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NEW EUROPEAN PATENT SPECIFICATION

④⑤ Date of publication of the new patent specification: **13.07.88**

⑤① Int. Cl.⁴: **A 24 D 3/02**

②① Application number: **82300636.6**

②② Date of filing: **09.02.82**

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

③③ Priority: **14.02.81 DE 3105455**

④③ Date of publication of application: **01.09.82 Bulletin 82/35**

④⑤ Publication of the grant of the patent: **05.09.84 Bulletin 84/36**

④⑤ Mention of the opposition decision: **13.07.88 Bulletin 88/28**

③④ Designated Contracting States: **BE CH FR GB LI NL SE**

⑤③ References cited:
FR-A-2 078 771
US-A-4 149 546
US-A-4 164 438

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EP 0 059 041 B2

Description

The invention relates to apparatus for forming open channels or grooves in the periphery of filter elements for smokers requisites, the apparatus comprising two conveyors, one of which carries the elements continuously in a parallel disposition and both of which have a series of troughs each of which having disposed on the inside surface thereof heated embossing dies, the troughs cooperating in facing pairs to surround respective filter elements.

Such filter elements can be produced by extruding thermally deformable filter materials 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 impress 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.

US—A—4 164 438 discloses an apparatus for forming grooves in filter plugs for cigarettes, which apparatus has a first conveyor drum, provided with troughs around its circumference and a second conveyor drum also provided with troughs around its circumference, these troughs having embossing dies on their inside surfaces. The troughs are adapted to hold filter plugs. The first conveyor drum cooperates with a drum which transports the filter plugs into the troughs of the first conveyor drum. Longitudinal grooves are embossed into the filter plugs upon their transfer. Further longitudinal grooves are embossed into the filter plugs when the troughs of the first conveyor drum cooperate in facing pairs with the troughs of the second conveyor drum.

It is an object of the present invention to provide an 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 the invention the troughs on one conveyor are carried alongside those on the other conveyor through an embossing zone along respective paths therein that are parallel or curve in the same sense, each pair of troughs remaining closed after insertion of a filter element and while together carrying it through the embossing zone, and all the required number of channels or grooves being embossed simultaneously in the element during passage through the zone.

The invention makes it 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 retain 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 the 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 mouth-piece 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 mean 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:

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

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

Figure 3 is a partial section along the line III—III in Figure 1;

Figure 4 is a partial section along the line IV—IV in Figure 3;

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

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

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

According to Figure 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 Figure 4) are provided on their surfaces with elongated, heatable embossing dies 34, 35, 36, 37 which, as shown in Figure 3, do not extend over the entire length of an inserted end to some extent beyond the die 34. In the case shown, there 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 (Figure 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 Figure 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 Figure 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 Figures 2 to 4. Thus, the operation of Figures 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 Figure 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 embossing area 69, where they are embossed, and finally arrive at a transfer point 84 in the position indicated at 86 in Figure 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 Figures 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 two conveyors, one of which carries the elements continuously in a parallel disposition and both of which have a series of troughs each of which having disposed on the inside surface thereof heated embossing dies, the troughs cooperating in facing pairs to surround respective filter elements characterised in that the troughs on one conveyor are carried alongside those on the other conveyor through an embossing zone along respective paths therein that are parallel or curved in the same sense, each pair of troughs remaining closed after insertion of a filter element and while together carrying it through the embossing zone, and all the required number of channels or grooves being embossed simultaneously on the element during passage through the zone.

2. Apparatus according to claim 1, characterised in that a 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 on the periphery of each conveyor, with one side (21, 22) of each conveyor

facing the other conveyor in a generally parallel manner in the embossing zone (19), the conveyors being driveable synchronously.

4. Apparatus according to any of the preceding claims, characterised in that the embossing dies (34—37, 74—77) 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.

Patentansprüche

1. Apparat zum Bilden von Kanälen oder Nuten im Mantel von Filterelementen für Raucherbedarfsartikel, der zwei Förderer aufweist, wovon einer die Elemente kontinuierlich in einer Parallelanordnung trägt und beide eine Serie von Rinnen haben, die jede auf ihrer Innenseite erhitzte Prägestempel aufweisen und die zum Umfassen des entsprechenden Filterelementes einander paarweise gegenüberliegende, dadurch gekennzeichnet, dass die Rinnen des einen Förderers während dem Durchlauf einer Prägezone längs, respektive auf Wegen, die parallel zueinander verlaufen oder im gleichen Sinne gekrümmt sind, längsseits zu denjenigen des anderen Förderers gebracht sind, dass jedes Paar der Rinnen nach dem Einfügen eines Filterelementes und währenddem sie letzteres zusammen durch die Prägezone tragen, geschlossen bleibt, und dass während dem Durchlauf durch die Zone die verlangte Anzahl von Kanälen oder Nuten gleichzeitig prägbare sind.

2. Apparat nach Anspruch 1, dadurch gekennzeichnet, dass ein erste Förderer (60) eine drehbare Trommel ist, an deren Peripherie Rinnen (67) in achsparalleler Anordnung vorliegen, und dass der zweite Förderer (63) ein drehbarer Ring ist, an dessen Innenperipherie Rinnen (68) in achsparalleler Anordnung vorliegen, wobei der Ring einen Innendurchmesser (62) hat, der grösser ist als der Aussendurchmesser (61) der Trommel (60), wobei die Trommel innerhalb des Ringes exzentrisch versetzt angeordnet ist, so dass der Achsabstand die Hälfte der besagten Durchmesser beträgt, und synchron mit dem Ring drehbar ist.

3. Apparat nach Anspruch 1, dadurch gekennzeichnet, dass beide Förderer (1, 2) Förderbänder sind, die mit zueinander parallel an der Peripherie jedes Förderers angeordneten Rinnen (13—18) ausgerüstet sind, so dass in der Prägezone (19) eine Seite (21, 22) jedes Förderers dem anderen Förderer etwa in Parallelanordnung gegenüberliegt, wobei die Förderer synchron antreibbar sind.

4. Apparat nach einem der vorhergehenden

Ansprüche, dadurch gekennzeichnet, dass die Prägestempel (34—37, 74—77) Stifte sind, die sich parallel zur Achse (40) jedes Troges erstrecken.

5. Apparat nach einem der Ansprüche 1—3, dadurch gekennzeichnet, dass die Prägestempel (34—37, 74—77) Stifte sind, die sich nach Schraubenlinien, zur Achse jeder Rinne geneigt, erstrecken.

6. Apparat nach Anspruch 4 oder 5, dadurch gekennzeichnet, dass die Rinnen (31, 43) und (67, 68) zwei Doppellänge-Filterteile (23) aufnehmen können und dass die Prägestempel (34—37, 74—77) sich nur über Längen erstrecken, die dem zentralen Teil der eingesetzten Doppellänge-Filterteile entsprechen.

Revendications

1. Appareil pour former des canaux ouverts ou des rainures à la périphérie d'éléments filtrants pour produits à fumer, le dit appareil comprenant deux transporteurs, l'un des transporteurs étant agencé pour déplacer les éléments d'une manière continue dans une disposition parallèle et les deux transporteurs ayant une série de bacs, des poinçons d'étampage chauffés étant disposés sur la surface intérieure de chaque bac, les bacs coopérant par paires afin d'entourer les éléments filtrants, caractérisé en ce que les bacs d'un transporteur sont entraînés à côté des bacs de l'autre transporteur à travers une zone d'étampage, les chemins respectifs des transporteurs dans cette zone étant parallèles ou incurvés dans le même sens, chaque paire de bacs coopérant après l'introduction d'un élément filtrant et durant le passage dans la zone d'étampage, tous les canaux ouverts et les creusures nécessaires étant étampées simultanément sur l'élément durant le passage à travers la dite zone.

2. Appareil selon la revendication 1, caractérisé en ce qu'un premier organe transporteur (60) est

un tambour rotatif portant les bacs (67) répartis sur sa périphérie, parallèlement à son axe de rotation, et en ce que le second organe transporteur (63) est un anneau rotatif portant les bacs (68) répartis parallèlement sur sa surface interne, le dit anneau ayant un diamètre interne (62) supérieur au diamètre externe (61) du tambour (60), et ce dernier étant monté excentriquement dans l'anneau, ayant son axe décalé par rapport à celui de l'anneau d'une distance égale à la moitié de la différence entre les dits diamètres, et étant mobile en rotation en synchronisme avec l'anneau.

3. Appareil selon la revendication 1, caractérisé en ce que les deux organes transporteurs sont des courroies (1, 2) équipées de bacs (13—18) disposés parallèlement les uns aux autres sur le pourtour de chaque organe transporteur, un des côtés (21, 22) de chaque organe transporteur s'étendant face à l'autre organe transporteur et parallèlement à celui-ci dans la zone d'étampage (19), les organes transporteurs étant susceptibles d'être entraînés en synchronisme.

4. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que les poinçons d'étampage (34—37, 74—77) sont des barres disposées parallèlement à l'axe de chaque bac.

5. Appareil selon l'une quelconque des revendications 1 à 3, caractérisé en ce que les poinçons d'étampage (34—37, 74—77) sont des barres de forme hélicoïdale, s'étendant obliquement par rapport à l'axe de chaque bac.

6. Appareil selon la revendication 4 ou la revendication 5, caractérisé en ce que les bacs (31, 32) et (67, 68) sont agencés pour recevoir deux doubles éléments filtrants (23) et en ce que les poinçons d'étampage (34—37) et (74—77) ne s'étendent que sur des longueurs correspondant à la partie centrale des doubles éléments filtrants engagés dans les bacs.

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