(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: 0 059 041 A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 82300636.6

(22) Date of filing: 09.02.82

(51) Int. Cl.³: A 24 D 3/02

(30) Priority: 14.02.81 DE 3105455

(43) Date of publication of application: 01.09.82 Bulletin 82/35

(84) Designated Contracting States: BE CH FR GB LI NL SE

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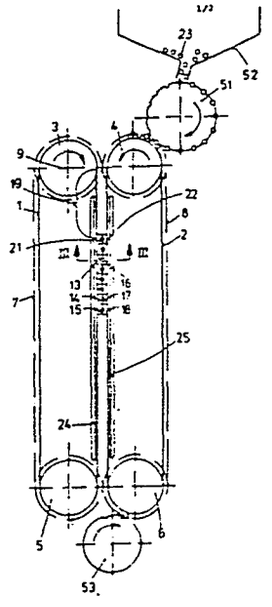
(54) Apparatus for forming channels in the periphery of filter elements.

(57) In an apparatus for producing filter cigarette mouthpieces with secondary air channels, longitudinal grooves are embossed in the periphery of the filter elements by means of heated dies arranged on the inner surfaces of troughs (13–18) carried by two conveyors (1, 2). During embossing, the troughs of each conveyor co-operate in facing pairs and jointly enclose each filter portion (23).



EP 0 059 041 A1

APPARATUS FOR FORMING CHANNELS IN THE PERIPHERY OF FILTER ELEMENTS

The invention relates to apparatus for forming open channels or grooves in the periphery of filter elements for smokers' requisites, in which the elements are transported by a conveyor in parallel disposition and are embossed with heated dies. Such filter elements can be produced by extruding thermally deformable filter material in the form of a tow and subsequently dividing the tow into portions.

In an apparatus of this type known from U.S. Patent 4 149 546, filter elements are carried by a rotary drum conveyor past a stationary heated arcuate element having ribs extending along the path of the filter elements. These ribs impressing grooves extending circumferentially round the filter elements. However, from many applications, channels are desired which extend not only in the circumferential direction but also in the longitudinal direction of the filter elements. Although the U.S. Patent refers to this possibility, it does not suggest any apparatus for producing such channels.

It is an object of the present invention to provide apparatus which makes it possible to produce channels of any desired shape, particularly channels extending in the longitudinal direction of filter elements, the apparatus being constructed with great simplicity and capable of simple incorporation into modern machines for producing filter cigarettes.

In accordance with this invention two trough conveyors are provided which pass continuously through an embossing zone with the troughs co-operating in facing pairs to enclose and shape an inserted filter element, embossing dies being disposed in the inside surfaces of the troughs.

The invention makes is possible to provide the complete periphery of a filter element with impressions of any desired configuration in one operation during the passage.

In one embodiment of the invention, which is particularly useful in a restricted space, the first conveyor is a rotatable drum with troughs arranged round its periphery parallel to its axis of rotation, and the second conveyor is a rotatable ring with parallel troughs arranged round on its internal periphery, the ring having an internal diameter larger than the external diameter of the drum, and the drum being eccentrically mounted within the ring with its axis displaced from that of the ring by half the difference between the said diameter, and being rotatable synchronously with the ring.

It is an advantage of this embodiment that it is possible to utilize the proved components of known transfer drums, and the use of two rigid, synchronously rotating trough conveyor members ensures in a simple manner that the two troughs which co-operate in the embossing are precisely opposed to each other.

In certain cases, it is desirable to detain the troughs participating in the embossing process for a relatively long period after this has taken place, so that the embossed channels can be consolidated in the thermoplastic material of the filter periphery. This is made possible by another embodiment of the invention in which both sets of troughs are arranged parallel to one another on the peripheries of respective endless belt conveyors, the conveyors facing each other in a generally parallel manner in the impression or stamping zone are being driven synchronously so that respective troughs in each conveyor co-operate.

Where the filter elements are to receive grooves which extend in the longitudinal direction from the mouth end (in the finished cigarette), but which do not extend as far as the end remote from the mouth, preference is given to an embodiment in which the troughs are designed to receive two double-length filter elements and the embossing dies only extend over an area corresponding to the area of the inserted, double-length filter elements.

Double-length filter elements are subsequently cut in the centre to form two filter elements, each being sufficient for one cigarette or other smoker's requisite. Troughs for double-length filter elements are also recommended for forming other channel configurations.

The filter elements produced by apparatus according to the invention and provided with embossed stamped or impressed channels or grooves are preferably used for filter cigarettes or for filter mouthpieces of other elongated smoker's requisites in whose mouthpiece secondary air channels are to be provided. The filter elements may be wrapped in a tipping paper which covers the channels and has openings pores, holes or recesses for secondary air that communicate with the covered channels through which the smoker can suck in secondary air or dilution together with the main-stream smoke. If the secondary air is only to mix with the main-stream smoke in the mouth, or is not to pass in an uncontrolled manner into the filter element, filter elements are used which have a peripherally airtight wrapping, so that the base of the impressed channels is also made airtight.

Where reference is made hereinafter to elongated smokers' requisites, it is intended to means cigars, whiffs or cigarillos, but more especially cigarettes.

The invention will be explained in greater detail hereinafter, by way of example, to the drawings, wherein:

Fig. 1 shows diagrammatically one embodiment of apparatus according to the invention, in which troughs are arranged on belt conveyors;

Fig. 2 is a perspective view of a trough used in the apparatus of Fig. 1;

Fig. 3 is a partial section along the line III-III in Fig. 1;

Fig. 4 is a partial section along the line IV-IV in Fig. 3;

Fig. 5 shows an embodiment of the invention equipped with a trough ring, viewed in the direction of the axes of rotation;

Fig. 6 shows diagrammatically the view in the direction of the arrow VI in Fig. 5.

In Figs. 1 and 5, the embossed filter elements are shown hatched in section and the unembossed ones unhatched.

According to Fig. 1, two endless belt conveyors 1 and 2 are guided over guide pulleys 3, 4, 5, 6 and are provided on their outer peripheries 7, 8 with trough means as at 13, 14, 15, 16, 17, 18, disposed parallel to the rotational axes 9 of the pulleys. Each trough means has in its surface groove or recess into which fits roughly half the periphery of a filter element. The trough means are distributed equidistantly round the entire periphery of the two conveyor belts 1 and 2 and, when passing through the embossing zone 19 and the following zone where the sides 21, 22, of the conveyors are opposed, they face one another in pairs and thereby enclose or mould an inserted filter portion 23 over the entire periphery thereof.

The guide pulleys 3, 4 are driven synchronously (by means not shown) and rotate in the direction of the arrows. The sides 2, and 22 are backed by rigid slides or runners 24, 25, so that the sides cannot yield. The recesses or moulds 31, 32 of the trough means 13, 16 (as shown in Fig. 4) are provided on their surfaces with elongated, heatable embossing dies 34, 35, 36, 37 which, as shown in Fig. 3, do not extend over the entire length of an inserted filter portion 23, so that the latter projects at either end to some extent beyond the die 34. In the case shown, their are four dies in the two facing moulds 31, 32, which are uniformly distributed over the periphery of the filter portion 23 and extend helically at an acute angle to the axial direction 40 of the troughs. The dies 34 to 37 are electrical heating rods, heated by a power supply not

shown in the drawings.

A supply transfer drum is supplied with individual filter portions 23 from a hopper 52. During the rotation of the transfer drum 51, the filter portions are individually transferred to the troughs of the conveyor belt 2 and from there into the embossing station, in each case enclosed between a pair of troughs from the two conveyor belts 1 and 2. The filter portions may be held in the open troughs, for example, by gravity, suction or mechanical guide.

A removal transfer drum 53 removes the now embossed filter portions from the troughs of the conveyor belt 2 and conveys them away for further processing.

The filter portions at this stage constitute two double-length filter elements and after separation along the line 54 (Fig. 3) are further processed to form double cigarettes. A double cigarette consists of a double-length filter rod, to each of whose ends a tobacco rod is coaxially fitted, and fixed to the filter element by adherent tipping paper placed around the filter element and the adjacent parts of the tobacco rods. The double cigarette is then cut up into individual cigarettes at the centre of the filter elements, as along the broken lines 55 and 56 in Fig. 3. By means of the embossed grooves, four channels are distributed over the periphery of each filter element and are covered by the tipping material of the particular mouthpiece and extend to the mouth end of the cigarette, which is located as in the sectional plane of the broken lines 55 and 56. The channels do not extend to the end of the filter elements remote from the mouth. Secondary air can enter the channels through pores, holes or recesses provided in the overlying tipping paper.

As a modification to this embodiment, the embossing dies can be arranged to be linear and parallel to the axial direction 40.

In the embodiment shown in Fig. 5, a trough drum 60, which can be driven in a rotary manner in the direction of the arrow, has an external diameter 61 that is somewhat smaller than the internal diameter 62 of a surrounding trough ring 63, which can be driven in a rotary manner in the same direction as and synchronously with the trough drum 60. The axis of the trough ring 63 is parallel to that of the trough drum 60, but is eccentrically displaced by a distance 64 equal to half the distance between the diameters 61 and 62. The periphery 65 of the trough drum 60 and the internal periphery 66 of the trough ring 63 have equidistant troughs, e.g. troughs or recesses 67, 68. The movement of the two drums is synchronised in such a way that in the embossing area 69 the troughs of the trough ring on the one hand and of the trough drum on the other face one another in pairs to mould the filter portions 70 which are deposited in the troughs of the trough drum 60.

The inner surfaces of the troughs of the drum 60 and the trough ring 63 are provided with embossing dies 74, 75, 76, 77, in the same way as the troughs of Figs. 2 to 4. Thus, the operation of Figs 3 and 4 also occurs in the embossing zone 69. The still unembossed filter portions pass from the outlet of a filter hopper 80 individually into the reception area of the trough drum 60, where they come to occupy the position 82 in Fig. 6, and from there they are moved by guide means (not shown) on the trough drum 60 to beneath the trough ring 63 in the position 83 indicated by broken lines. They then pass through the embodding area 69, where they are embossed, and finally arrive at a transfer point 84 in the position indicated at 86 in Fig. 6. From this position, the filter portions are pushed by a ram (not shown), in time with the continuously moving troughs, into the position 87, which is located in a groove of a removal transfer drum 85, which transfers the embossed filter portions to a discharge conveyor 88.

This apparatus is also intended for processing double-length filter portions, as described with reference to Figs. 1 to 4.

It is to be noted that owing to the eccentricity of the mounting of the trough drum with respect to the trough ring, the troughs are initially open for receiving the filter portions from the hopper outlet 80, and then close through the embossing zone 69, after which they open again for transfer of the filter portions to the transfer drum 85.

CLAIMS

1. Apparatus for forming open channels or grooves in the periphery of filter elements for smokers' requisites, the apparatus comprising a conveyor adapted to carry the elements in a parallel disposition to be embossed with heated embossing dies, characterised by two conveyors (1, 2 and 60, 63), each provided with a series of troughs (13-18 and 67, 68) which pass through an embossing zone (19, 69) with the troughs co-operating in facing pairs to mould an inserted filter element (23, 82), embossing dies (34-37, 74-77) being disposed on the inside surfaces of the troughs.

2. Apparatus according to claim 1, characterised in that the first conveyor (60) is a rotatable drum with troughs (67) arranged round its periphery parallel to its axis of rotation, and the second conveyor (63) is a rotatable ring with parallel troughs (68) arranged round its internal periphery, the ring having an internal diameter (62) larger than the external diameter (61) of the drum (60), and the drum being eccentrically mounted within the ring with its axis displaced from that of the ring by half the difference between the said diameters, and being rotatable synchronously with the ring.

3. Apparatus according to claim 1, characterised in that both conveyors are belt conveyors (1, 2) equipped with troughs (13-18) arranged parallel to one another the periphery of each conveyor, with one side (21, 22) of each conveyor facing each other in a generally parallel manner in the embossing zone (19), and are drivable synchronously.

4. Apparatus according to any of the preceding claims, characterised in that the embossing dies are rods extending parallel to the axis of each trough.

5. Apparatus according to any of claims 1 to 3, characterised in that the embossing dies (34, 37, 74-77) are helical rods extending at an angle to the axis (40) of each trough.

6. Apparatus according to claim 4 or 5, characterised in that the troughs (31, 32 and 67, 68) can accommodate two double-length filter portions (23) and that the embossing dies (34-37 and 74-77) only extend over lengths corresponding to the central part of the inserted double-length filter portions.

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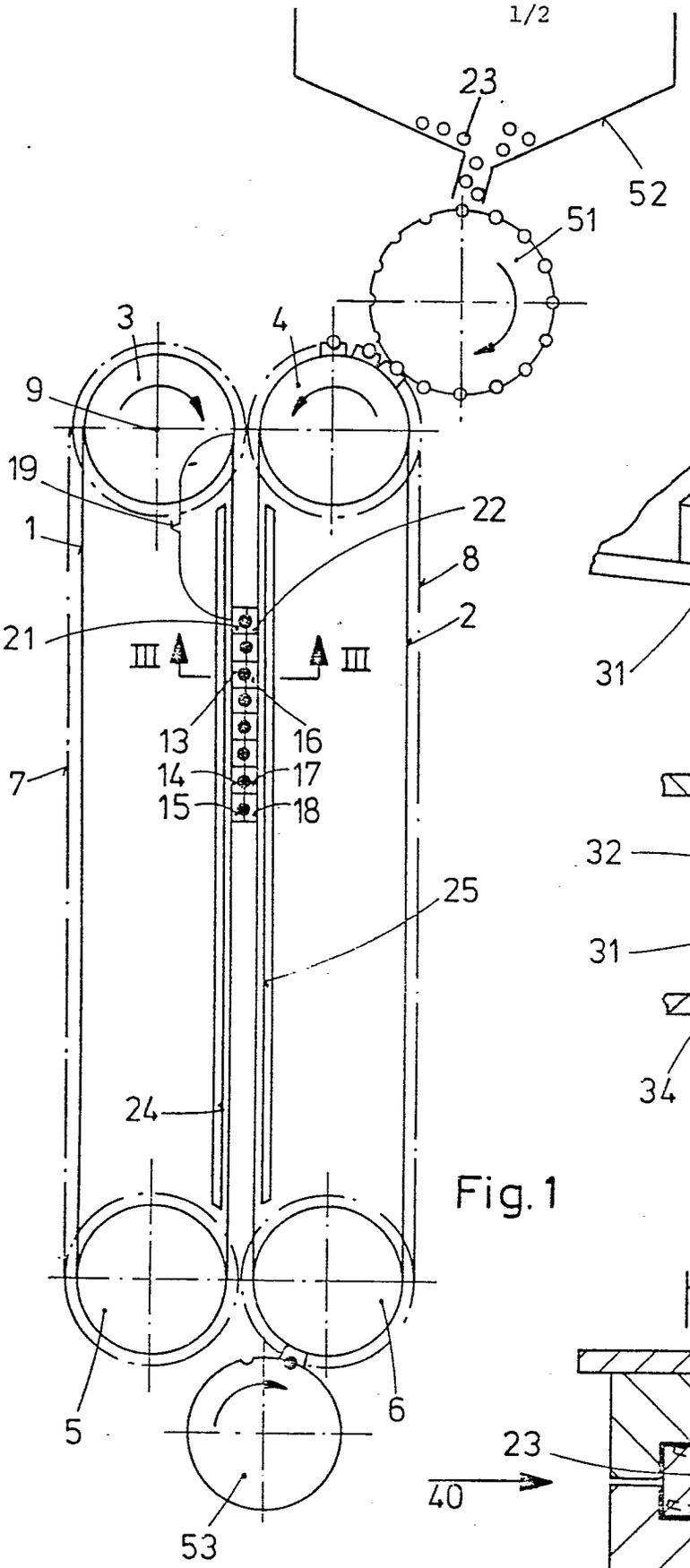

Fig. 1

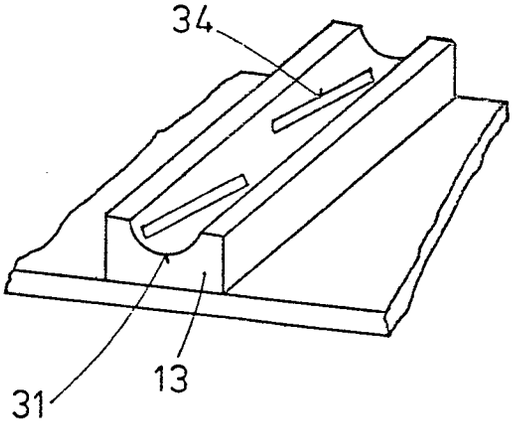

Fig. 2

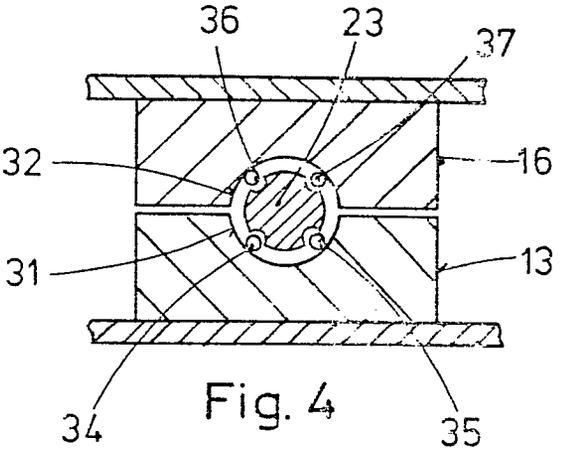

Fig. 4

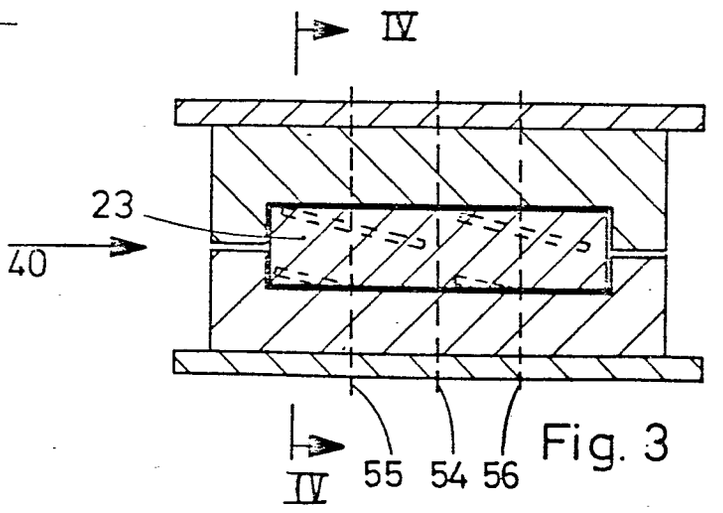

Fig. 3

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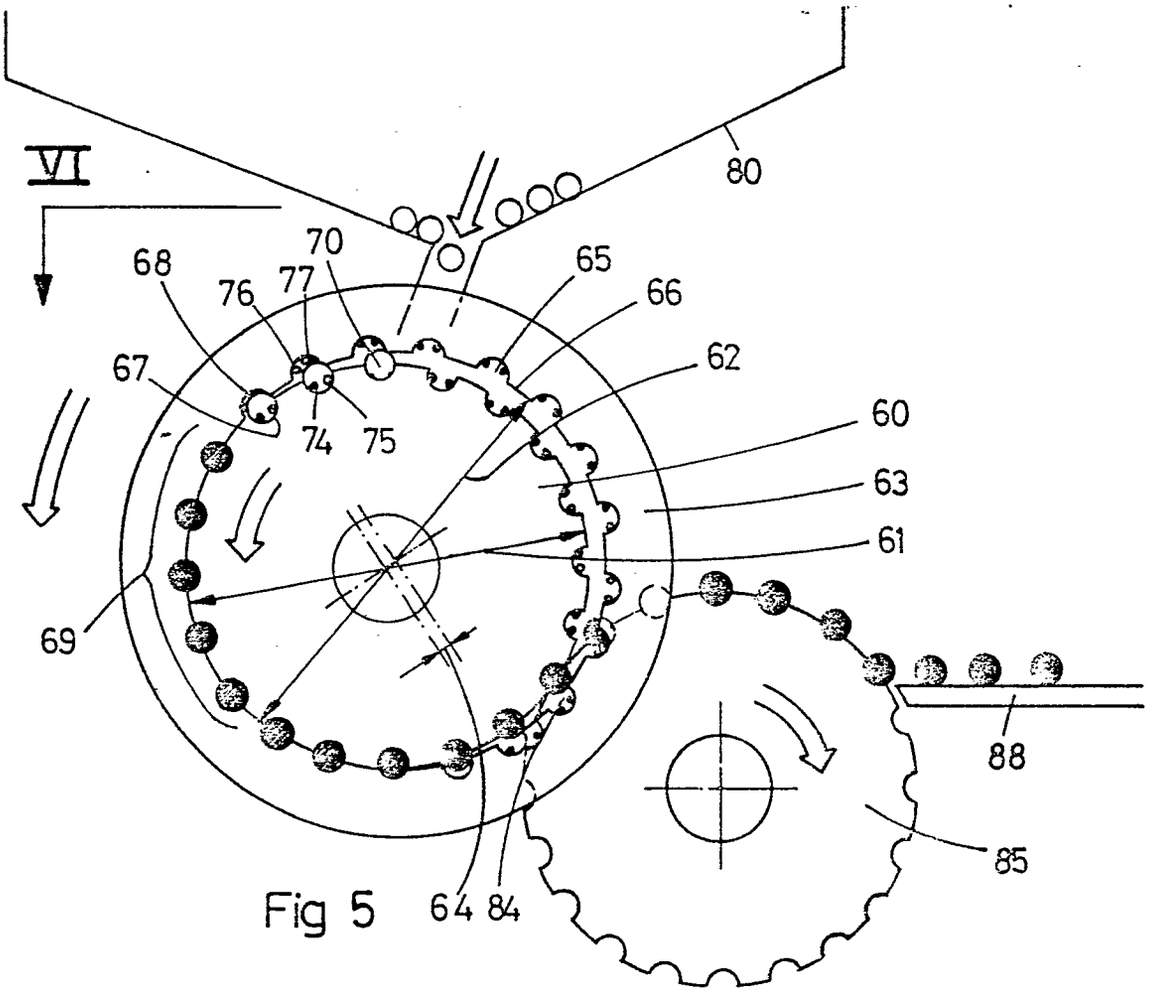

Fig 5

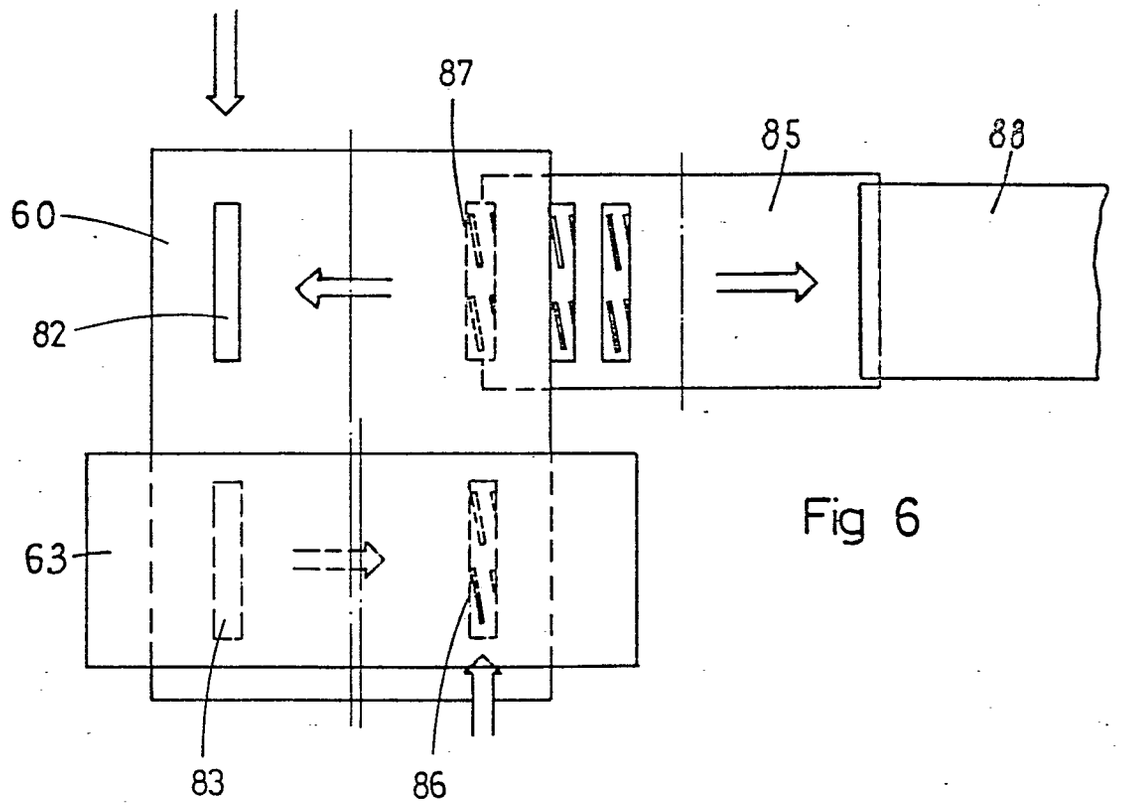

Fig 6

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EUROPEAN SEARCH REPORT

0059041
Application number

EP 82 30 0636

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	US-A-4 164 438 (BAUMGARTNER PAPIERS) *Figures 1-4; column 2, line 20 to column 3, line 56*	1	A 24 D 3/02
D,A	US-A-4 149 546 (LUKE) *Figures 1-3; column 3, line 20 to column 5, line 21*	1	
A	FR-A-2 078 771 (CIGARETTE COMPONENTS LTD.)		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

A 24 C
A 24 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24-05-1982	RIEGEL R.E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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