CUTTING APPARATUS FOR CONTINUOUS ROD CIGARETTE MAKING MACHINES

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Fig. 2
CUTTING APPARATUS FOR CONTINUOUS ROD CIGARETTE MAKING MACHINES

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For the rod-cutters of cigarette-making machines there has been used a knife apparatus in which for cutting through the cigarette rod a circular knife is used which is driven by planet gearing. When, in this arrangement, the planet wheel is in the form of a cogwheel and the driven wheel mounted on the knife shaft is in the form of a counter cogwheel, experience has shown that with the great working speeds of modern machines it is not possible to obtain a constant, satisfactory operation, because quite apart from the natural wear and the wobble thereby produced, it is impossible to avoid the fracturing of teeth or the like owing to the unavoidable entrance of foreign bodies. Moreover, owing to the high speed, the cogwheels cannot be heavy, massive and particularly stable. A belt-drive has also been proposed, but experience has shown that it does not offer sufficient security against slip, and owing to the necessary high speeds cannot be adopted.

A friction-wheel drive has also been proposed and this offers the best solution, but it has been observed that it has the drawback that in order to maintain the frictional pressure respecting the radial adjustment of the knife shaft which becomes necessary, not only is too great an expenditure of power necessary but there is also a troublesome constructional design.

In contrast with these arrangements, the present invention consists in that, while employing a friction-wheel drive, the friction disc, which is secured against rotation, is arranged on a constantly rotating eccentric.

Thus, by this arrangement the revolvable friction disc is not constrained, by the eccentric on which it is mounted, to make an eccentric movement, which in the course of one revolution is spread over the full 360°. According to the invention, this eccentric is employed in order to make use of the eccentricity for pressing the friction disc against the friction wheel of the knife-shaft. In this operation it is preferable to arrange that the pressure is not exerted at the point of maximum eccentricity but beforehand, so that the friction disc exerts a constant pressure on the driving wheel.

According to a further feature of this invention, in order to facilitate the pressure adjustment against the friction wheel, if the knife shaft is radially adjusted in relation to the driving shaft, the support for the knife shaft is mounted eccentrically on the driving shaft, and the eccentric for the friction disc is mounted on the eccentric boss of the knife-shaft support in such manner that it may be turned, but can afterwards be fixed. Consequently, the two eccentrics can be displaced in relation to one another from the position where they cover one another concentrically to the full throw of both eccentrics, and thus an exact radial adjustment of the knife shaft and at the same time an exact mutual adjustment of the friction wheel and the friction disc is obtained.

The invention is illustrated in the annexed drawings, in which:

Fig. 1 shows the general arrangement of the invention.

Fig. 2 is a partial section of a cutting apparatus.

Fig. 3 is a side view.

First of all the present invention will be explained by means of the general arrangement shown in Fig. 1. On the shaft a there is arranged the eccentric b. On this eccentric is seated the counter-eccentric b' and upon this latter is mounted the friction disc c which is provided with an arm c'. A pin c'' of this arm c' engages in a guideway d attached to the frame of the machine. On the eccentric there is also mounted the arm e, which carries the bearing for the shaft f. On the shaft f are mounted the friction disc g and the circular knife which has been omitted for the sake of clearness.

Now when the shaft a turns with the eccentric b, the centre of the friction disc c only changes its position in relation to the shaft a, but is otherwise prevented from turning by the guide- way d. The shaft f of the circular knife mounted on the arm e, by the action of the friction disc g remains in constant engagement with the friction disc c on which the disc g rolls. Now if the arm e is arranged in relation to the eccentric b in such manner that the point of contact x of the two friction discs c and g is located behind the point of greatest eccentricity of the disc c, then the mutual engagement of the two discs c and g can be maintained with certainty.

Now if the circular knife is worn rendering it necessary to move the shaft f outwards, it is only necessary to increase the eccentricity of the eccentric b, which can, for instance, be done by fitting a guideway arranged in the direction of the eccentricity, on to the end of the shaft a, in which guideway the eccentric b can be displaced and held firm.

The adjustment of the eccentricity of the eccentric can, however, also be brought about, by arranging the latter on a further eccentric and then displacing both eccentrics in relation to one another.
Another. Such a form of construction is shown in Figs. 2 and 3. On the driving shaft 1 is mounted the eccentric 2 which is connected with the box 4 by means of a dog-clutch 3, the purpose of which will be explained later. The box 4 is attached to the collar 1' of the driving shaft 1 by a dog clutch 5. On the eccentric 2 is mounted the eccentrical 6 which corresponds to that denoted by b in the form of construction illustrated in Fig. 1. This eccentric is provided with a ball bearing 7, which carries the friction ring 8, corresponding to the friction disc c shown in Fig. 1. This ring 8 is connected with the ring 9 by means of the screw 10. On the ring 9 a roller 11 is mounted which is held in a guideway 12 arranged radially to the shaft 1. This guideway 12 is fitted to the cover 13 of the housing. On the eccentric 6 is attached, by means of the screw 14, a support 15 for the knife-shaft. The knife-shaft 16 rests in the ball bearings 17 of the support 15 and engages with the friction ring 8 by means of the friction disc 18.

In order that both eccentrics shall be retained relatively to one another in the adjusted position, the eccentric 2 is provided with teeth 19 with which suitable teeth cut in the ring 20 engage. This ring 20 is attached to the eccentric 6 by means of the screw 21. In an annular recess 6' of the eccentric 6 there is inserted a helical spring 22, one end of which rests against the eccentric 6 and the other against the collar 2' of the eccentric 2. Thus, if the nut 23 on the driving shaft 1 is loosened, the eccentric 2 in the opening in the eccentric 6, is thrust towards the left (Fig. 2), and the teeth 19 are disengaged. Now by suitable rotation of the eccentrics in relation to one another the eccentricity of the friction disc 8 can be changed, and by tightening the nut 23 these two eccentrics are again coupled together. At this point it should be mentioned that, in order to make the drawings clear, the two eccentrics are shown adjusted to their maximum eccentricity. If the machine is adjusted from the outset the circular knife 24 will be so selected that first of all the eccentrics are so adjusted that their eccentricity is first of all neutralized, that is the friction disc 8 remains completely at rest. Only when the circular knife 24 has become worn to a certain extent is an eccentricity produced by displacing the eccentrics in relation to one another, which eccentricity can be increased gradually in proportion to the wear of the circular knife.

In order to enable the adjustment of the counterweight 25 to correspond to the increasing eccentricity of the friction ring 8 and the consequent outward radial displacement of the knife support 15, to the eccentric 2 is connected a further eccentric 26, the eccentricity of which must, of course, be exactly opposite, that is to say diametrically opposite to the eccentricity of the eccentric 2. On this eccentric 26 is mounted the support 27 of the counter-weight 25, and a locking disc 28 provided with a collar keeps the support 27 in position on the eccentric 26. On the support 27 there is mounted, by means of a bolt 29, the roller 30, which is held in a guideway 31 advanced radially to the shaft 1. This guideway 31 is connected to the flange 6' provided on the eccentric 6, by means of the screws 32.

The driving shaft 1 is mounted in the housing 35 by means of the ball-bearing 33, and the thrust bearing 34, which housing is closed on one side by the housing cover 36 and on the other side by the housing cover 37. A felt ring 97 inserted in an annular groove of the housing cover 35 serves as a packing member for the housing 35 which is filled with oil. On the shaft 1, and secured by the key 38 is mounted the worm wheel 39, which engages with the worm 37. The latter is mounted on the shaft 41 which is mounted in the socket 42 for the cutting apparatus and is driven by the main driving shaft of the cigarette machine. Now the dog-clutch 3 serves to enable the cutting apparatus to be adjusted in correct relation to the cigarette machine. By loosening the nut 33, the dog clutch 3 can be brought out of engagement. Now the cutting apparatus can be brought into the correct position by suitable rotation of the knife support in relation to the shaft 1.

Having thus described the nature of the said invention and the best means I know of carrying the same into practical effect, I claim:

1. A cutting mechanism for cigarette machines comprising a sun gear, a planet gear, a shaft upon which said planet gear is mounted, a cutting element carried by said shaft, said sun gear being eccentrically mounted and means for varying the eccentricity of said sun gear to compensate for wear of said cutting element.

2. A cutting mechanism for cigarette machines comprising a sun gear, a planet gear, a shaft upon which said planet gear is mounted, a cutting element carried by said shaft, said sun gear comprising a non-rotative outer ring, and means for varying the eccentricity of said ring with relation to the shaft of said sun gear.

3. A cutting mechanism for cigarette machines comprising a sun gear, a planet gear, a shaft upon which said planet gear is mounted, a cutting element carried by said shaft, and a shaft for said sun gear, said sun gear comprising an eccentric mounted upon said sun gear shaft and an outer ring mounted upon said eccentric.

4. A cutting mechanism for cigarette machines comprising a sun gear, a planet gear, a shaft upon which said planet gear is mounted, a cutting element carried by said shaft, a shaft for said sun gear, said sun gear comprising an eccentric mounted upon said sun gear shaft, a second eccentric mounted upon said first mentioned eccentric and an outer ring carried by said second eccentric.

5. A cutting mechanism for cigarette machines comprising a sun gear, a planet gear, a shaft upon which said planet gear is mounted, a cutting element carried by said shaft, a shaft for said sun gear, said sun gear comprising an eccentric mounted upon said sun gear shaft, and an outer ring mounted upon said eccentric.

6. A cutting mechanism for cigarette machines comprising a drive shaft, an eccentric mounted upon said drive shaft, a non-rotative ring carried by said eccentric, a planet gear secured to said eccentric and means for varying the eccentricity of said outer ring with relation to said shaft while retaining the relative positions of said planet gear and said outer ring.

7. A cutting mechanism for cigarette machines comprising a drive shaft, an eccentric fixed to
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said drive shaft, an outer ring mounted upon said eccentric, a planet gear traveling upon said outer ring controlled by said eccentric, a cutting element carried by said planet gear and means for adjusting the position of said planet gear about said eccentric so as to vary the distance of said planet gear from said shaft in order to compensate for wear of said cutting element.

8. A cutting mechanism for cigarette machines comprising a drive shaft, an eccentric fixed to said drive shaft, an outer ring mounted upon said eccentric, a planet gear traveling upon said outer ring controlled by said eccentric, a cutting element carried by said planet gear and means for varying the distance of said planet gear from said shaft in order to compensate for wear of said cutting element.

9. A cutting mechanism for cigarette machines comprising a shaft, an eccentric mounted upon said shaft, a second eccentric mounted upon said first eccentric, means for adjusting the relative positions of said eccentrics, a ball race mounted upon said second eccentric, an outer ring carried by said ball race, means for maintaining said outer ring stationary with respect to the rotational movement of said eccentrics, a planet gear fixed to said second eccentric, a cutting element carried by said planet gear.

10. A cutting mechanism for cigarette machines comprising a drive shaft, an eccentric mounted upon said drive shaft, a second eccentric mounted upon said first mentioned eccentric, means for adjusting the relative positions between said eccentrics upon said shaft, an outer ring mounted upon said second eccentric, means for maintaining said outer ring stationary with respect to the rotational movement of said eccentrics, a planet gear mounted upon said second eccentric, a cutting element carried by said planet gear and a counter weight carried by said first eccentric.

11. A cutting mechanism for cigarette machines comprising a drive shaft, an eccentric mounted upon said drive shaft, a second eccentric mounted upon said first mentioned eccentric, means for adjusting the relative positions between said eccentrics, an outer ring mounted upon said second eccentric, means for maintaining said outer ring stationary with respect to the rotational movement of said eccentrics, a third eccentric secured to said first eccentric, a planet gear carried by said second eccentric, a cutting element carried by said planet gear and a counter weight controlled by said third eccentric.

12. A cutting mechanism for cigarette machines comprising a friction sun gear, a friction planet gear, a shaft upon which said friction planet gear is mounted, a cutting element operated by said planet gear, said friction sun gear being eccentically mounted and means for varying the eccentricity of said friction sun gear to compensate for the wear of said cutting element.

13. A cutting mechanism for cigarette machines comprising a friction sun gear, a friction planet gear, a shaft upon which said friction planet gear is mounted, a cutting element operated by said planet gear, said friction sun gear comprising a nonrotative outer ring constituting the friction surface of said drive means for varying the eccentricity of said ring with relation to the shaft of said sun gear.

14. A cutting mechanism for cigarette machines comprising a friction sun gear, a friction planet gear, a shaft upon which said planet gear is mounted, a cutting element operated by said planet gear, a shaft for said friction sun gear, said sun gear comprising an eccentric mounted upon said sun gear shaft and an outer ring mounted upon said eccentric, said cutting element being disposed opposite the point of greatest eccentricity.

15. A cutting mechanism for cigarette machines comprising a friction sun gear, a friction planet gear, a shaft upon which said planet gear is mounted, a cutting element carried by said shaft, a shaft for said sun gear, said sun gear comprising an eccentric secured to said shaft, a second eccentric mounted upon said first mentioned eccentric, an outer ring mounted upon said second eccentric and means for adjusting the relative position between said two eccentrics so as to vary the eccentricity of said outer ring with relation to said sun gear shaft so as to compensate for wear of said cutting element.

16. A cutting mechanism for cigarette machines comprising a drive shaft, an eccentric fixed to said drive shaft, an outer ring constituting a friction gear mounted upon said eccentric, a friction planet gear traveling upon said outer ring controlled by said eccentric, a cutting element carried by said planet gear and means for varying the radial distance of said planet gear from said shaft in order to compensate for wear of said cutting element.

17. A cutting mechanism for cigarette machines comprising a drive shaft, an eccentric mounted upon said drive shaft, a second eccentric mounted upon said first mentioned eccentric, means for adjusting the relative positions between said eccentrics, an outer ring constituting a friction drive mounted upon said second eccentric, a cutting element carried by said planet gear and a counter weight controlled by said first eccentric.

18. A cutting mechanism for cigarette machines comprising a drive shaft, an eccentric mounted upon said drive shaft having teeth thereon, a second eccentric mounted upon said first mentioned eccentric having teeth cooperating with the teeth upon said first eccentric, a friction planet gear cooperating with said outer ring and a cutting element carried by said friction planet gear.

19. A cutting mechanism for cutting machines comprising a drive shaft, an eccentric mounted upon said drive shaft, clutch means connecting said eccentric to said drive shaft, an outer ring mounted upon said eccentric, a friction planet gear controlled by said eccentric cooperating with said outer ring, and a cutting element carried by said friction planet gear, said clutch connecting means permitting the cutting element to be adjusted with relation to the continuously formed cigarette tube.

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