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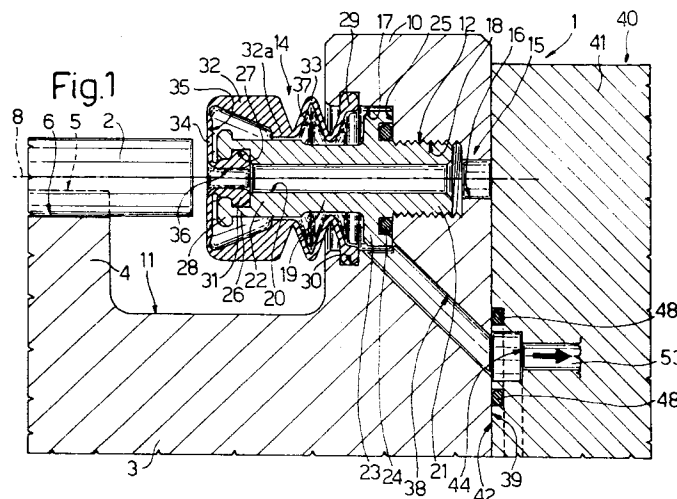
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I-10121 Torino (IT)(54) **Device for pneumatically testing tobacco items, particularly cigarettes.**

(57) A device (1) for pneumatically testing tobacco items (2), particularly cigarettes, wherein a conveyor (3), with transverse seats (6) for respectively receiving at least one item (2), transports, coaxially with at least one end of each seat (6), a terminal (12) of a compressed test fluid circuit (13) and a connecting element (14) for connecting the terminal (12) to a

respective item (2) inside the respective seat (6); the connecting element (14) being a tubular elastic bladder element surrounding the terminal (12) and connectable to a compressed fluid source (50) so as to selectively assume an expanded configuration wherein it is connected in fluidtight manner to one end of a respective item (2).

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The present invention relates to a device for pneumatically testing tobacco items, particularly cigarettes.

For the sake of simplicity, in the following description, specific reference will be made purely by way of example to the above application of the present device.

Cigarette manufacturing and processing lines, and particularly filter assembly machines, are fitted with devices for pneumatically testing the cigarettes to determine correct assembly and soundness of the various component parts.

In general, known test devices of the above type comprise a conveyor - normally a rotary drum - with a succession of seats, each for receiving and retaining at least one cigarette; and, coaxially with each end of each seat, the conveyor carries a terminal of a compressed test fluid circuit. One of the terminals is normally connected to a supply pump, and the other terminal to a control system which, by measuring the variations in the test fluid as it flows through the cigarette, provides for determining acceptance or rejection of the cigarette.

The terminals of known test devices of the above type are normally connected to respective mechanical control devices for moving the terminals axially to and from a position engaging a respective end of a cigarette housed in a respective seat. Depending on whether the seat contains one or two cigarettes, two or four of such mechanical devices are provided for each seat, and are not only cumbersome and expensive to produce, but also contribute towards increasing the weight of the conveyor and hence reducing the operating speed of the production line as a whole.

It is an object of the present invention to provide a test device of the above type designed to overcome the aforementioned drawbacks.

According to the present invention, there is provided a device for pneumatically testing tobacco items, in particular cigarettes; the device comprising a conveyor with transverse seats, each for receiving at least one item; and a circuit for a compressed test fluid; the circuit comprising a compressed fluid source; a number of terminals connectable to the source and each fitted to the conveyor coaxially with a respective end of a respective seat; and, for each terminal, an element for connecting the terminal to the respective item; characterized in that the connecting element is an elastic bladder element for receiving compressed fluid; supply means being connectable to the connecting element for selectively expanding it into a configuration wherein it is connected in fluidtight manner to one end of a respective item inside a respective seat.

Each connecting element is preferably a tubular element surrounding the respective terminal.

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

Figures 1 and 2 show half cross sections, with parts removed for clarity, of a preferred embodiment of the test device according to the present invention in two different operating positions;

Figure 3 shows a front view of a detail in Figures 1 and 2.

Number 1 in Figures 1 and 2 indicates a pneumatic test device for testing a succession of cigarettes 2.

Device 1 comprises a conveyor consisting of a cylindrical drum 3 in turn comprising a central portion 4, the cylindrical peripheral surface 5 of which presents a succession of longitudinal seats 6 (only one shown). Each seat 6 provides for housing and retaining a respective cigarette 2, and for advancing it transversely as drum 3 is rotated about an axis 7 (Figure 3) parallel to axes 8 of seats 6 by a known actuating device (not shown) connected to the central shaft 9 of drum 3.

Drum 3 also comprises an annular end flange 10 separated from central portion 4 by an annular groove 11, and supporting a number of terminals 12 of a pneumatic test circuit 13. Each terminal 12 is fitted through flange 10 coaxially with a respective seat 6, and is associated with a respective deformable element 14 for connecting it to a respective cigarette 2 housed inside respective seat 6.

As shown in Figure 1, coaxially with each axis 8, flange 10 presents a through hole 15 comprising a first small-diameter outer portion 16, a larger-diameter inner portion 17 facing respective seat 6, and an internally threaded intermediate portion 18 connecting portions 16 and 17 and larger in diameter than portion 16 and smaller in diameter than portion 17.

Each terminal 12 comprises a body 19 presenting an axial through hole 20 and divided into a first externally threaded cylindrical portion 21, and a second substantially cylindrical portion 22 separated from portion 21 by an outer annular flange 23 smaller in diameter than portion 17 of hole 15 and which, on the side facing portion 21, presents a front annular groove housing a seal 24. Portion 21 is screwed into portion 18 of hole 15, and flange 23 cooperates in fluidtight manner with an annular shoulder 25 connecting portions 18 and 17 of hole 15. Portion 22 of terminal 12 projects from respective hole 15 towards respective seat 6, and presents, on its free end, a tubular appendix 26, the inner surface of which presents an annular groove 27, and the outer surface of which constitutes an extension of the outer surface of portion 22, and is interrupted by an annular shoulder defined by an annular end flange 28 separated by a

relatively small distance from the end of respective cigarette 2.

Each element 14 consists of a tubular elastic bladder element preferably made of elastomeric material and comprising a first annular connecting foot 29 housed in an annular groove 30 formed in portion 17 of hole 15; a second annular connecting foot 31 housed in groove 27; a rigid intermediate cup-shaped collar 32 flaring towards central portion 4 of drum 3 and presenting an annular base 32a mounted so as to slide axially along a portion of body 19 adjacent to flange 28; a tubular thin-walled bellows 33 connecting base 32a of collar 32 to foot 29; and a thin annular wall 34 connecting the flared end of collar 32 to foot 31 and weakened centrally by an annular notch 35 coaxial with axis 8 and presenting substantially the same diameter as cigarette 2. Foot 31 defines a central hole 36 coaxial with axis 8 and communicating with hole 20; while element 14 defines, about terminal 12 and together with part of portion 17 of hole 15, an annular chamber 37 communicating externally via an oblique hole 38 formed through flange 10 and terminating at end surface 39 of drum 3 at a distance from axis 7 smaller than that between axis 7 and the outer end of respective hole 15, but along the same radius of surface 39 through axis 8 of respective hole 15.

At surface 39, drum 3 is connected in sliding and fluidtight manner to a fixed pneumatic distributor 40 forming part of pneumatic circuit 13 together with terminals 12 and respective deformable elements 14. As shown more clearly in Figure 3, distributor 40 comprises a fixed annular plate 41 with a central hole engaged in rotary manner by shaft 9; and the front surface 42 of plate 41 facing surface 39 presents two grooves 43 and 44 extending along a first circumference 45 presenting a radius equal to the distance between axis 7 and the centers of the mouths of holes 38 at surface 39; and a further groove 46 extending along a small portion of a circumference 47 presenting a radius equal to the distance between axes 7 and 8.

Groove 43 extends about axis 7 through an angle C presenting a bisector B coincident with that of angle A through which groove 46 extends about axis 7, and which is much smaller than angle D through which groove 44 extends about axis 7, is smaller than the angle (not shown) between two adjacent holes 15, and is greater than angle A.

Fluidtight sealing between surfaces 39 and 42 is ensured by a pair of annular seals 48 located on either side of circumference 45 and respectively inwards and outwards of grooves 43 and 44; and by an annular seal 49 surrounding groove 46.

In addition to distributor 40, pneumatic circuit 13 also comprises a pump 50 connected to grooves 43 and 46 by respective conduits 51 and

52; an exhaust conduit 53 communicating at one end with the atmosphere and at the other with groove 44; and a known control system 54 for detecting the characteristics of the compressed air stream through chamber 46, and emitting an analog signal for both activating a reject device (not shown) and modifying operation of the production line (not shown) along which device 1 is installed.

Operation of device 1 is easily deducible from the foregoing description and by comparing Figures 1 and 2 showing the idle and operating positions respectively of device 1.

For each of terminals 12, device 1 is in the idle position when the outer end of respective hole 38 at surface 39 is positioned facing a portion of surface 42 not within angle C; in which position, hole 38 communicates with exhaust conduit 53 so that chamber 37 communicates with the outside atmosphere. Alongside a zero pressure difference between chamber 37 and the outside atmosphere, bellows 33 is contracted; base 32a of collar 32 is withdrawn along body 19 towards flange 10; and wall 34 is substantially flat and maintained a given distance from and substantially parallel to the end of cigarette 2 in respective seat 6.

Upon the outer end of hole 38 moving within angle C and communicating with the chamber defined by groove 43, hole 38 communicates with pump 50; pump 50 pressurises chamber 37 to expand bellows 33; and base 32a of collar 32 slides along body 19 towards respective seat 6 until it is arrested against flange 28. The above expanded position of element 14 (Figure 2) corresponds to a substantially conical configuration of wall 34 which moves towards respective seat 6 to cooperate in fluidtight manner with the outer periphery of the end of respective cigarette 2. Fluidtight sealing between the deformed wall 34 and the periphery of the end of respective cigarette 2 is ensured by notch 35 slightly deforming wall 34 locally.

By the time respective hole 15 communicates with the chamber defined by groove 46, element 14 is already in the above expanded operating position, so that an air stream generated by pump 50 is fed along conduit 52 and hole 15 and through cigarette 2. The characteristics of the air stream are measured by control system 54 and used for modifying given parameters of the cigarette manufacturing process and, normally, for activating a reject device (not shown) if necessary.

In the event seats 6 each contain two coaxial oppositely oriented cigarettes 2, each end of drum 3 presents a flange 10 with a ring of terminals 12 connected to respective elements 14 and to a respective circuit 13.

According to a variation not shown, even in the event each seat 6 contains only one cigarette,

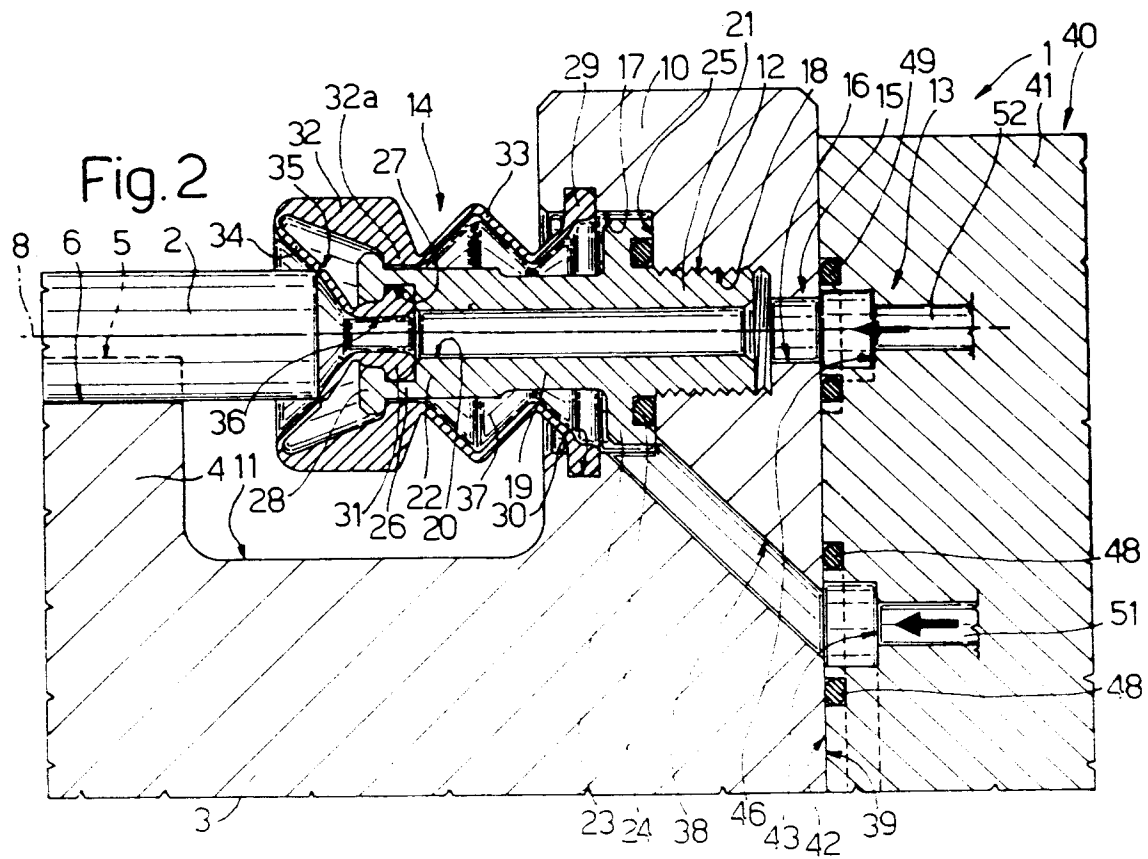
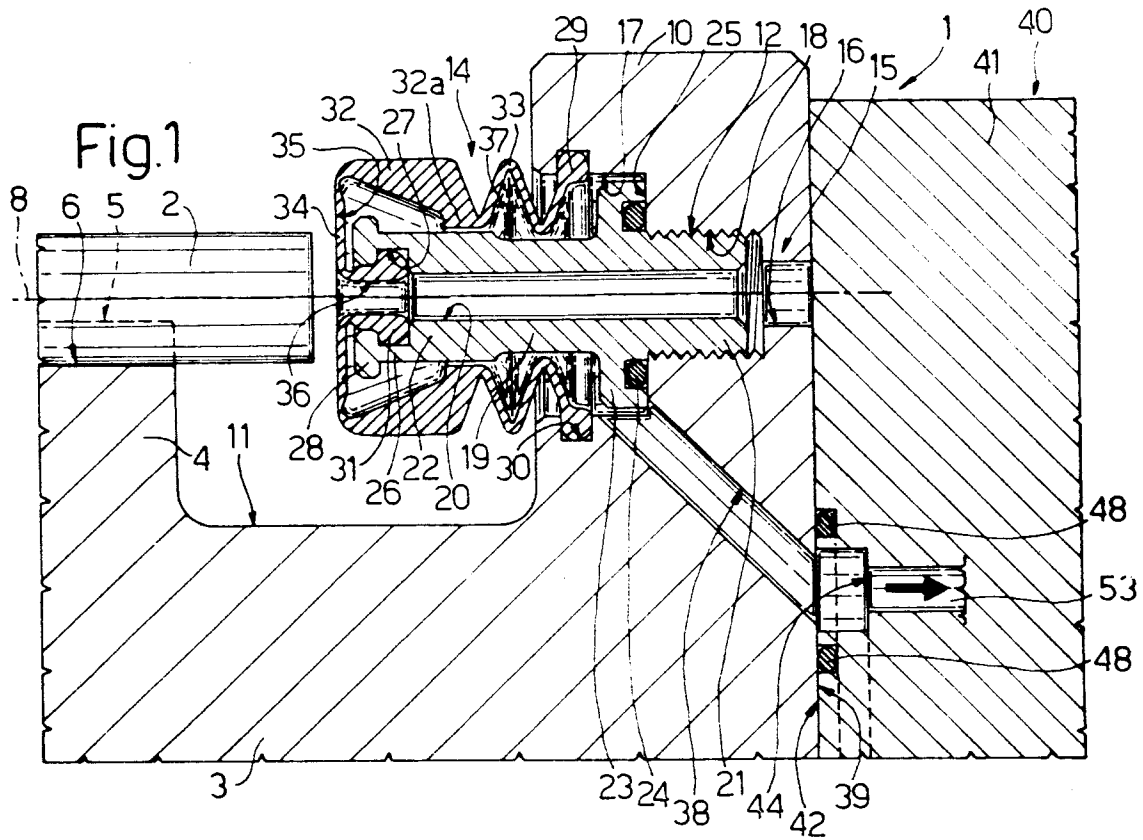
drum 3 presents two flanges 10 with respective rings of terminals 12 cooperating via respective elements 14 with respective ends of respective cigarettes 2; in which case, for each cigarette 2, control system 54 is connected to the terminal 12 opposite the one connected to pump 50.

Claims

1. A device for pneumatically testing tobacco items (2), in particular cigarettes; the device comprising a conveyor (3) with transverse seats (6), each for receiving at least one item (2); and a circuit (13) for a compressed test fluid; the circuit (13) comprising a compressed fluid source (50); a number of terminals (12) connectable to the source (50) and each fitted to the conveyor (3) coaxially with a respective end of a respective seat (6); and, for each terminal (12), an element (14) for connecting the terminal (12) to the respective item (2); characterized in that the connecting element (14) is an elastic bladder element (14) for receiving compressed fluid; supply means (40) being connectable to the connecting element (14) for selectively expanding it into a configuration wherein it is connected in fluid-tight manner to one end of a respective item (2) inside a respective seat (6).
2. A device as claimed in Claim 1, characterized in that each connecting element (14) is an elastic tubular element (14) surrounding the respective terminal (12).
3. A device as claimed in Claim 2, characterized in that each connecting element (14) comprises a relatively rigid portion (32) mounted so as to slide along the respective terminal (12); at least one elastically deformable portion (33, 34) associated with said rigid portion (32); and two annular end feet (29, 31) for connecting the connecting element (14) in fluidtight manner to the respective terminal (12); the connecting element (14) defining, about the respective terminal (12), a variable-volume air chamber (37) communicating with said supply means (40).
4. A device as claimed in Claim 3, characterized in that each connecting element (14) comprises two said deformable portions (33, 34) on either side of said rigid portion (32) and each interposed between said rigid portion (32) and a respective said foot (29, 31).
5. A device as claimed in Claim 4, characterized in that a first of the two deformable portions

(33, 34) comprises a tubular bellows (33).

6. A device as claimed in Claim 4 or 5, characterized in that said rigid portion (32) is cup-shaped, flaring towards the respective said seat (6), and comprises an annular base (32a) mounted in sliding manner to the respective said terminal (12); the end of the rigid portion (32) opposite said base (32a) being connected to one (31) of said annular feet (29, 31) by a second (34) of said two deformable portions (33, 34).
7. A device as claimed in Claim 6, characterized in that said second deformable portion (34) comprises an annular wall (34) interposed between the respective said foot (31) and the respective said end of the rigid portion (32).
8. A device as claimed in Claim 7, characterized in that said annular wall (34) presents an annular weakening notch (35) of substantially the same shape and size as the end of said item (2).
9. A device as claimed in one of the foregoing Claims from 6 to 8, characterized in that each terminal (12) presents axial stop means (28) for arresting the travel of the base (32a) of the rigid portion (32) towards the respective said seat (6).
10. A device as claimed in one of the foregoing Claims from 3 to 9, characterized in that said supply means (40) comprise a first (43) and second (44) chamber selectively connectable in fluidtight manner to said air chamber (37); said first chamber (43) being a pressurized chamber; and said second chamber (44) presenting an exhaust (53) connected to the outside atmosphere.



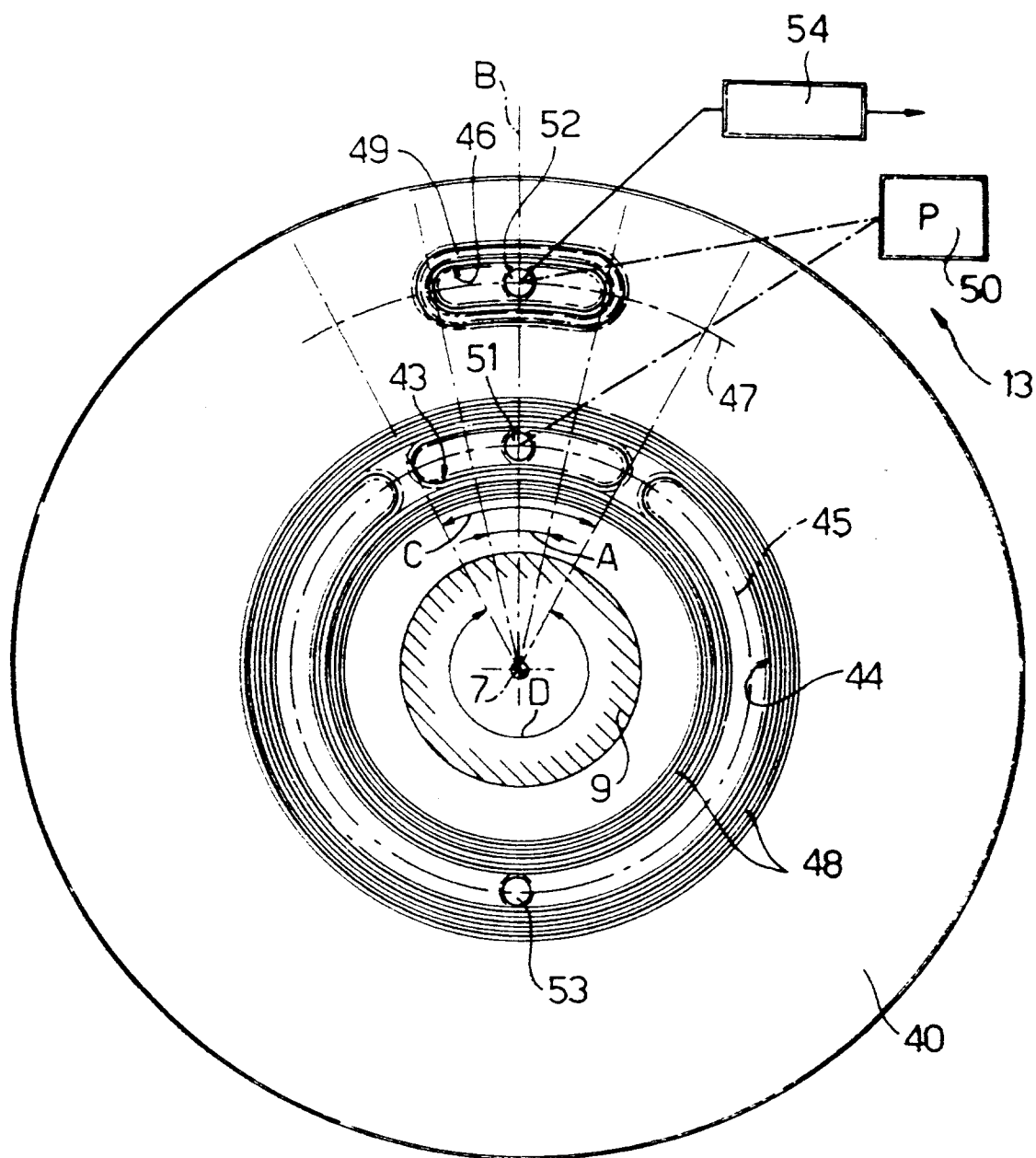


Fig.3



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EUROPEAN SEARCH REPORT

Application Number
EP 94 11 3901

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)
X	DE-A-32 19 100 (B.A.T. CIGARETTENFABRIKEN GMBH) * the whole document *	1,2	A24C5/34
A	GB-A-2 259 846 (GD SOCIETA PER AZIONI) * page 7, line 12 - page 8, line 9; figures 5,6 *	1	
A	GB-A-2 261 151 (GD SOCIETA PER AZIONI)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A24C G01M G01N
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 December 1994	Examiner Riegel, R
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			