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Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

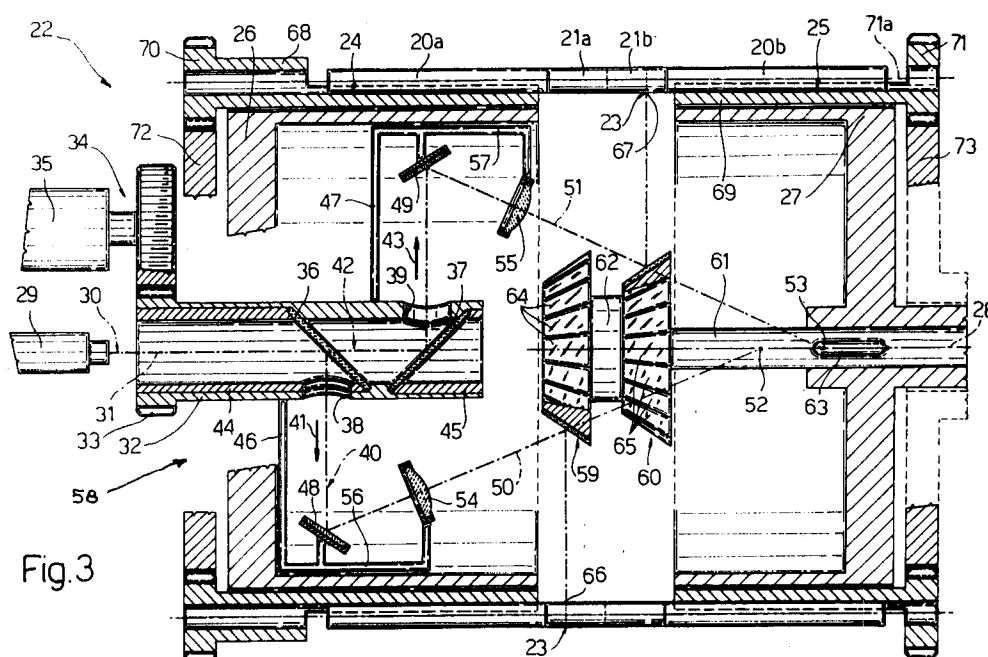
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EUROPEAN PATENT APPLICATION(21) Application number: **94120605.4**(51) Int. Cl.⁶: **A24C 5/60**(22) Date of filing: **23.12.94**(30) Priority: **23.12.93 IT BO930519**(43) Date of publication of application:
28.06.95 Bulletin 95/26(84) Designated Contracting States:
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I-10121 Torino (IT)(54) **Method and machine for producing ventilated cigarettes.**

(57) A method and machine whereby a succession of double cigarettes (15), each consisting of two cigarette portions (5) connected by a double filter (6), is fed, in a direction perpendicular to the longitudinal axis of the double cigarettes (15), through a cutting unit (17) wherein each double cigarette (15) is cut

into two single cigarettes (20) which are fed through a perforating unit (22) before being separated axially, and, as they are being perforated, are rotated about their axes (71a) by respective rotation devices (68, 69).

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The present invention relates to a method of producing ventilated cigarettes.

So-called "ventilated" cigarettes are produced using perforating devices normally forming part of a filter assembly machine, and the perforating "tool" of which consists of a focused laser beam.

On filter assembly machines of the type described, for example, in British Patent n. 2241866, filter-tipped cigarettes are produced from a succession of first tobacco items consisting of double cigarette portions which, traveling transversely through a first cutting station along the path defined by the filter assembly machine, are each cut into two single portions to form a first and second orderly succession traveling side by side and parallel to each other. At a rolling station along the path, each portion in one of the two successions is connected to a corresponding portion in the other succession to form a second tobacco item hereinafter referred to as a "double cigarette". Each double cigarette consists of two cigarette portions separated by a double filter connected integral with the two portions by a band, the central portion of which surrounds the double filter, and the end portions of which each surround the end of a respective cigarette portion.

According to the above British patent, the double cigarettes so formed are then fed successively through a second cutting station where they are cut transversely into half to form two successions of third tobacco items consisting of oppositely-oriented single cigarettes. That is, downstream from the cutting station, the single cigarettes in each pair formed by cutting each double cigarette are arranged with their filters facing and substantially contacting each other.

According to the above British patent, the two successions of filter-tipped cigarettes are then fed along said path to a turnover station where each cigarette in one succession is turned over and fed into the gap between two adjacent cigarettes in the other succession to form a single succession of equioriented cigarettes.

On a filter assembly machine of the above type, the perforating device mentioned previously is normally of the type described, for example, in US Patent n. 5,105,833, and is associated with a feed roller downstream from the turnover station, for forming ventilation holes through the filter connecting bands of the cigarettes in said single succession of equioriented cigarettes.

Though theoretically feasible, forming ventilation holes in the cigarettes downstream from the turnover station in actual fact poses serious problems. As modern filter assembly machines are capable of producing over ten thousand cigarettes a minute, which are fed past the perforating device in one succession, and as each cigarette is normally

provided with at least twenty ventilation holes, the laser source capable of handling such a job is not only relatively expensive but also relatively bulky.

To overcome the above drawback, Patent DE OS 41 08 166, for example, relates to a filter assembly machine wherein the ventilation holes are formed in the double cigarettes by a laser device designed to emit pairs of pulsed focused laser beams and located at a further perforating station wherein the double cigarettes are rotated about their axis.

While effectively halving the pulse frequency of the laser device, such a method presents serious drawbacks in that a double cigarette, both on account of its length and the fact that the double filter being perforated forms the intermediate portion of it, cannot be rotated by other than rolling which, as is known, seriously damages the cigarettes.

It is an object of the present invention to provide a straightforward, relatively low-cost method of producing ventilated cigarettes, designed to overcome the above drawbacks.

According to the present invention, there is provided a method of producing ventilated cigarettes, the method comprising the steps of feeding a succession of groups, each consisting of two cigarette portions connected by a double filter, along a given path and in a direction perpendicular to the longitudinal axis of the groups; making the two cigarette portions and the double filter in each group integral with one another by means of a respective wrap-around band to form a double cigarette; cutting the double cigarettes to obtain two successions of single cigarettes presenting filters facing and substantially contacting each other; turning over one of the two successions so that the relative single cigarettes are aligned with and equioriented in relation to the single cigarettes in the other succession; and forming ventilation holes in the single cigarettes to obtain ventilated cigarettes; the method being characterized in that the perforating step is performed after the double cigarette cutting step and prior to the turnover step, to form said ventilation holes in pairs of single cigarettes with the filters facing and substantially contacting each other.

The perforating step in the above method is preferably performed on pairs of cigarettes wherein each single cigarette in each pair is rotated about its axis independently of the other single cigarette in the pair.

The present invention also relates to a machine for producing ventilated cigarettes.

According to the present invention, there is provided a machine for producing ventilated cigarettes, the machine comprising transfer means for feeding a succession of groups, each consisting of two cigarette portions connected by a double filter,

in a direction perpendicular to the longitudinal axis of the groups and along a given path; rolling means for making the two cigarette portions and respective double filter integral with one another by means of a respective wrap-around band and so forming a respective double cigarette; cutting means for cutting the double cigarettes and so forming two successions of single cigarettes presenting filters facing and substantially contacting each other; turnover means for turning over one of the two successions so that the relative single cigarettes are aligned with and equioriented in relation to the single cigarettes in the other succession; and perforating means for forming ventilation holes in the single cigarettes to obtain ventilated cigarettes; the machine being characterized in that the perforating means are located along said path, downstream from the cutting means and upstream from the turnover means, in such a position as to form said ventilation holes in pairs of single cigarettes with the filters facing and still substantially contacting each other.

Preferably, the perforating means of the above machine comprise conveyor means for feeding said pairs of single cigarettes along part of said path; said conveyor means comprising, for the single cigarettes in each said pair, a first and second support aligned along a common axis and substantially independent of each other, and actuating means for rotating said supports about said common axis.

A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic view in perspective, with parts removed for clarity, of a preferred embodiment of the machine according to the present invention;

Figure 2 shows a schematic view in perspective of a detail of the Figure 1 machine;

Figure 3 shows an axial section of the Figure 2 detail, with parts removed for clarity.

Number 1 in Figure 1 indicates a filter assembly machine, the intermediate portion 2 of which comprises an input roller 3 supplied, by known devices not shown, with a succession of groups 4, each consisting of two cigarette portions 5 and a double filter 6 interposed between portions 5.

As it turns about its axis 7, roller 3 feeds groups 4 transversely to their longitudinal axis, and along the initial portion of a path B extending along the whole of machine 1, on to a roller 8 parallel to roller 3 and rotating at constant angular speed about its axis 9 and in the opposite direction to roller 3. Roller 8 constitutes the input roller of a finishing unit 10 which, in addition to roller 8, also comprises two cascade rollers 11 and 12 for sup-

plying roller 8 with a succession of bands 13, each of which provides for making portions 5 and double filter 6 in each group 4 integral with one another. Unit 10 also comprises a rolling unit 14 for successively receiving groups 4 and bands 13, for rolling each band 13 about respective double filter 6 and the facing end portions of respective cigarette portions 5 to form a double cigarette 15, and for feeding double cigarettes 15 on to the roller 16 of a cutting unit 17.

Cutting unit 17 is located along path B, and provides for cutting double cigarettes 15 in half to form two successions 18 and 19 of single cigarettes 20, indicated respectively 20a and 20b, arranged side by side and oppositely oriented, i.e. with their filters 21a and 21b facing and substantially contacting each other.

Successions 18 and 19 are transferred from roller 16 to a perforating unit 22 located along path B and which provides for forming a ring of ventilation holes 23 (Figures 2 and 3) in cigarettes 20a and 20b in each pair of coaxial cigarettes 20.

As shown in Figures 2 and 3, cigarettes 20a and 20b are partially housed inside respective peripheral seats 24 and 25 of two feed drums 26 and 27, which are arranged facing and angularly integral with each other, and are both rotated by a motor (not shown) at a preferably constant first angular speed V1 about a common axis 28 parallel to axis 7.

In addition to drums 26 and 27, perforating unit 22 also comprises a preferably continuous laser source 29 for emitting a beam 30 along an axis 31 substantially coincident with axis 28; and a tubular body 32 mounted for rotation about its axis coincident with axis 31, and housed partially inside drum 26. On the end facing source 29, body 32 presents an outer ring gear 33 meshing with the transmission 34 of a motor 35 for imparting to body 32 an adjustable second angular speed V2. Close to the end opposite that fitted with ring gear 33, body 32 is fitted inside with a semitransparent mirror 36 and a total reflection mirror 37, which are arranged in series along axis 31, as of source 29, and are so inclined as to direct beam 30 through two radially-opposite, axially-offset holes 38 and 39 formed in the wall of body 32. Being semitransparent, mirror 36 reflects a first fraction 40 of beam 30 in a first radial direction 41 substantially perpendicular to axis 31, and allows a second fraction 42 to proceed along axis 31 where it is reflected by mirror 37 in a second radial direction 43 diametrically opposite direction 41 and substantially perpendicular to axis 31. Mirrors 36 and 37 are maintained in their respective positions by two bushes 44 and 45 housed inside and coaxial and integral with body 32.

From the end of body 32 housed inside drum 26, there extend radially outwards two arms 46 and 47 supporting respective mirrors 48 and 49 for respectively intercepting beam 40 from hole 38 and beam 42 from hole 39, and which are so inclined as to reflect respective beams 40 and 42 along respective axes 50 and 51 directed towards respective points 52 and 53 of axis 28. Axes 50 and 51 coincide respectively with the optical axes of two focusing lenses 54 and 55 fitted to respective arms 56 and 57 respectively integral with arms 46 and 47. Lenses 54 and 55 provide for focusing beams 40 and 42 at two points or focuses which, if the focused beams were not deviated further, would substantially coincide with points 52 and 53 for any angular position, about axis 31, of a movable assembly indicated as a whole by 58 and comprising tubular body 32, arms 46, 47, 56, 57, mirrors 36, 37, 48, 49, and lenses 54, 55.

Unit 22 also comprises two reflecting elements 59 and 60, each in the form of a truncated regular pyramid coaxial with axis 28 and with its apex facing body 32. Reflecting elements 59 and 60 are fitted to a shaft 61 which is also fitted with a spacer 62 interposed between reflecting elements 59 and 60, and is connected to drum 27 by means of a tongue 63 so as to rotate about axis 28 at the same angular speed as drums 26 and 27.

Reflecting elements 59 and 60 each present a number of faces equal to the number of respective seats 24 and 25, and presenting respective reflecting surfaces or mirrors 64 and 65 for intercepting and reflecting focused beams 40 and 42 radially outwards and forming reflected focuses 66 and 67 located, in use, on the surface of respective filters 21a and 21b projecting from respective seats 24 and 25 housing the rest of respective cigarettes 20a and 20b.

As shown in Figure 3, seats 24 and 25 are each formed in respective gondolas 68 and 69 parallel to axis 28, connected for rotation to respective drums 26 and 27, and integral and coaxial with respective gears 70 and 71 rotating about a common axis 71a coincident with the common axis of the two cigarettes 20a and 20b housed, in use, inside seats 24 and 25. Gears 70 all mesh with a central ring gear 72, while gears 71 all mesh with a ring gear 73 coaxial with ring gear 72 and axis 31, and which, together with ring gear 72, is rotated by known drive means (not shown) about axis 31 at such an angular speed V3 as to impart a given angular speed V4 to seats 24 and 25 and rotate cigarettes 20a and 20b about their respective axes as they are fed by drums 26 and 27 about axis 28.

The relationship between speeds V1, V2, V3 and V4, and, in general, operation of unit 22 for forming two successions 74 and 75 of ventilated cigarettes 76a and 76b, are as described in afore-

mentioned US Patent n. 5,105,833 to which full reference is made herein in the interest of full disclosure.

As shown in Figure 1, successions 74 and 75 are transferred from drums 26 and 27 to a roller 77 by which they are transferred to a known turnover unit 78 located along path B, and which provides for turning each cigarette 76b in succession 75 over on to the opposite side of respective cigarette 76a in succession 74, and into a position wherein it is equioriented and axially spaced in relation to cigarette 76a.

The two successions 74 and 75 of equioriented, spaced cigarettes 76a and 76b are then fed to the input roller 79 of the output portion (not shown) of machine 1.

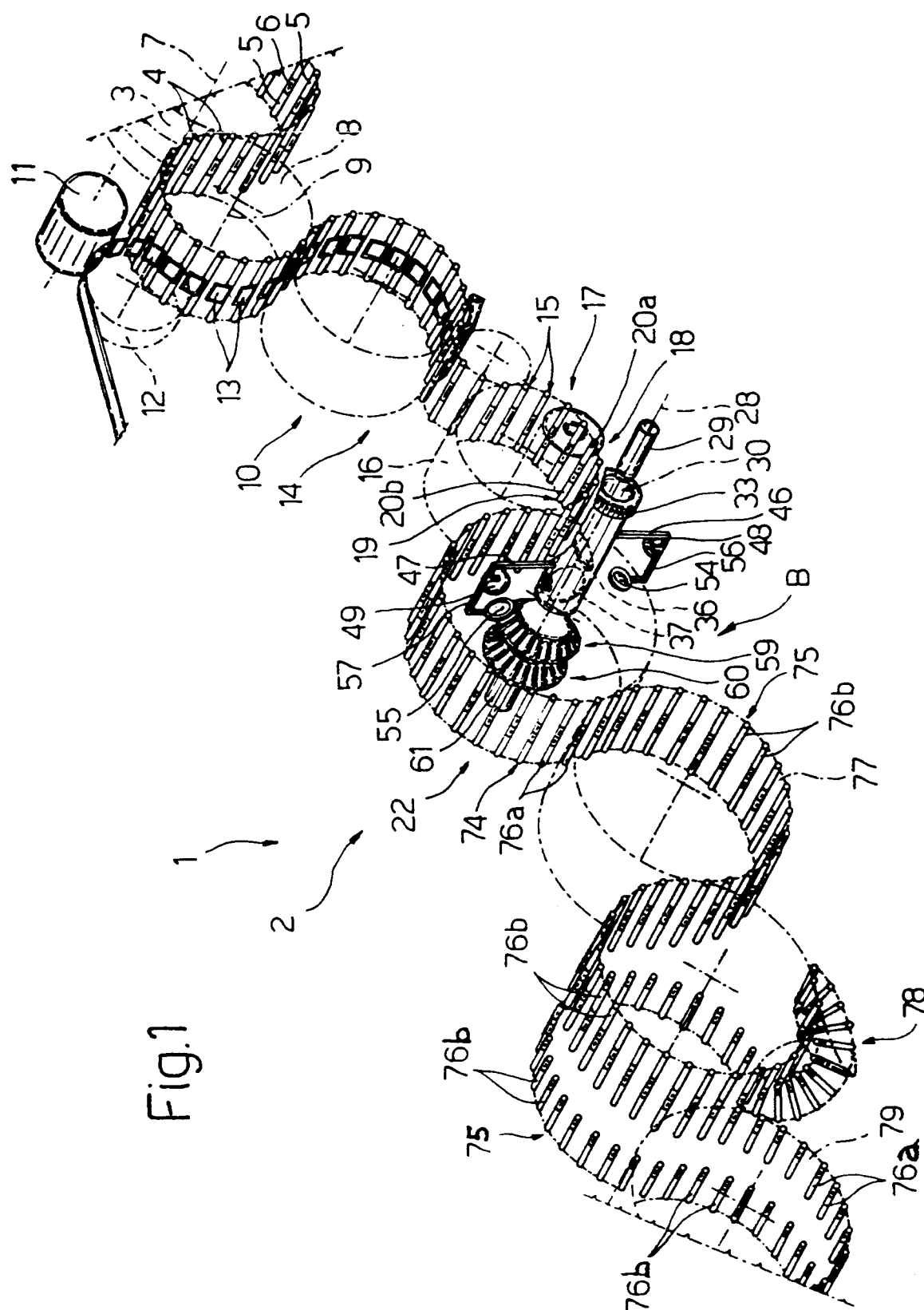
By virtue of being located immediately downstream from cutting unit 17 but upstream from turnover and spacing unit 78 along path B, perforating unit 22 therefore provides not only for forming rings of holes 23 at half the pulse frequency of source 29 required for forming them in cigarettes 20 in a single succession, but also for supporting cigarettes 20a and 20b in each pair of coaxial cigarettes 20 on respective rotary gondolas 68 and 69 by which cigarettes 20a and 20b are rotated, without rolling, about their respective axes.

In connection with the above, it should be pointed out that cutting double cigarette 15 into cigarettes 20a and 20b by means of cutting unit 17 is essential for employing gondolas 68 and 69, in that even the slightest difference, due for example to inevitable manufacturing tolerances, in the instantaneous angular positions of two coaxial gondolas 68 and 69 would inevitably result in twisting and tearing of a double cigarette 15.

Claims

1. A method of producing ventilated cigarettes (76), the method comprising the steps of feeding a succession of groups (4), each consisting of two cigarette portions (5) connected by a double filter (6), along a given path (B) and in a direction perpendicular to the longitudinal axis of the groups (4); making the two cigarette portions (5) and the double filter (6) in each group (4) integral with one another by means of a respective wrap-around band (13) to form a double cigarette (15); cutting the double cigarettes (15) to obtain two successions (18, 19; 74, 75) of single cigarettes (20) presenting filters (21) facing and substantially contacting each other; turning over one (75) of the two successions (74, 75) so that the relative single cigarettes are aligned with and equioriented in relation to the single cigarettes in the other succession (74); and forming ventilation holes

- in the single cigarettes (20) to obtain ventilated cigarettes (76); the method being characterized in that the perforating step is performed after the double cigarette cutting step and prior to the turnover step, to form said ventilation holes in pairs of single cigarettes (20) with the filters (21) facing and substantially contacting each other.
2. A method as claimed in Claim 1, characterized in that the perforating step is performed on pairs of cigarettes (20) wherein each single cigarette (20) in each pair is rotated about its axis (71a) independently of the other single cigarette (20) in the pair.
 3. A method as claimed in Claim 1 or 2, characterized in that the perforating step is performed by means of a laser beam (30) which is divided into two focused laser beams (40, 42) for simultaneously perforating the single cigarettes (20) in both successions (18, 19) of single cigarettes (20).
 4. A machine for producing ventilated cigarettes (76), the machine comprising transfer means for feeding a succession of groups (4), each consisting of two cigarette portions (5) connected by a double filter (6), in a direction perpendicular to the longitudinal axis of the groups (4) and along a given path (B); rolling means (14) for making the two cigarette portions (5) and respective double filter (6) integral with one another by means of a respective wrap-around band (13) and so forming a respective double cigarette (15); cutting means (17) for cutting the double cigarettes (15) and so forming two successions (18, 19; 74, 75) of single cigarettes (20) presenting filters (21) facing and substantially contacting each other; turnover means (78) for turning over one (75) of the two successions (74, 75) so that the relative single cigarettes are aligned with and equioriented in relation to the single cigarettes in the other succession; and perforating means (22) for forming ventilation holes in the single cigarettes (20) to obtain ventilated cigarettes (76); the machine being characterized in that the perforating means (22) are located along said path (B), downstream from the cutting means (17) and upstream from the turnover means (78), in such a position as to form said ventilation holes in pairs of single cigarettes (20) with the filters (21) facing and still substantially contacting each other.
 5. A machine as claimed in Claim 4, characterized in that the perforating means (22) comprise conveyor means (26, 27) for feeding said pairs of single cigarettes (20) along part of said path (B); said conveyor means (26, 27) comprising, for the single cigarettes (20) in each said pair, a first and second support (68, 69) aligned along a common axis (71a) and substantially independent of each other; and actuating means (70, 72; 71, 73) for rotating said supports (68, 69) about said common axis (71a).
 6. A machine as claimed in Claim 5, characterized in that said conveyor means comprise two drums (26, 27) fitted respectively with said first and second supports (68, 69) and rotating about a common axis (28) parallel to the axes (71a) of the supports (68, 69).
 7. A machine as claimed in Claim 6, characterized in that the perforating means (22) also comprise a laser source (29) for emitting a first laser beam (30) along the axis (28) of said two drums (26, 27); dividing means (36) for dividing said first laser beam (30) into a second and third laser beam (40, 42); a movable reflecting and focusing assembly (58) for focusing said second and third laser beams (40, 42) substantially at respective fixed points (52, 53) along the axis (28) of the two drums (26, 27); and reflecting means (59, 60) for directing, in use, said second and third laser beams (40, 42) on to said single cigarettes (20).
 8. A machine as claimed in Claim 7, characterized in that said reflecting means (59, 60) comprise two distinct reflecting devices (59, 60) coaxial with each other along the axis (28) of said drums (26, 27).



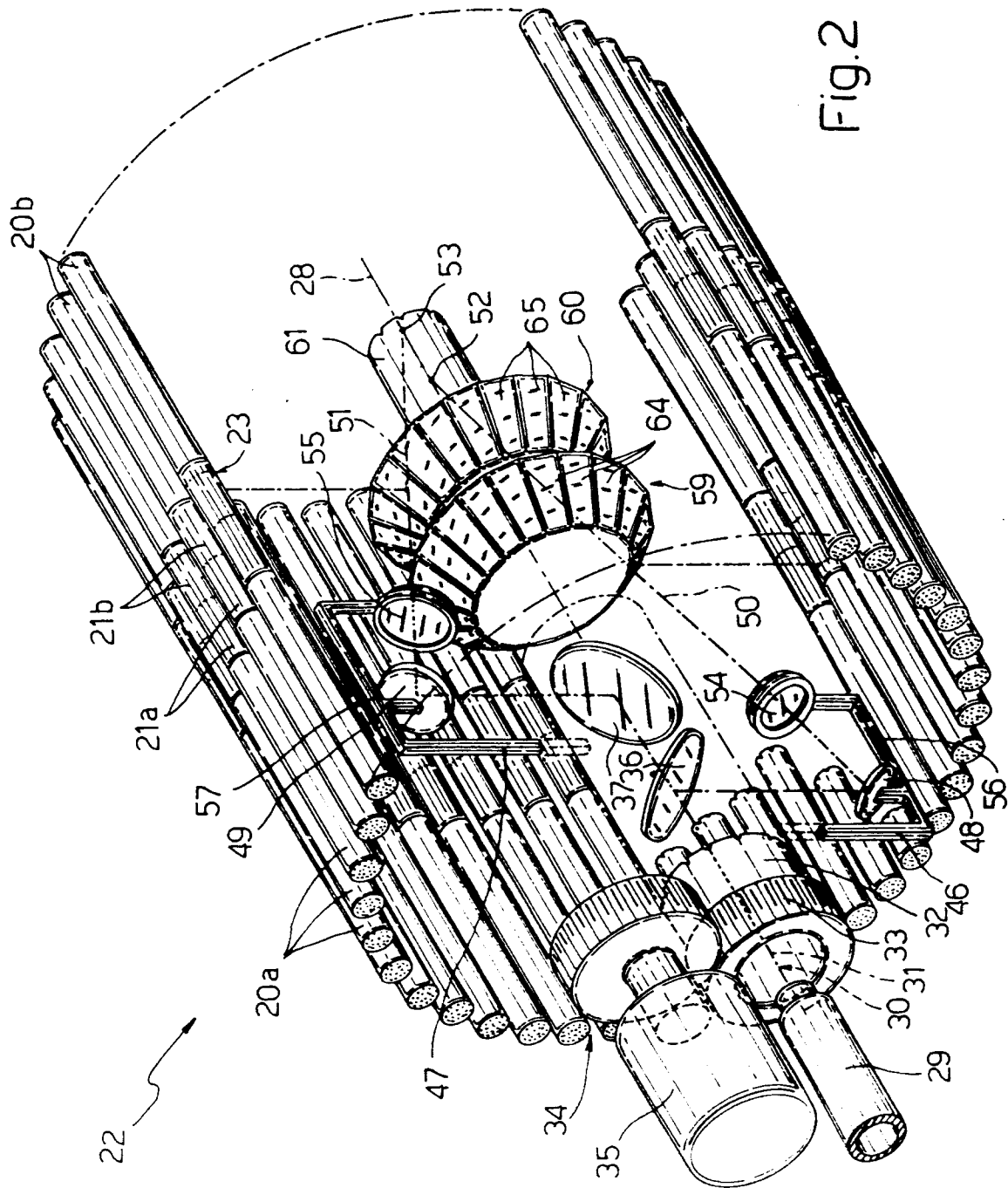
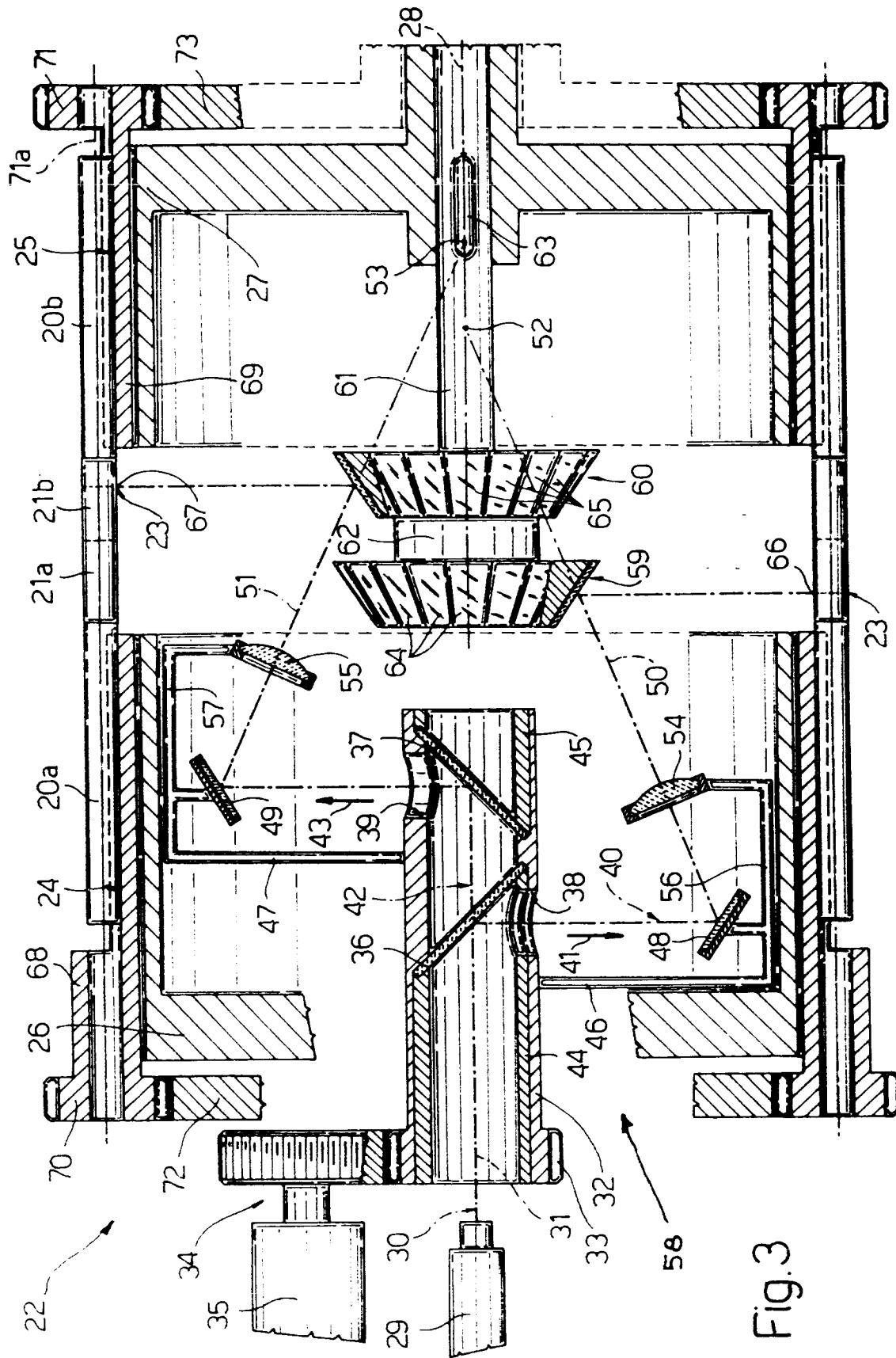


Fig. 2





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 94 12 0605

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.6)
A	GB-A-2 230 688 (MOLINS PLC) * page 19, line 7 - page 20, line 2; figures 6-8 * ---	1-6	A24C5/60
A	FR-A-2 403 034 (HAUNI-WERKE KORBER) * page 12, line 25 - page 15, line 7; figures 14,15 * ---	1,4,7,8	
A	GB-A-2 219 485 (MOLINS PLC) * the whole document * ---	1,4	
A,D	US-A-5 105 833 (MATTEI) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A24C B23K
Place of search THE HAGUE		Date of completion of the search 31 March 1995	Examiner Riegel, R
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