United States Patent [19]

Preston et al.

[11] **3,712,160**

[45] **Jan. 23, 1973**

[54] **TRIMMERS FOR CIGARETTE MAKING MACHINES**

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[73] Assignee: **Molins Machine Company Limited,** Deptford, London, England

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[21] Appl. No.: **57,498**

[30] **Foreign Application Priority Data**

Aug. 1, 1969 Great Britain.....38,738/69

[52] **U.S. Cl.** .....**83/4,** 83/101, 83/422, 83/433, 83/473, 101/84 C

[51] **Int. Cl.** **B26d 3/28**

[58] **Field of Search**.....83/1, 4, 422, 433, 473, 490, 83/491, 492, 494, 101; 131/84 C

[56] **References Cited**

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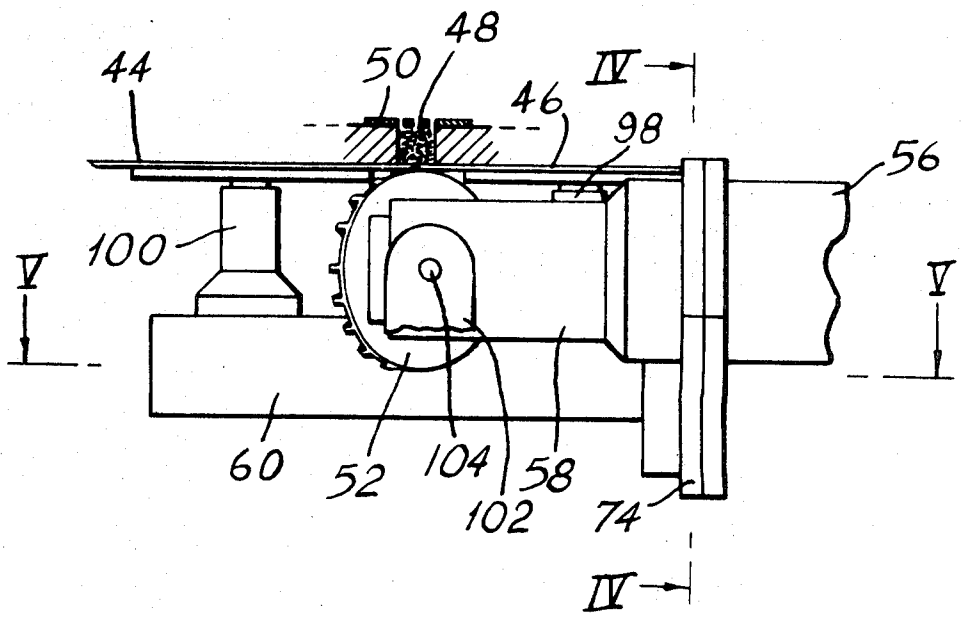
[57] **ABSTRACT**

A trimmer for a cigarette making machine has two co-operating rotating discs and a rotary brush all of which are mounted on a carrier member capable of swinging up and down slightly about a pivot axis to vary the amount of tobacco removed by the trimmer. The pivot axis of the carrier part coincides with the axis of a drive shaft which drives the discs and brush via a shaft in the carrier part which has a bevel gear meshing with a bevel gear on the drive shaft.

13 Claims, 6 Drawing Figures



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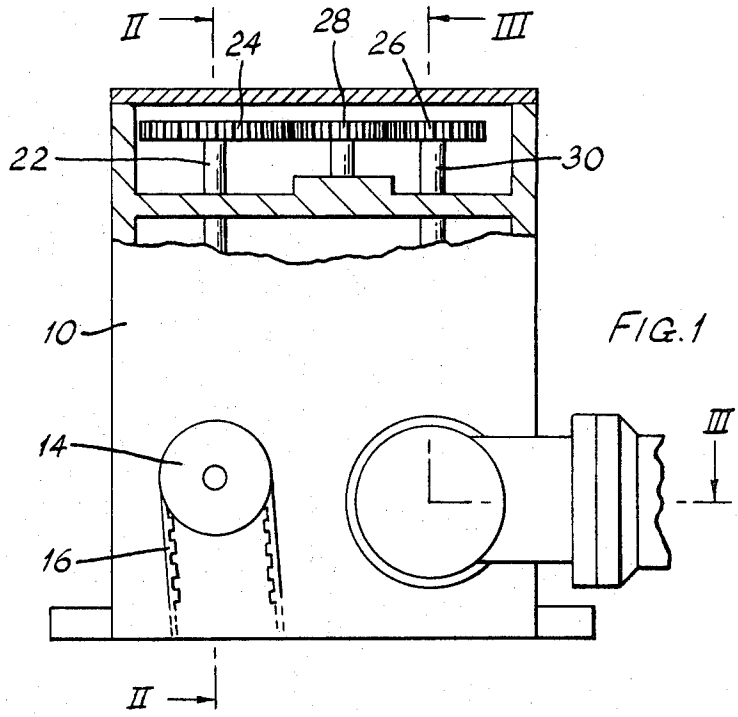

FIG. 1

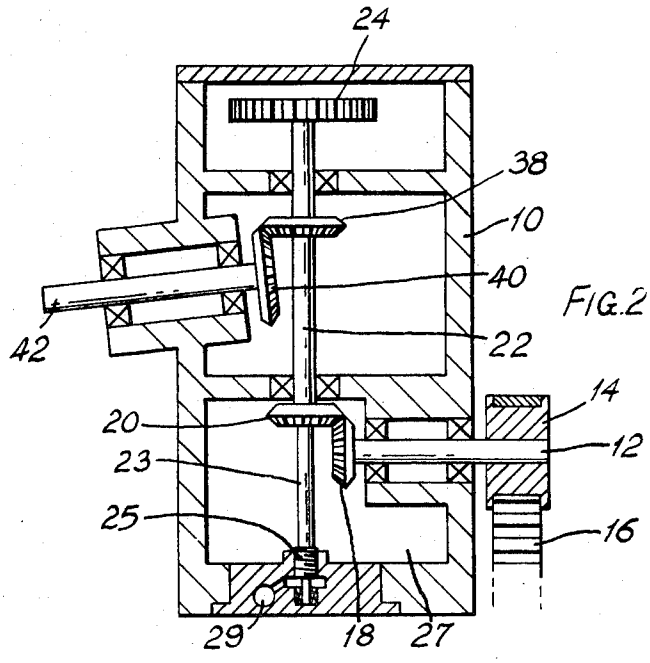

FIG. 2

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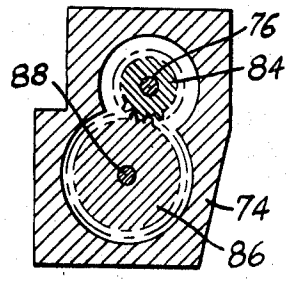


FIG. 4

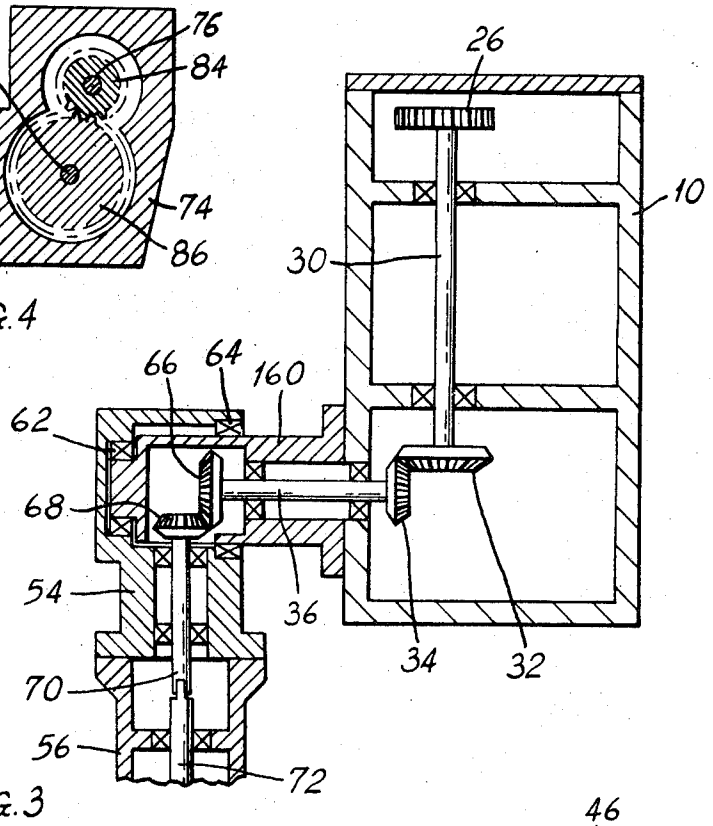
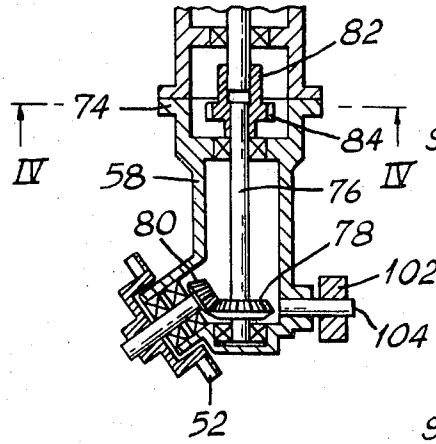


FIG. 3



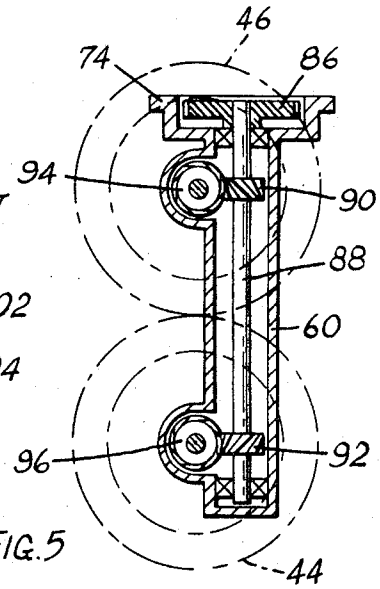


FIG. 5

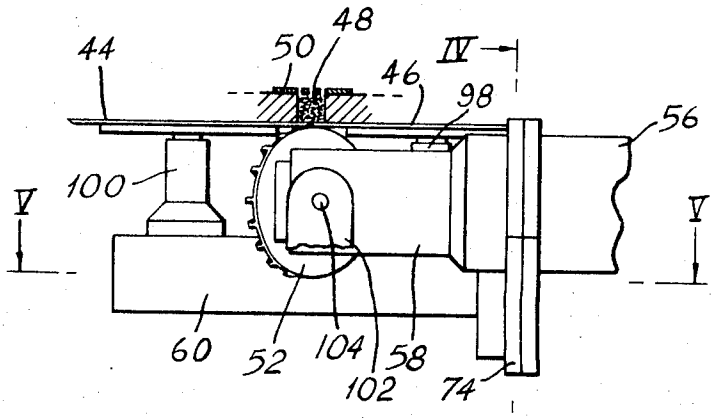


FIG. 6

TRIMMERS FOR CIGARETTE MAKING MACHINES

This invention is concerned with the trimmer of a cigarette-making machine which removes excess tobacco from the tobacco stream before the stream is enclosed in a paper wrapping to form a cigarette rod. The trimmer may for example consist of two discs, as described for example in U.S. Pat. Nos. 3,089,497 to Molins et al. and 3,147,486 to Powell.

A trimmer according to this invention comprises one or more rotary trimming members mounted on a carrier part which is pivotally mounted on a stationary member including a drive shaft for driving the trimming member or members, the drive shaft being coaxial with the pivot axis about which the carrier part pivots relative to the stationary member.

In a preferred arrangement the member or members (for example the two discs as in patents referred to) which act on the tobacco stream to remove excess tobacco are driven via a shaft in the carrier part which extends laterally from the drive shaft about which the trimmer pivots. This intermediate shaft preferably has a gear, for example a bevel gear, which meshes with a gear on the drive shaft.

The pivotally mounted trimmer structure preferably also includes a rotary brush which assists in removing excess tobacco separated from the remainder of the stream by the trimmer discs or the equivalent.

Movement of the trimmer to vary the amount of excess tobacco removed from the tobacco stream may be achieved in response to one or more controls and may in principle be as described in the patents already referred to.

An example of a trimmer according to this invention is shown in the accompanying drawings. In these drawings:

FIG. 1 is a partly sectioned side view showing mainly the gear box from which the trimmer is driven;

FIG. 2 is a section on the line II—II in FIG. 1;

FIG. 3 is a section on the line III—III in FIG. 1, showing in addition more of the trimmer itself;

FIG. 4 is a section on the line IV—IV in FIG. 3 and also on the line IV—IV in FIG. 6;

FIG. 5 is a section on the line V—V in FIG. 6; and

FIG. 6 is a side view of part of the trimmer, as seen from the right of FIG. 3.

As shown in FIGS. 1 and 2, the trimmer is driven from a gear box 10 which includes an input shaft 12 carrying a pulley 14 for a timing belt drive 16. At the inner end of the shaft 12 there is a bevel gear 18 which meshes with a bevel gear 20 on a vertically extending shaft 22. At the upper end of the shaft 22 there is a gear wheel 24 which drives a gear wheel 26 via an idler 28. The gear wheel 26 is mounted on a shaft 30 which carries a bevel gear 32 (see FIG. 3) meshing with a bevel gear 34 on a shaft 36 which is the drive shaft of the trimmer.

The speed ratio between the shafts 22 and 30 may be made variable by allowing for interchangeable gears 24, 26 and 28, in which case the idler gear 28 may be horizontally movable to allow for changes in the sizes of the gear wheels.

As shown in FIG. 2, a further bevel gear 38 on the shaft 22 meshes with a bevel gear 40 on a shaft 42 which transmits a drive to another part of the cigarette

making machines, for example the suction band on which the tobacco stream is built up in the case of a Molins Mark 9 cigarette making machine.

The trimmer itself consists basically of two discs 44 and 46 (see FIG. 6) which rotate about parallel axes lying substantially vertical. As shown in FIG. 6 these discs act on a tobacco stream 48 which is carried by a suction band 50, both of which are shown in cross-section. The excess tobacco (not shown) comes below the co-operating edges of the discs and is separated from the main stream of tobacco by the action of the discs. Furthermore, a rotary brush 52 helps to sweep away the excess tobacco, which may be sucked away through appropriate pipes (not shown) and may be returned to the hopper of the cigarette making machine. Up and down movement of the trimmer as viewed in FIG. 6, varies the amount of tobacco removed by the trimmer.

The axes of rotation of the trimmer discs are at right angles to the tobacco stream on the band 50, which may be inclined slightly to the horizontal, for example by say 6°.

The trimmer does not move up and down in a linear fashion, but pivots about the axis of the drive shaft 36 (see FIG. 3). For this purpose the discs 44 and 46 are carried near the end of a tubular housing which includes a section 54, an intermediate section 56 and a composite integral section including parts 58 and 60 (see FIG. 6). The section 54 is mounted around a tubular member 160 which is coaxial with the drive shaft 36. Ball or roller bearings 62 and 64 enable the housing portion 54 to swing freely about the axis of the shaft 36, carrying with it the remainder of the trimmer.

A bevel gear 66 on the drive shaft 36 meshes with a bevel gear 68 which is on the first section 70 of a laterally extending shaft which also includes an intermediate section 72 housed within the intermediate portion 56 of the tubular housing.

The inner end of the intermediate housing portion 56 is secured to the housing portion 54 by bolts or other means, while the outer end is secured to an end plate section 74 (FIG. 6) which is integral with the tubular housing portions 58 and 60.

A shaft section 76 within the housing portion 58 drives the rotary brush 52 via bevel gears 78 and 80, being coupled to the intermediate shaft section 72 by a member 82 which includes a gear 84. This gear 84 meshes with a larger gear 86 on a shaft section 88 in the housing portion 60 (FIG. 5). Helical gears 90 and 92 on the shaft section 88 mesh with gears 94 and 96 on vertical shafts which extend through tubular housings 98 and 100 (see FIG. 6) and carry the trimmer discs 44 and 46 at their upper ends.

The arrangement may be such that the gears 84 and 86 can be replaced when necessary, by gears of different relative diameters.

The up and down swinging movement of the trimmer only carries the discs through a distance of the order of a few millimeters. This movement is brought about by a link 102 (see FIGS. 3 and 6) which is pivoted to the housing portion 58 of the trimmer by a pin 104. The link 102 extends vertically and may be subject to control, for example by a hydraulic ram responding to variations in the air permeability of the tobacco stream before trimming, and to a servo motor responding to variations in the density of the tobacco stream after

trimming detected by a beta-ray device, as mentioned in the previous patents.

The discs **44** and **46** may have circumferentially spaced recesses or may be otherwise shaped so as to trim off less tobacco at localized intervals to form cigarettes with dense ends, as mentioned in British Pat. No. 881,024.

The rotary brush **52** may be a moulding of plastic consisting of radially extending vanes connected to an end disc.

As shown in FIG. **2**, an extension shaft **23** extends downwards from the lower end of the shaft **22** and carries a screw-threaded part **25** which acts as a pump to deliver lubricating oil from a sump **27** to a passage **29** which extends to the top of the gear box. Oil from the passage **29** lubricates for example the gears **24**, **26** and **28**. The part **25** has a conventional thread which is machined down to a smaller diameter so that the thread in section has the form of a truncated cone. The flat peripheral area of the thread is a close running fit in the bore in the gear box containing the part **25**.

What we claim as our invention and desire to Secure by Letters Patent is:

1. A trimmer for a cigarette making machine, comprising at least one rotary trimming member mounted on a carrier part which is pivotally mounted on a stationary member including a drive shaft for driving the trimming member, the drive shaft being coaxial with the pivot axis about which the carrier part pivots relative to the stationary member, and the axis of rotation of the trimming member being substantially normal to the pivot axis, whereby the trimming member moves substantially in the direction of its axis of rotation during pivotal movement of the carrier part.

2. A trimmer according to claim **1** in which the carrier part includes a shaft which extends transversely relative to the drive shaft and carries a gear wheel meshing with a gear wheel on the drive shaft, the drive from the drive shaft to the trimming member being transmitted via the shaft in the carrier part.

3. A trimmer according to claim **2** in which the drive shaft is mounted in a tubular part of the stationary member, and in which the carrier part includes a portion which surrounds the tubular part of the stationary member and is pivotally mounted on the tubular part by means of ball or roller bearings.

4. A trimmer according to claim **3** in which the gear wheels are bevel gears.

5. A trimmer for a cigarette making machine comprising two trimming members in the form of discs arranged to rotate about parallel axes with their edges close to one another, said discs being mounted on a carrier part which is pivotally mounted on a stationary member including a drive shaft for driving the trimming members, the drive shaft being coaxial with the pivotal axis about which the carrier part pivots relative to the stationary member.

6. A trimmer according to claim **5** including also a rotary brush which is mounted on the carrier part and is driven from the drive shaft, the brush being arranged to brush away excess tobacco separated from the main stream of tobacco by the joint action of the two discs.

7. A trimmer according to claim **1** in which the stationary member comprises a gear box including interchangeable gears by means of which the speed of rotation of the trimming member can be varied.

8. A trimmer according to claim **7** in which the gear box includes a sump from which a screw rotating in a bore in a wall of the sump is arranged to pump oil during use to lubricate gears in the gear box.

9. A trimmer for a cigarette making machine comprising two cooperating disc-like trimming members arranged to rotate about spaced parallel axes and mounted on a carrier part which is pivotally mounted on a stationary member including a drive shaft for driving the trimming members, the drive shaft being coaxial with the pivot axis about which the carrier part pivots relative to the stationary member.

10. A trimmer according to claim **9** in which the axes of rotation of the trimming members are normal to the pivot axis, whereby the trimming members move substantially in the direction of the axes of rotation during pivotal movement of the carrier parts.

11. Trimming apparatus for a cigarette filler stream comprising

a. a stationary support member,
b. a carrier part pivotally mounted on said support member,
c. at least one rotary trimming member mounted on said carrier part, and
d. transmission means for driving said rotary trimming member and including rotary drive means coaxial with the pivot axis of said carrier part,
e. the axis of rotation of said trimming member being substantially normal to the pivot axis of said carrier part,
f. whereby the trimming member moves substantially in the direction of its axis of rotation during pivotal movement of said carrier part.

12. Apparatus according to claim **11** comprising a pair of rotary trimming members arranged on said carrier part to rotate about spaced parallel axes substantially normal to the pivot axis of said carrier part.

13. Apparatus according to claim **11** further comprising

a. air pervious conveyor means for carrying said tobacco stream past said trimming member, and
b. means for directing an air flow through the conveyor means for compressing the tobacco stream as it passes said trimming member,
c. the pivot axis of said carrier part being arranged so that said trimming member can remove a variable amount of tobacco from said tobacco stream on said conveyor means.

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