins 12 and 14 varies slightly during each revolution of the wheels 2 and 4. It should further be noted that the rod support 16 in this case performs a slight rolling motion relative to the rod 20; for this reason the surface of the rod support 16 which engages below the rod 20 may be slightly convex in a longitudinal section through the bottom of the U section.

FIG. 4 shows a different possible way of compensating for the slight vertical movement of the rod support 16 with respect to the rod during cutting. It is a view from behind the wheel 4, which in this case is carried by a vertically slidable part 32. The wheel 4 rests on a wheel 34 mounted on a stationary spindle 36, and the part 32 is pulled down by a spring 38 so as to hold the wheel 4 in contact with the wheel 34. The peripheral surface of the wheel 4 is formed as a cam which controls the vertical position of the wheel 4 in a manner such that the vertical movement of the centre of the rod support 16 with respect to the rod 20 during cutting is reduced or substantially eliminated. FIG. 4 shows the periphery of the wheel 4 formed with a flattened portion 4A which is shown somewhat exaggerated in FIG. 4 for the sake of clarity. This flattened portion lies at the bottom of the wheel 4 when the rod support 16 is at its top position. The amount of compensation for the vertical movement of the rod support 16 during cutting

depends upon the radius of the pins **12** and **14.** However, the cam shape of the wheel **4** may be such as to provide approximately the mean compensation required for the full range of rod lengths. As an alternative, the cam may be formed on a separate member attached to the wheel **4,** and this cam member may be replaceable so that a different cam can be used for different rod lengths. As a further alternative, the wheel **4** may have slightly different cam profiles in different planes normal to the shaft **8,** and the wheel **34** may be adjustable as to its axial position so that it can engage the wheel **4** in any of the various positions in which different cam profiles determin different degrees of up and down movement of the wheel **4.** For example, the flattened portion **4A** may be formed in two or more steps (i.e., as viewed in a plane passing through the axes of the shaft **8** and spindle **36**). Each of the discrete cam profiles can be used for a given range of rod lengths. The axial position of the wheel **36** can be made adjustable by means of a screw. A further possible alternative is possible to form a continuously varying cam profile portion **4A** since the force between the wheel **4** and wheel **34** is small. Yet another possibility is that the wheel **4** may have a circular outline, and the wheel **34** may be formed as a cam, in which case the wheel **34** would be driven at a speed such that its peripheral velocity equals that of the wheel **4.**

In all the above examples where the wheel **4** is arranged to move up and down during each revolution, the shaft **8** may simply provide a rotational mounting for the wheel **4,** and the drive may come from the wheel **2** via the connecting member **10.**

As an alternative to the wheel **4** being mounted on the vertically movable member **32,** it may be mounted at the end of a horizontal lever pivoted about a horizontal axis. In this case, the vertical height of the wheel **4** may be controlled by means of a driven cam engaging a wheel on the lever.

In the arrangements so far described, the wheels **2** and **4** perform one revolution for each cut. As an alternative, two similar such devices may be placed side by side with their rod supports 180° out of phase with one another so that the speed of rotation can be halved. For this purpose the two devices may be mirror images of one another about a central vertical plane lying along the axis of the rod, each support **16** being arranged to project away from its associated wheels (and towards the other device) so that the rod supports can both move along circular paths (180° out of phase with one another) without clashing with the connecting members **10.**

We claim:

1. A ledger for a rod-making machine comprising two rotary members arranged to rotate at the same speed about parallel axes; a connecting member which is pivotally connected to radially adjustable parts on both rotary members cooperating with radially oriented adjustment screws comprising first adjustment means, the pivot axes both being at the same distance from the axes of rotation of the respective rotary members, and the four axes being at all times at the four corners of a parallelogram so that the connecting member stays in the same orientation while the rotary members rotate; a rod support which is carried by the connecting member and has a U-shaped cross-section for engaging partly round the underside of the rod to support the rod during each cut, and including a transverse slot for receiving a knife during cutting; and second adjustment means for adjusting the height of the rod support relative to at least one of the rotary members independently of the operation of said first adjustment means to maintain said rod support at a fixed predetermined elevation during each stroke when adjustment of said radially adjustable parts is made.

2. A ledger for cooperation with a knife blade in a rod-making machine comprising:

a. two rotary members arranged to rotate at the same speed about parallel fixed axes,

b. a radially slidable part on each rotary member and a captive screw for adjusting each slidable part radially with respect to its associated rotary member,

c. a connecting member pivotally connected to said radially slidable parts of said rotary members for movement about a closed path with rotation of said members,

d. a rod-support device secured to said connecting member and having a longitudinally extending groove of semi-circular cross-section for engaging partly round and supporting the rod during each cutting stroke as said rod-support device moves through a part of said path and a slot extending transversely through said groove for receiving the blade during each cutting stroke, and

e. means for adjusting the height of the rod-supporting device relative to said connecting member to maintain said surface of said rod-supporting device at a fixed predetermined elevation during each stroke when adjustment of said radially slidable parts is made.

3. A ledger for cooperation with a knife blade in a continuous rod-making machine including means for changing the lengths of individual rods severed from the continuous rod comprising:

a. at least two rotary members arranged to rotate at the same speed about parallel fixed axes,

b. pivot means on each of said rotary members spaced from said axes,

c. a connecting member extending between said pivot means for movement through a closed path with rotation of said members,

d. rod-support means mounted on said connecting member and having a longitudinally extending groove of semi-circular cross-section for engaging partly round and supporting the continuous rod during each cutting stroke as said rod-support means moves through a part of said path, and a slot extending transversely through said groove for receiving the blade during each cutting stroke,

e. first adjustment means including threaded means for adjusting the radial distance of each of said pivot means from the axis of the respective rotary member by rotation of said threaded means, and

f. second adjustment means, independent of said first adjustment means, for adjusting the distance of said rod-support means from the axis of at least one of said rotary members,

g. whereby the respective distances between said rod-support means and said axes may be maintained constant with adjustment of the radial distance of said pivot means from at least one of said axes, and during each cutting stroke said rod-support means may be maintained at a fixed predetermined orientation for supporting said continuous rod.

4. A ledger according to claim 3 wherein the path of the continuous rod is fixed and the respective distances between the axes of said rotary members and said path is fixed.

5. A ledger according to claim 2 including means for controlling the movement of said rod-support device along a substantially flat plane through said part of said closed path during each cutting stroke whereby said closed path is substantially circular except for said part which is flatter than the circular part of said path, and displacement of said rod by said support means is thereby prevented.

6. A ledger according to claim 5 wherein said control means comprises means for raising and lowering at least one of said rotary members as said support means passes through said part of said closed path.

7. A ledger according to claim 6 wherein said raising and lowering means comprises cam means.

8. A ledger according to claim 7 wherein at least one of said rotary members includes a circular periphery with a flattened cam portion and said ledger further comprises a stationary cam follower.

9. A ledger according to claim 5 wherein said two rotary members are arranged to rotate slightly out of phase with one another whereby said rod-support device performs a slight rolling motion relative to the rod while supporting the rod during each cutting stroke.

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