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

(11) **EP 1 800 552 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.06.2007 Bulletin 2007/26

(51) Int Cl.:
A24C 5/32 *(2006.01)*

(21) Application number: **06126672.2**

(22) Date of filing: **20.12.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **22.12.2005 IT BO20050779**

(71) Applicant: **G.D.S.p.A.**
I-40133 Bologna (IT)

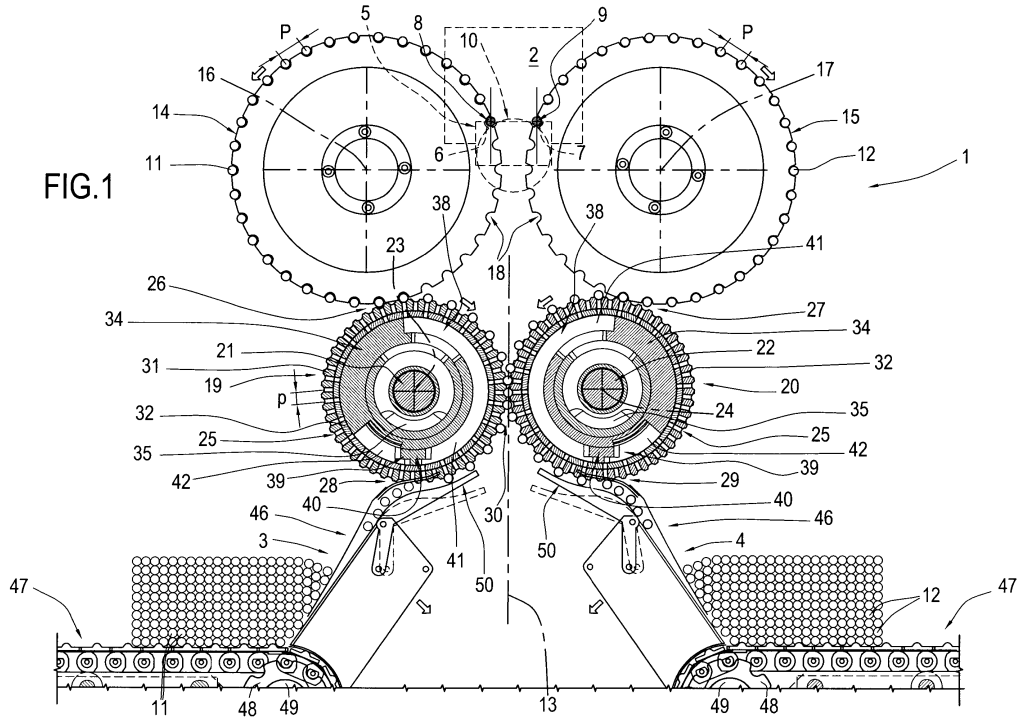
(72) Inventors:
- **Draghetti, Fiorenzo**
  40059, Medicina (Bologna) (IT)
- **Eusepi, Ivan**
  40013, Castelmaggiore (Bologna) (IT)
- **Montanari, Andrea**
  41052, Guiglia (Modena) (IT)

(74) Representative: **Ghioni, Carlo Raoul Maria**
Bugnion S.p.A.
Via Goito, 18
40126 Bologna (IT)

(54) **A unit for conveying tobacco products**

(57) Filter plugs or sticks are directed from a filter maker onto a pair of conveyor rollers (19, 20) counter-rotating substantially in contact one with another at a point of tangency (30) and furnished with equispaced peripheral flutes (25) by which the single sticks (11, 12) are taken up and transferred from an infeed position (26, 27) to a release position (28, 29). The flutes (25) occupying a limited sector (41) of each roller (19, 20) are connected selectively to a source of suction by an internal valve mechanism (32, 39) composed of a slide (40) positionable to set the width of the sector (41), and a selector sleeve (32) slidable axially between operating positions in which suction is generated across the sector (41) through flutes (25) spaced apart respectively at a longer pitch (P), and at a shorter pitch (p) equivalent to half of the longer pitch (P).

FIG.1



EP 1 800 552 A1

Description

[0001] The present invention relates to a unit for conveying tobacco products.

[0002] The prior art embraces manufacturing systems for tobacco products that comprise a transfer conveyor unit interposed between a production machine such as a filter maker, for example, and a user machine that might be a filter tip attachment machine, or an assembler of composite filters, that is to say filters consisting in a combination of filter plugs having different filtration properties.

[0003] A conveyor unit of the aforementioned type would serve in this instance to transfer filter sticks or plugs, and will feed the sticks or plugs to the user machine either directly or employing temporary storage containers.

[0004] Thus, in the case of a twin-track type of filter maker, the two tracks will be connected by two conveyor units to respective filter tip attachment machines, or possibly to two infeed points of a single machine assembling composite filters.

[0005] The object of the present invention is to provide a unit for conveying tobacco products that will be extremely compact, versatile, and effective in the same measure when connecting either a one-track or a twin-track maker to either a single user machine or a plurality of user machines.

[0006] The stated object is realized in a unit according to the invention for conveying tobacco products, as recited and characterized in one or more of the appended claims.

[0007] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 shows a unit for conveying tobacco products according to the present invention, illustrated schematically in a front elevation view with certain parts omitted and others in section;
- figures 2 and 3 are schematic front elevation views of the unit for conveying tobacco products as in figure 1, shown enlarged and in two different operating positions;
- figures 4a and 4b show a detail of figure 3 in a section on IV-IV;
- figure 5 shows a detail of the conveyor unit as in figures 1 to 4, viewed in perspective.

[0008] Referring to figure 1, numeral 1 denotes a unit for conveying tobacco products, in its entirety, interposed between a production machine 2 turning out filter sticks or plugs, shown schematically as a block, and receiving means denoted 3 and 4.

[0009] The production machine 2 is a twin-track filter maker, that is, a type having a garniture tongue 5 with two channels 6 and 7 extending side by side, along which respective continuous filter rods 8 and 9 are formed, and a rotary cutter 10 by which the two rods are divided respectively into discrete lengths consisting in filter sticks 11 and 12, for example.

[0010] The conveyor unit 1 presents a structure disposed symmetrically on either side of a vertical plane 13 parallel with and equidistant from the channels 6 and 7, and comprises rotary conveyor means placed to take up and feed the filter sticks 11 and 12, embodied as a pair of rollers 14 and 15 rotatable anticlockwise and clockwise, respectively, about corresponding horizontal axes 16 and 17 parallel to the vertical plane 13.

[0011] Each of the two rollers 14 and 15 is furnished peripherally with aspirating flutes 18 equispaced one from the next at a predetermined pitch P, into which respective sticks 11 and 12 are directed singly and in succession from the runout end of the tongue 5.

[0012] The unit 1 comprises further rotary conveyors consisting in a second pair of rollers 19 and 20, identical one with another, mounted on shafts 21 and 22 of which the axes 23 and 24 extend parallel to the axes 16 and 17 of the feed rollers 14 and 15, and rotatable thus clockwise and anticlockwise, respectively, at the same tangential speed as the aforementioned rollers 14 and 15.

[0013] The two rollers 19 and 20, furnished peripherally with flutes 25 equispaced one from the next at a pitch p equivalent to half the pitch P of the flutes 18 aforementioned, are located respectively between the feed rollers 14 and 15 on the one hand, with which a substantially tangential interface is established at infeed positions denoted 26 and 27, and on the other, positions 28 and 29 at which the sticks 11 and 12 are released to the aforementioned receiving means 3 and 4.

[0014] The two second rollers 19 and 20 also rotate substantially tangential one to another at a point denoted 30 and are positioned angularly on the respective shafts 21 and 22 in such a way that the single flutes 25 of the one roller 19 will align in succession with the single flutes 25 of the other roller 20 at the point of tangency 30.

[0015] Referring also to figures 4a and 4b, each of the two rollers 19 and 20 comprises two rotary members carried in rotation by the relative shaft 21 and 22, and more exactly an outer sleeve 31 affording the flutes 25, and an inner sleeve 32 constituting distribution means. Each shaft 21 and 22 also carries two fixed cylindrical elements 33 and 34 concentric one with another.

[0016] As discernible in figures 1 to 3, the innermost cylindrical element 33 communicates by way of a duct 35 with a source of negative pressure (not illustrated) and is furnished with a through radial slot 36 directed toward the relative infeed position 26 and 27.

[0017] The outer cylindrical element 34 is fashioned with a radial slot 37 placed to coincide with the slot 36 of the inner element, and functions as the inner wall of a chamber 38 that extends angularly from a point coinciding with the infeed position 26 or 27, through an arc of between 180° and 270°, and is delimited externally by the inner cylindrical surface of the distribution sleeve 32.

[0018] Numeral 39 denotes valve means consisting in a vane or slide 40 riding against the internal cylindrical

surface of the distribution sleeve 32 and positionable thus within the chamber 38.

[0019] Thus, the chamber 38 is divided into a first portion or sector 41, compassed between the infeed position 26 or 27 and the slide 40 and connected directly to the aforementioned negative pressure source by way of the slots 36 and 37, and a second portion or sector 42 located downstream of the slide 40, relative to the direction of rotation of the roller 19 or 20, which remains at atmospheric pressure as will become clear in due course.

[0020] Referring again to figures 4a and 4b, each of the peripheral flutes 25 is furnished with two holes 43 located at points near to its two ends, set apart one from another at a distance denoted d, whilst the inner or distribution sleeve 32 (figure 5) presents a first set of holes 44 ordered in pairs axially aligned and set apart at the aforementioned distance d, and a second set of holes 45 ordered in pairs set apart likewise one from another by the same distance d, and offset axially by a given distance from the holes 44 of the first set.

[0021] The paired holes 44 of the first set are arranged on the inner sleeve 32 equispaced angularly at a selected pitch P, whilst the paired holes 45 of the second set are equispaced at a pitch p equivalent to half the aforementioned pitch P.

[0022] The inner sleeve 32 is mounted to the relative shaft 21 or 22 with freedom of axial sliding movement, induced by actuator means of conventional type (not illustrated), and positionable thus in such a manner as to bring about a first coupling between the two holes 43 in every second flute 25 of the outer sleeve 31 and each pair of holes 44 of the first set, spaced at pitch P (see figure 4a), or alternatively, a second coupling between the two holes 43 in each and every flute 25 of the outer sleeve 31 and each pair of holes 45 of the second set, spaced at pitch p (see figure 4b).

[0023] Consequently, with the roller 19 or 20 set in rotation, in the case of the second coupling, all of the flutes 25 are connected to the negative pressure source when aligned on the first sector 41 of the chamber 38, whereas in the case of the first coupling, the connection with negative pressure will occur by way only of every second flute 25, when aligned on the selfsame first sector 41.

[0024] The valve means 39 combine with the distribution means 32 to create a device by which the flutes 25 are connected selectively to the source of negative pressure.

[0025] In the operating configuration of figure 1, the slides 40 of the two rollers 19 and 20 are positioned at the respective release positions 28 and 29, and the distribution sleeves 32 of the rollers 19 and 20 are positioned as in figure 4a, in such a manner as to bring about the first coupling, that is to say with every second flute 25 connected to the source of negative pressure.

[0026] In addition, the inner sleeves 32 of the two rollers 19 and 20 are positioned angularly relative one to another on the respective shafts 21 and 22 in such a way that when passing through the point of tangency 30, under normal operating conditions, each aspirating flute 25 of the one roller 19 or 20 will align with a non-aspirating flute 25 of the other roller 20 or 19.

[0027] In this situation, the filter sticks 11 and 12 taken up onto the rollers 19 and 20 at the infeed positions 26 and 27 are transferred beyond the point of tangency 30, with no mutual interference occurring between the two flutes 25 meeting at the selfsame point, and toward the release positions 28 and 29, where the positioning of the slides 40, each delimiting the aspirating first sector 41 of the relative chamber 38, is such as to shut off the connection between the flutes 25 and the source of negative pressure.

[0028] At this juncture, the filter sticks 11 and 12 are transferred respectively to the receiving means 3 and 4, each of which comprises an inclined chute 46 emptying onto a relative horizontal conveyor 47 along which the filter sticks will accumulate en masse.

[0029] Each conveyor 47 is looped at the ends around respective timing pulleys 48 of which one only, turning on a relative shaft 49, is indicated in figure 1.

[0030] More exactly, each chute 46 is furnished at the infeed end with a pivotable guide 50 hinged by a free top end to an inclined wall 51 forming part of the chute 46 and hinged in its turn about an axis parallel to the axis of the pulley shaft 49.

[0031] In the event of a blockage forming at the release positions 28 and 29 during normal operation, the guide 50 rocks on its pivot, tripping sensors of conventional type (not illustrated) that will cause the unit 1 to shut down.

[0032] The operating configuration shown in figure 2 differs from that of figure 1 in that the inner sleeve 32 of one roller 19 is in the aforementioned second coupling position, whereby the two holes 43 of every flute 25 are matched with each pair of holes 45 of the second set, at the shorter pitch p (see figure 4b), and the slide 40 is located at the release position 28.

[0033] In the case of the other roller 20, the inner sleeve 32 occupies the first coupling position in which the two holes 43 of every second flute 25 are matched with each pair of holes 44 of the first set, at the longer pitch P (see figure 4a), and the slide 40 is located at the point of tangency 30.

[0034] In this situation, the aspirating first sector 41 of the chamber 38 inside this roller 20 extends from the relative infeed position 27 to the point of tangency 30, where the respective sticks 12 are taken up by the vacant flutes 25 of the other roller 19, alternated with the flutes 25 occupied by the sticks denoted 11. Once beyond the point of tangency 30, accordingly, the sticks 11 and 12 of both streams will follow the same path toward the release position 28 associated with the receiving means denoted 3.

[0035] In the configuration of figure 3, the operating mode of the two rollers 19 and 20 described with reference to the example of figure 2 is inverted, with the sticks 11 and 12 of both streams following the same path, beyond the point of tangency 30, toward the release position

29 associated with the receiving means denoted 4.

[0036] The conveyor unit 1 thus described will be seen to be extremely versatile, given that different operating conditions can be accommodated simply by altering the angular position of the slide 40 within the chamber 38, and the axial position of the inner sleeve 32.

[0037] With this in mind, the production machine 2, which in the embodiment described by way of example is a twin-track filter maker, might equally well be replaced by two one-track machines turning out sticks 11 and 12 having identical or dissimilar properties, or even a single machine from which sticks 11 or 12 are taken up by just one roller 14 or 15.

[0038] Likewise in this instance, the sticks 11 or 12 can be directed by the second pair of rollers 19 and 20 toward both of the receiving means 3 or 4, or to just one of these same receiving means.

Claims

1. A unit for conveying tobacco products **characterized in that** it comprises:

   - a pair of rotary conveyors (19, 20) turning in opposite directions substantially in contact one with another at a point of mutual tangency (30) and furnished with angularly equispaced peripheral flutes (25) each serving to accommodate a single product (11, 12), by which products (11, 12) are transferred from an infeed position (26, 27) to a release position (28, 29);
   - conveyor means (14, 15) feeding a succession of products (11, 12) to at least one of the rotary conveyors (19, 20) at the infeed position (26, 27);
   - a device (32, 39) by means of which the peripheral flutes (25) occupying at least one sector (41) of predetermined width presented by at least one of the rotary conveyors (19, 20) can be connected selectively to negative pressure means.

2. A unit as in claim 1, wherein the selective connection device (32, 39) is incorporated into each rotary conveyor (19, 20) and comprises valve means (39) serving to regulate the width of the sector (41), also distribution means (32) serving to vary the number of flutes (25) within the sector (41) that are connected to the negative pressure means.

3. A unit as in claim 2, wherein valve means (39) comprise a slide (40) with freedom of angular movement, able to assume at least two operating positions (30, 28) each delimiting a respective sector (41) within which negative pressure can be generated through the flutes (25).

4. A unit as in claim 3, wherein each rotary conveyor (19, 20) comprises a fixed cylindrical element (34) defining a chamber (38) in the form of a sector to a circle, separated by the slide (40) into a portion or sector (41) connected to the negative pressure means and a portion or sector (42) in which pressure is atmospheric.

5. A unit as in claims 2 to 4, wherein distribution means (32) occupy a fixed angular position on the respective rotary conveyor (19, 20) while able to assume at least a first and a second operating position in which flutes (25) spaced respectively at a first predetermined pitch (P) and at a second predetermined pitch (p) are connected to the negative pressure means.

6. A unit as in claim 4 or 5, wherein distribution means (32) comprise a rotating sleeve (32) coaxial with the respective rotary conveyor (19, 20), able to assume a first operating position allowing the selection of a first number of flutes (25) spaced at the first predetermined pitch (P) and a second operating position allowing the selection of a second number of flutes (25) spaced at the second predetermined pitch (p).

7. A unit as in claim 6, wherein the sleeve (32) is furnished peripherally with first and second sets of holes (44, 45) spaced apart respectively at the first pitch (P) and at the second pitch (p), and slidable axially between two operating positions in which flutes (25) spaced at the first pitch (P) and flutes (25) spaced at the second pitch (p), respectively, are connected to the negative pressure means.

8. A unit as in claims 5 to 7, wherein the measure of the second pitch (p) is equivalent to half the measure of the first pitch (P).

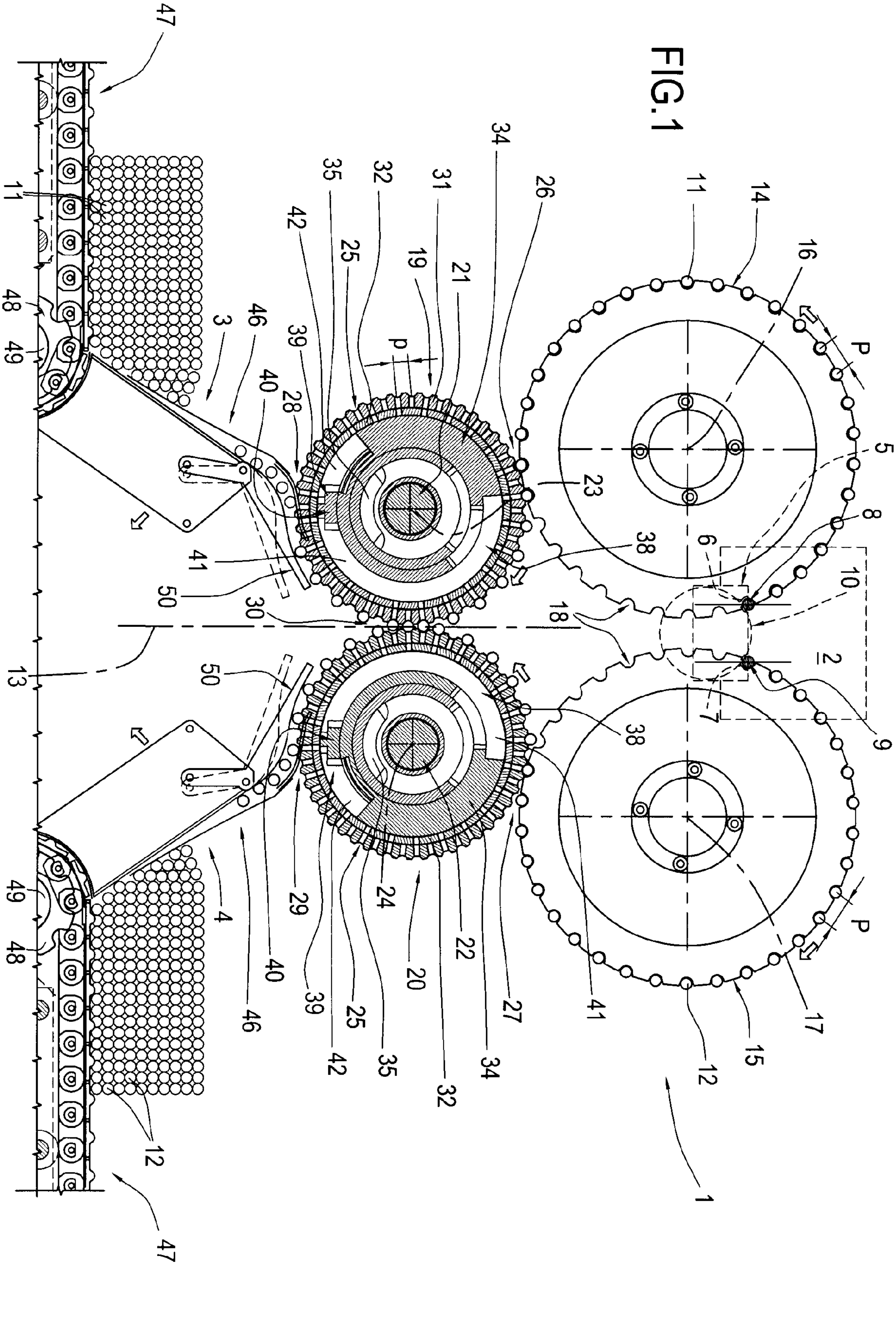


FIG.1

FIG.2

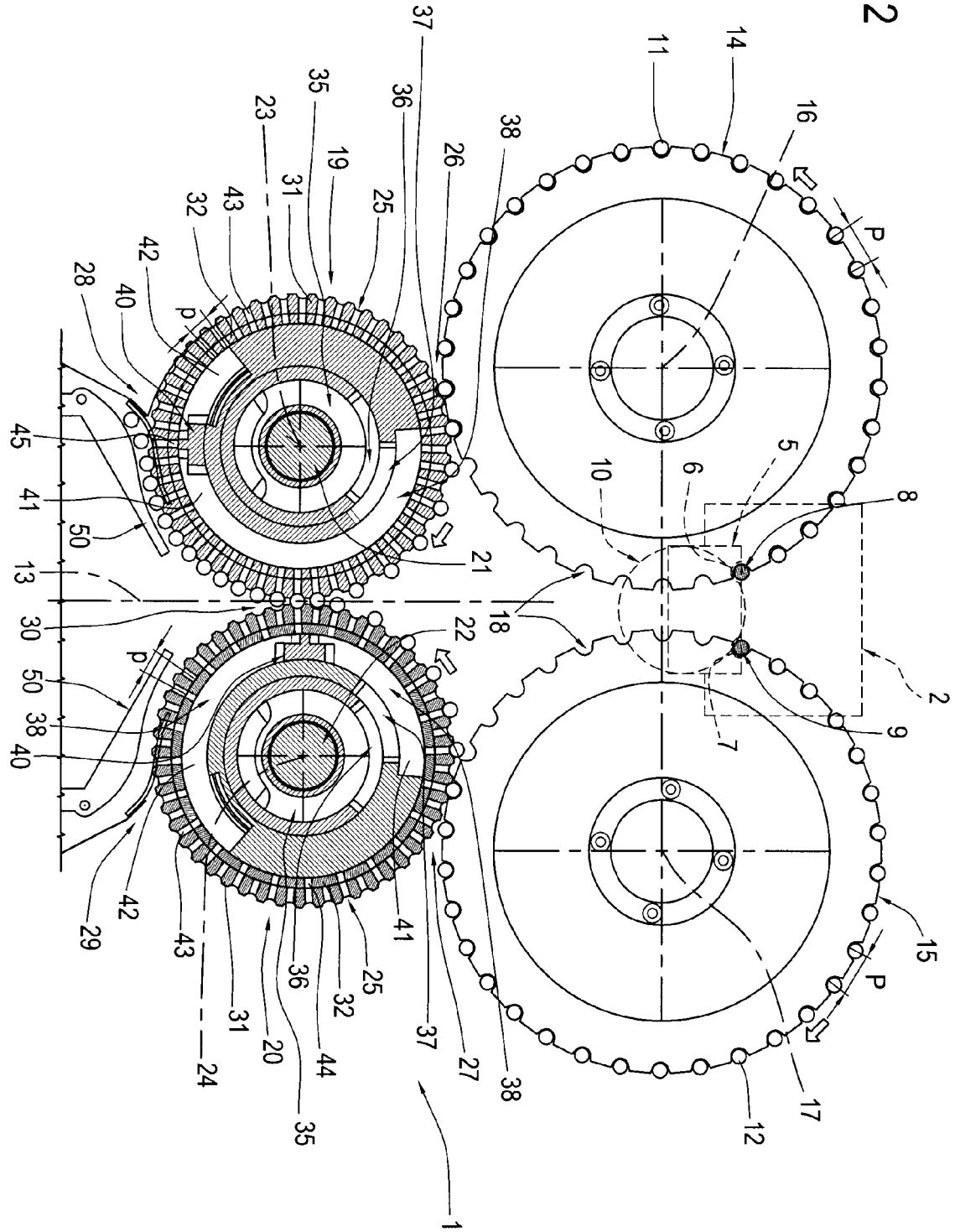

1
2
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
35
36
37
38
40
41
42
43
44
45
50
P
p

FIG.3

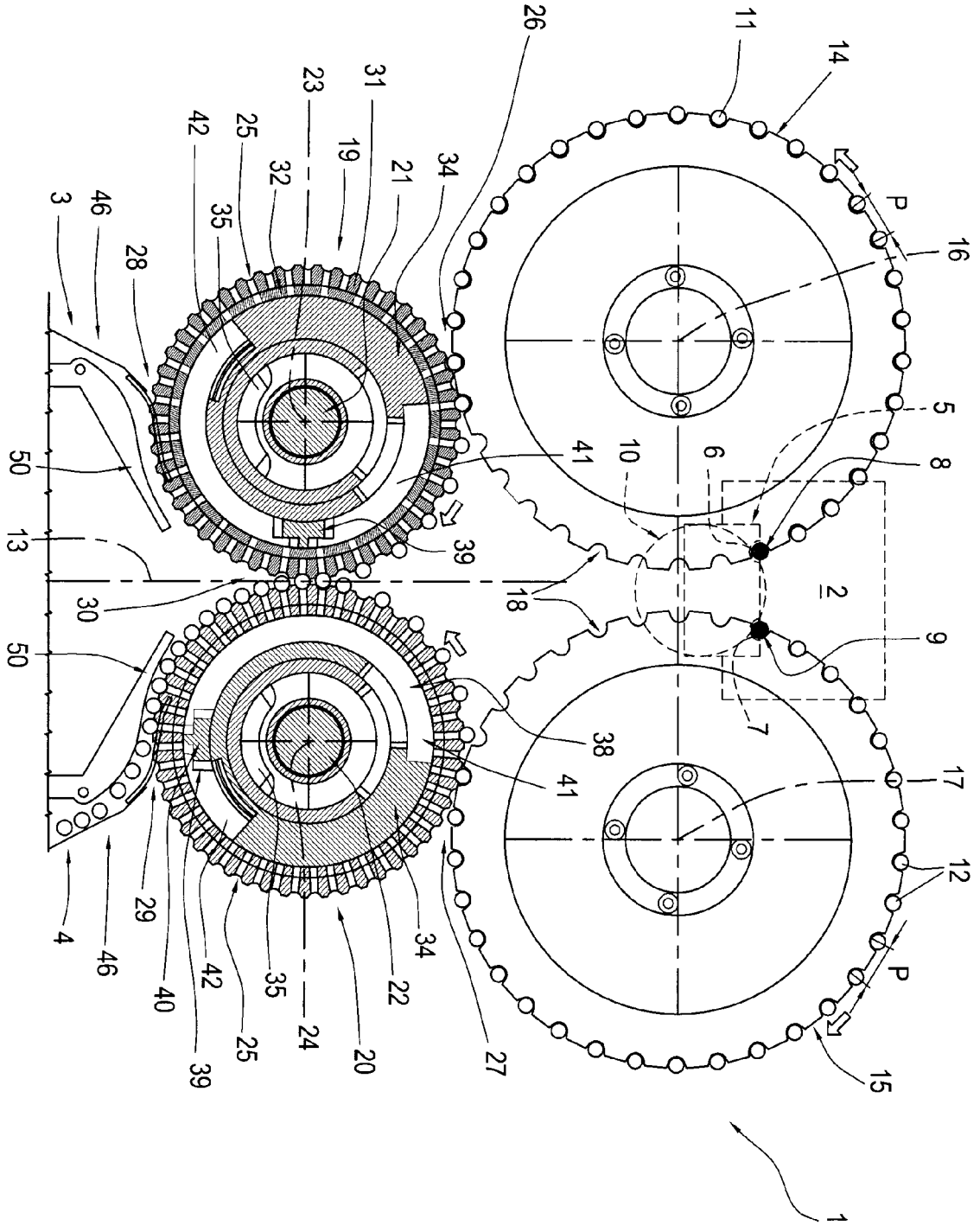

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
34
35
38
39
40
41
42
46
50
P

FIG.4a

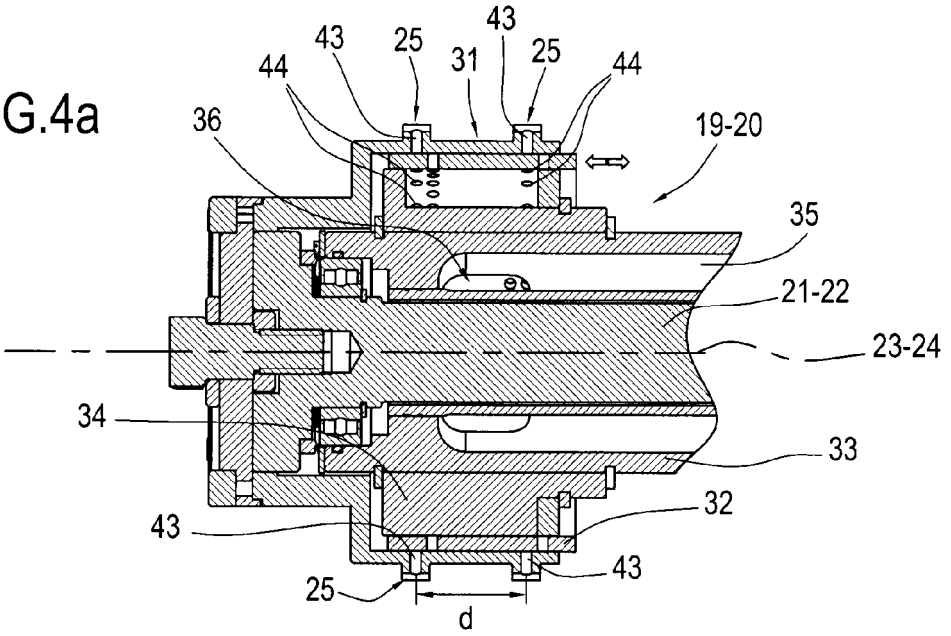


FIG.4b

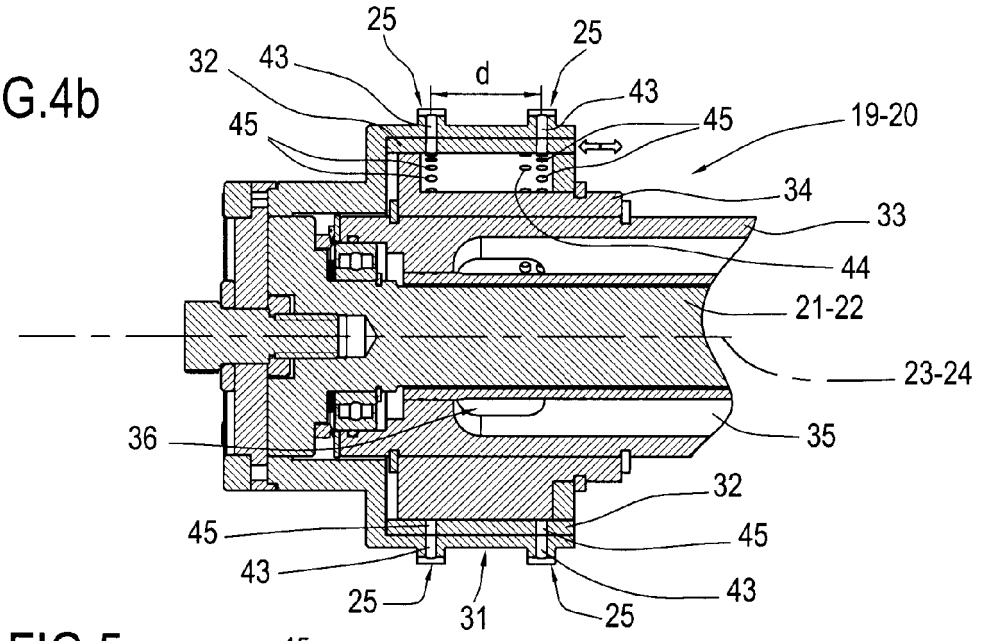
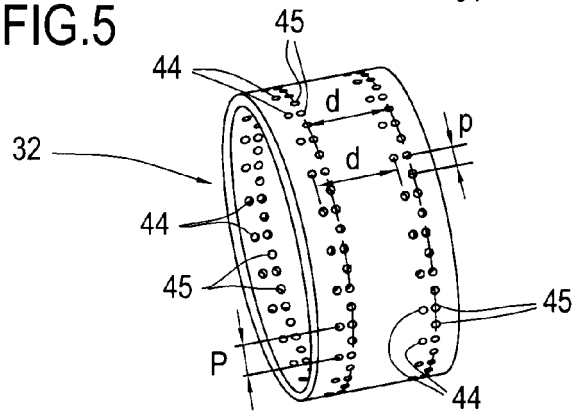


FIG.5



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 12 6672

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 235 330 A (HEITMANN, UWE ET AL) 25 November 1980 (1980-11-25) * column 4, line 41 - column 6, line 56; figures *	1	INV. A24C5/32
X	EP 0 937 415 A (HAUNI MASCHINENBAU AG) 25 August 1999 (1999-08-25) * the whole document *	1	
X	US 4 452 255 A (BRAND ET AL) 5 June 1984 (1984-06-05) * column 12, line 29 - column 14, line 62; figure 3 *	1	
X	EP 1 397 962 A (HAUNI MASCHINENBAU AG) 17 March 2004 (2004-03-17) * abstract; figures *	1	
X	EP 0 674 853 A (JAPAN TOBACCO INC) 4 October 1995 (1995-10-04) * column 15, line 22 - column 18, line 30; figures *	1	TECHNICAL FIELDS SEARCHED (IPC) A24C
X	EP 0 693 257 A (JAPAN TOBACCO INC) 24 January 1996 (1996-01-24) * the whole document *	1	
A	EP 1 312 270 A (FOCKE & CO. ; FOCKE & CO. (GMBH & CO. KG)) 21 May 2003 (2003-05-21) * the whole document *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 April 2007	MARZANO MONTEROSSO

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

3

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 12 6672

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-04-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4235330 A	25-11-1980	DE 2833346 A1	14-02-1980
		GB 2027328 A	20-02-1980
		IT 1122365 B	23-04-1986
		JP 1481715 C	27-02-1989
		JP 55021396 A	15-02-1980
		JP 63027241 B	02-06-1988
EP 0937415 A	25-08-1999	AT 217763 T	15-06-2002
		CN 1225806 A	18-08-1999
		DE 19806125 A1	19-08-1999
		ES 2177150 T3	01-12-2002
		JP 11268825 A	05-10-1999
		PL 331400 A1	16-08-1999
		US 6142289 A	07-11-2000
US 4452255 A	05-06-1984	GB 2098954 A	01-12-1982
		IT 1150533 B	10-12-1986
		JP 57186484 A	16-11-1982
EP 1397962 A	17-03-2004	AT 347280 T	15-12-2006
		CN 1489947 A	21-04-2004
		JP 2004105183 A	08-04-2004
		PL 362168 A1	22-03-2004
		US 2004050666 A1	18-03-2004
EP 0674853 A	04-10-1995	DE 69519245 D1	07-12-2000
		DE 69519245 T2	01-03-2001
		JP 3426694 B2	14-07-2003
		JP 7265049 A	17-10-1995
		US 5695441 A	09-12-1997
EP 0693257 A	24-01-1996	DE 69513894 D1	20-01-2000
		DE 69513894 T2	20-04-2000
		JP 3368054 B2	20-01-2003
		JP 8033471 A	06-02-1996
		US 5657850 A	19-08-1997
EP 1312270 A	21-05-2003	DE 10156296 A1	28-05-2003

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82