

May 5, 1970

O. KAPPELER ET AL

3,509,887

MECHANISMS FOR FILLING TOBACCO INTO PREFORMED CIGARETTE PAPERS

Filed Sept. 16, 1968

2 Sheets-Sheet 1

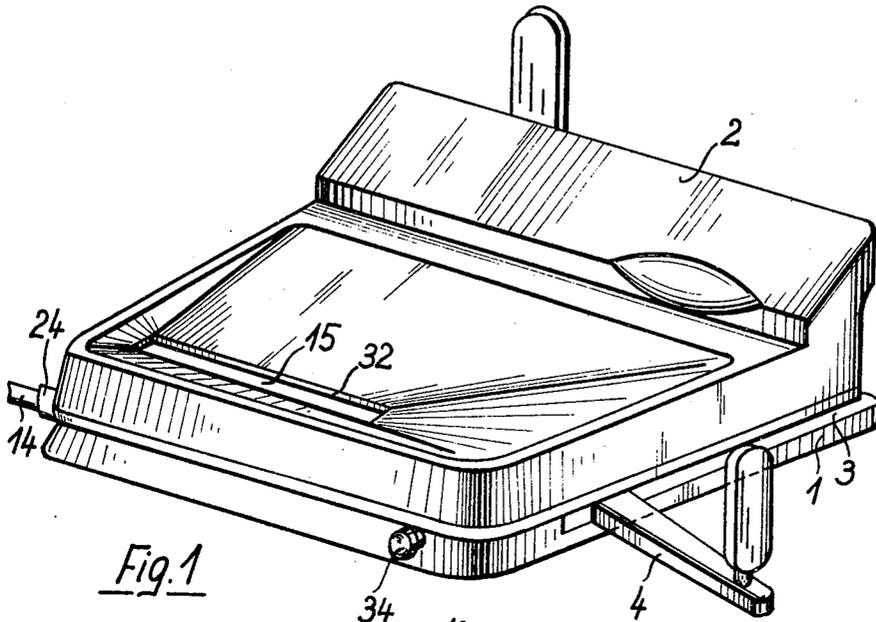


Fig. 1

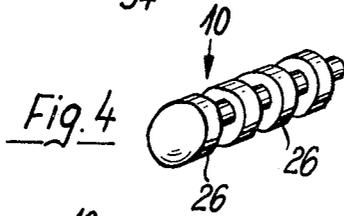


Fig. 4

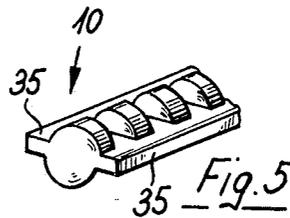


Fig. 5

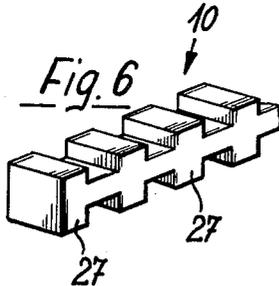


Fig. 6

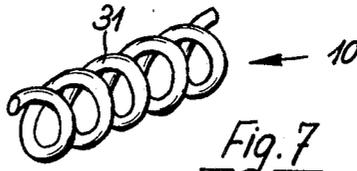


Fig. 7

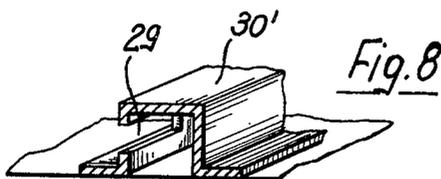


Fig. 8

INVENTORS

Otto Kappeler, Rudolf Messner

BY

Reh and Lind
Att

May 5, 1970

O. KAPPELER ET AL

3,509,887

MECHANISMS FOR FILLING TOBACCO INTO PREFORMED CIGARETTE PAPERS

Filed Sept. 16, 1968

2 Sheets-Sheet 2

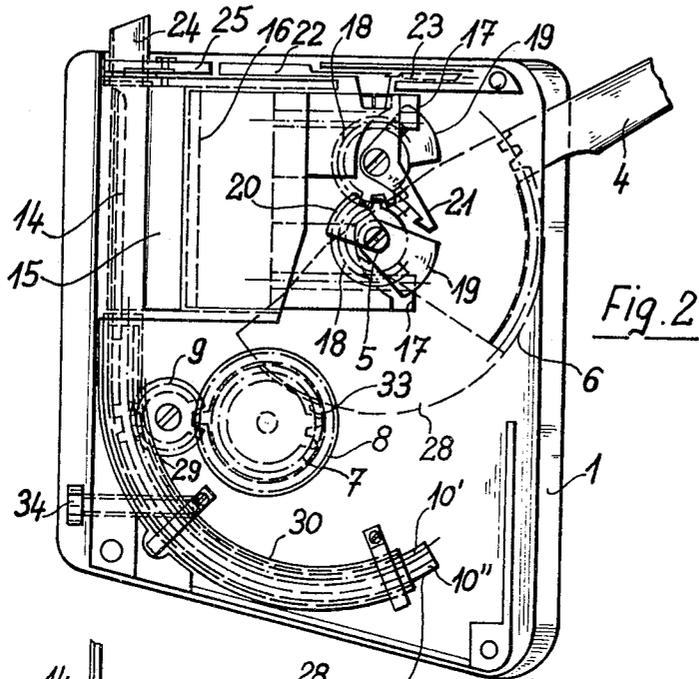


Fig. 2

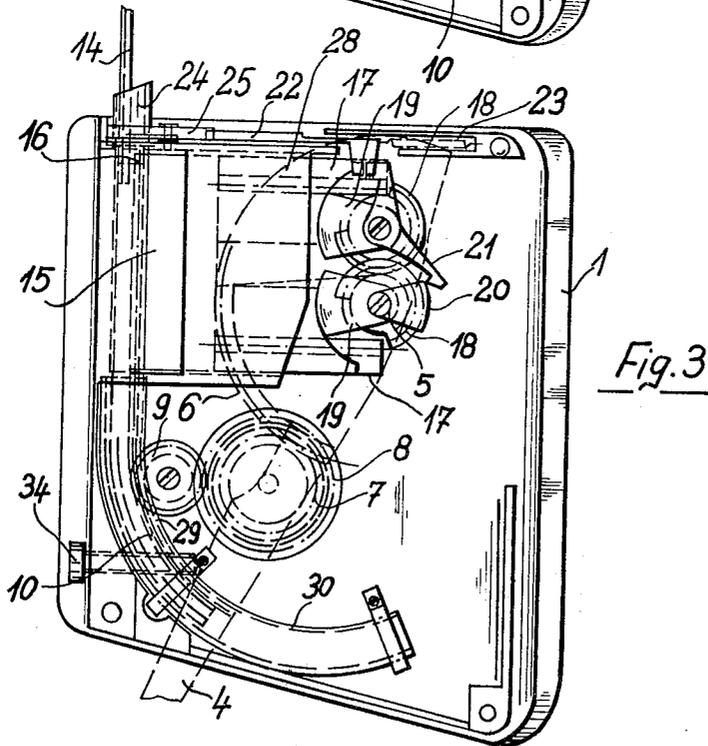


Fig. 3

INVENTORS

Otto Kappeler, Rudolf Messner

BY

Richard Conrad Agt

1

2

3,509,887

MECHANISMS FOR FILLING TOBACCO INTO PREFORMED CIGARETTE PAPERS

Otto Kappeler and Rudolf Messner, Trossingen, Germany,
assignors to Elka-Werke Fritz Kiehn GmbH, Tros-
singen, Wurttemberg, Germany

Filed Sept. 16, 1968, Ser. No. 762,276

Int. Cl. A24c 5/02, 5/42

U.S. Cl. 131-70

14 Claims

ABSTRACT OF THE DISCLOSURE

A resilient tobacco ejector mechanism arcuately disposed in a housing and operated by a lever having a toothed sector, for use in cigarette-manufacturing machinery. The ejector is in the form of a rack which cooperates with the toothed sector of the operating lever. The lever also operates a thrust plate within the tobacco magazine of the housing. The rack-operating mechanism produces a two-phase action relative to the thrust plate and the tobacco ejector.

The present invention relates to a mechanism for filling tobacco into preformed cigarette papers, having a thrust plate displaceable transversely of the longitudinal direction of a tobacco magazine by an operating lever and with an elastic tobacco ejector arcuately arranged in the housing and extending through the tobacco magazine, the movements of thrust plate and tobacco ejector being executed within two successive ranges of angular movement of the operating lever.

It is known to provide filler mechanisms in which the thrust plate is driven positively, without using springs and using double toggle arrangements. In these constructions, a plurality of articulating connections is required.

In tobacco filling mechanism, it is also known to operate the tobacco ejector by a flexible linkage, the linkage even taking the form of a helical spring in order to be able to follow changes in direction.

It is an object of the present invention to achieve a reduction in the overall length of the mechanism and it is another object to arrange for the thrust plate to be positively operated in all positions without having to resort to springs, and also to arrange for the linkage to contain no articulating parts whatsoever.

In accordance with the invention, the tobacco ejector is of elastic design and takes the form of a toothed rack which is driven directly by a toothed sector fixed to the operating lever, or indirectly via a gear set.

In this fashion, a tobacco ejector is provided which, exploiting the available space, can be housed arbitrarily within a guide in the housing of the mechanism, e.g. in an oblique or arcuate relationship to the tobacco magazine, and can be moved in a straight line out of this position, through the magazine, and/or out of same back into the initial position.

A toothed sector attached to the operating lever is so arranged that it co-operates with the rack at, or virtually at, the time of completion of the pressing of the tobacco.

An intermediately disposed gear set makes it possible to bridge arbitrary intervals between toothed sector and rack and to achieve any desired transmission ratio in the kinematic chain.

Conveniently, the rack will be in the form of a round bar of elastic material, preferably a synthetic material, which, at the drive end, in order to form toothing, contains recesses succeeding one another at intervals and, diametrically thereto, other recesses, cut-outs or the like which are designed to reduce the stiffness in the bending

mode. The toothed rack can also consist of cylindrical sections or prismatic elements attached to one another at intervals. Yet again, the use of a known kind of helical spring as a toothed rack is quite possible, the pitch of the helical spring corresponding to the pitch of the toothing in the mating gear. The toothed rack can be inserted free in the guide or can be secured against rotation by additional guide elements, for example rollers or by in situ moulded ribs in the neighbourhood of the neutral axis (bending mode). In order to ensure that the rack is securely located throughout the duration of the thrust plate movement, a circular segmental portion is attached to the operating lever, the first part of which is formed as a smooth circumferential surface which is followed by a second part having teeth, the first part swinging freely through during the phase of advance of the thrust plate, and the second part, after engaging with the gearing, serves to advance the rack.

In order to guide the rack, a tube section fixed to the housing is provided, the cross-section of which is slightly larger than the rack diameter. The guide may also be constituted by a U-section moulding, the web and flanges of whose profile constitute the guiding surfaces for the rack. The guide contains a cut-out in order to allow the driving gear to engage the rack.

In accordance with a further development, the positive guidance and driving of the tobacco thrust plate are achieved by virtue of the fact that the operating lever is non-rotationally secured to one or two partially toothed gears which, in order to drive the thrust plate, mesh with racks arranged thereon, and that cam levers are attached in a fixed or adjustable fashion to the drive gears, which levers engage behind the thrust plate in the pressure position whilst the gears disengage from the racks. In this fashion, positive drive to the thrust plate is achieved.

The invention will now be described with reference to the accompanying drawings which illustrate the invention but in no restrictive sense.

FIG. 1 is an elevational view of the mechanism;
FIG. 2 is a plan view with the housing cover removed and showing the operating lever in the initial position;

FIG. 3 is a plan view in accordance with that of FIG. 2, showing the operating lever pivoted into the end position;

FIG. 4 illustrates an elevational view of a rack constituted by cylindrical sections;

FIG. 5 is a rack with guide ribs;

FIG. 6 is a rack constituted by an assembly of prismatic bodies;

FIG. 7 is a helical spring serving as a rack; and

FIG. 8 is a rack guide in section.

The mechanism comprises a bottom housing section 1 and a top housing section 2 which can be fitted in position thereon. In a horizontal slot 3 located beneath the tobacco magazine in the bottom housing section 1, there is an operating lever 4 which can pivot about a spindle 5. Attached to the operating lever there is a circular sector 6 the first part 28 of which has a smooth peripheral surface, this being followed by a second part of toothed form, the first part swinging through freely during the phase of advance of the thrust plate 16 and the second part, after engaging with a gear set 7, 8, 9, then serving to feed the rack 10. The gear 9 is connected to the elastic rack 10 which acts as a tobacco ejector. In order to temporarily lock the gear 7, this gear contains a recess 33 in which the toothed part of sector 28 engages.

The gear 9 extends through a cut-out 29 in the rack guide, the latter being constituted by a section of tube 30. The rack 10 is provided at the magazine end with a tongue 14 which, in one terminal position of the rack, extends into the tobacco magazine 15, and during the

3

ejection process, extends from the holding tube 24 along with the column of tobacco.

In the tobacco magazine 15, there is mounted a slidable thrust plate 16 carrying racks 17 at its sides, with which racks partially toothed gears 18 attached to the operating lever 4, engage. The said gears 18 carry cam levers 19 which temporarily bear against the arcuate rear side of the tobacco thrust plate 16 in order to lock the same in the pressure position when the partial toothing on the gears runs out of engagement with the racks. The cam levers 19 may have a smaller radial extent over those of their portions co-operating with the pressure plate when the latter is in the pressure position, in order, by moving the thrust plate slightly backwards, to facilitate the process of ejection of the tobacco. A cam 20, attached to one of the gears 18 in order to pivot therewith, co-operates through a double lever 21, with the slide 22, moving it longitudinally against the force of the spring 23 so that it operates the jaws 25 co-operating with the holding tube 24, in order to hold or release (as the case may be) the preformed cigarette paper slid over it. The details just mentioned, concerning the movement of the thrust plate, are given simply to explain how the invention operates but do not form an essential part thereof.

In the example of FIG. 2, the rack 10 comprises a round bar of synthetic material, which, at the side facing the gear 9, has teeth 10' and at the other side recesses 10'' in order to reduce the bending forces.

In a further form, in accordance with the example of FIG. 4, the rack can consist of cylindrical sections 26 of flexible material, connected together at intervals, the spacing and the thickness of the cylindrical sections corresponding to the teeth on the meshing gear 9. In accordance with FIG. 6, the rack 10 comprises prismatic bodies 27 of flexible material which are in turn connected together at intervals through the medium of intervening components. Whereas the rack of FIGS. 2 to 5 and 6, are inserted freely in the guides, the rack 10 of FIG. 5 is secured against rotation in the guide 30 by the co-operation between the ribs 35, which it has in the plane of its neutral axis, and grooves formed in the guide. FIG. 7 illustrates a known kind of helical spring 31 made of metal or synthetic material with or without a reinforcing insert, used as a rack, the pitch and diameter of the spring being so contrived that in co-operation with the gear 9 the action of a rack-and-pinion drive arrangement is achieved. Instead of the guides illustrated in FIGS. 2 and 3, with circular sections, the guide 30' of FIG. 8 can be used, this having a generally U-shaped profile and a square cross-sectional form. It is suitable in particular for the accommodation of racks 10 having angular sections. In the neighbourhood of the point of engagement with the gear 9, this guide too contains a cut-out 29.

Where the rack has a helical design as in FIG. 7 it is possible to form two or more windings simultaneously, with different thicknesses, so that the weaker one forms the root of the tooth.

In order to explain the function of the mechanism, it will be assumed that the operating lever 4 is in the position shown in FIG. 2. The tobacco magazine will then be open and the tobacco ejector 10 will be in the terminal position illustrated. In this position, the tobacco magazine can be filled through a charging opening 32. The sector 28 projects into the recess 33 in the gear 7 and thus locks the rack.

By pivotal movement of the operating lever 4 in the clockwise direction (FIG. 3), this lever, through the first range of its angular movement, drives the gears 18 and thus through the medium of the racks 17 slides the thrust plate 16 into the tobacco magazine 15. The cam levers 19 at the same time engage behind the thrust plate and lock it in the pressure position. With further pivotal movement of the operating lever, the sector 28 moves out of the recess 33 in the gear 7 and the toothed sector 6 moves

4

into mesh with the gear 7 so that the gears 7, 8 and 9 are rotated and the rack 10 is moved towards the tobacco magazine 15 in order to feed the column of tobacco out of the holding pipe 24 into a preformed cigarette paper which has been slid over said pipe. The preformed cigarette paper is held in position whilst this operation goes on, by the jaws 25.

In order to provide an adaptation for varying lengths of preformed paper, the angle of rotation of the operating lever 4 can be limited in arcuate movement by arranging for it to abut against an adjuster screw 34.

When swinging the operating lever 4 back, first of all the rack 10 is moved into the position shown in FIGURE 3, and as a consequence of the engagement of the sector 28 in the recess 33 in the gear 7, the rack 10 is locked. At the same time, the cams 19 release the thrust plate 16, the cam 20 and the jaws 25, and thereafter the partially toothed gears 18 co-operate with the racks 17 to move the thrust plate 16 back into its initial position.

The gears 18 thus exclusively perform the function of displacing the thrust plate, i.e. moving it forwards and backwards in a positive manner. The phases of pressing and closing on the part of the thrust plate, are brought about by the cam levers 19.

We claim:

1. A mechanism for filling tobacco into preformed cigarette paper comprising a housing having a thrust plate defining one end of a tobacco magazine, and an operating lever attached to said housing, said plate displaceable transversely of the longitudinal direction of said tobacco magazine by operating lever, a resilient tobacco ejector arcuately arranged in said housing and extending through the tobacco magazine, and a toothed sector operatively connected to said operating lever, the movements of the thrust plate and tobacco ejector being executed within two successive ranges of angular movement of the operating lever, said tobacco ejector comprising a rack which is operated by said toothed sector arranged on the operating lever.

2. A mechanism as claimed in claim 1, wherein the toothed sector is connected to the rack by an intermediate gear set.

3. A mechanism as claimed in claim 2, wherein said toothed sector comprises a circular sector attached to the operating lever, the first part of which has a smooth circumferential surface which is followed by a second part provided with gear teeth, the first part swinging freely through during the first range of movement of the thrust plate and the second part serving to feed the rack after engagement with the gear set during the second range of movement.

4. A mechanism as claimed in claim 3, wherein the thrust plate comprises racks and two partially toothed gears, and said operating lever is non-rotatably attached to one of said two partially toothed gears which mesh with said thrust plate racks in order to displace the latter, said toothed gears having cam levers attached thereto, which levers engage behind the thrust plate in the pressure position whilst the toothed gears disengage from the thrust plate racks.

5. A mechanism as claimed in claim 4, wherein the toothed gears and the cam levers are a one-piece design.

6. A mechanism as claimed in claim 4, wherein the cam levers have a reducing radius over that part of their zones which, at the terminal end of said second range of movement come into engagement with the thrust plate.

7. A mechanism as claimed in claim 4, wherein one of the toothed gears carries a second cam controlling a clamping device mounted on said housing for holding the preformed cigarette paper on a holding pipe.

8. A mechanism as claimed in claim 1, wherein said housing also includes a guide for the rack which comprises a tube section fixed to the housing.

9. A mechanism as claimed in claim 1, wherein the rack is in the form of a round bar containing recesses or

5

cut-outs at the side opposite that on which the rack teeth are located.

10. A mechanism as claimed in claim 1, wherein the rack comprises cylindrical sections connected at intervals.

11. A mechanism as claimed in claim 1, wherein the rack comprises prismatic elements connected together at intervals.

12. A mechanism as claimed in claim 1, wherein the rack carries guide ribs in a plane of the longitudinal axis of the rack, and said housing has a guide with recesses, said ribs engaging in said recesses in said guide in order to be longitudinally displaceable therein.

13. A mechanism as claimed in claim 2, wherein the rack comprises a helical spring the pitch of which is so contrived that the space between the turns is sufficient for engagement of the tooth flanks on a gear of the gear set.

6

14. A mechanism as claimed in claim 1, wherein there is provided a guide for the rack in the form of a U-shaped moulded component the web and flange portions of which constitute guide surfaces for the rack.

References Cited

UNITED STATES PATENTS

700,040	5/1902	Hansen-Ellehammer	--	131—70
3,202,156	8/1965	Kappeler et al.	-----	131—70

FOREIGN PATENTS

704,524	4/1941	Germany.
162,802	4/1949	Germany.

15 ALDRICH F. MEDBERY, Primary Examiner

J. H. CZERWONKY, Assistant Examiner