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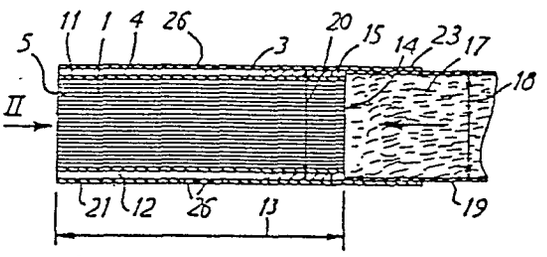
(71) Applicant: FABRIQUES DE TABAC REUNIES S.A., Quai Jeanrenaud 3 P.O. Box 11, CH-2003 Neuchâtel (CH)

(72) Inventor: Lauenstein, Michael Bruno, Rue des Niclaudes 1, CH-2036 Cormondreche (CH)
Inventor: Jordi, Hans, Croix 26, CH-2014 Bole (CH)

(74) Representative: Bass, John Henton et al, REDDIE & GROSE 16 Theobalds Road, London WC1X 8PL (GB)

(54) Smoking articles with filters and apparatus for producing the same.

(57) In a filter cigarette, channels for secondary or dilution air are formed by slits (6 to 12) in an intermediate sheet (4) interposed between the filter rod (1) and the tipping paper (20). Perforations (26) in the tipping paper communicate with the channels. The intermediate sheet may be of paper and between 0.1 and 0.6 mm in thickness, and preferably surrounds the filter rod without an overlap and leaves a tolerance gap (15) between itself and the tobacco rod (17).



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SMOKING ARTICLES WITH FILTERS AND APPARATUS FOR PRODUCING THE SAME

The invention relates to elongated smoking articles, for example cigarettes, having a filter at the mouth end of a tobacco rod, the filter being in the form of a rod surrounded by a tipping material, such as paper, suitable for contact with the lips, which overlaps a wrapper or cover surrounding the tobacco rod, and having at its periphery channels for secondary or dilution air covered by the tipping material. The invention also relates to apparatus for producing such an article.

An article of this type is known from DE-OS 2 849 904 in which the filter rod is surrounded by a tubular element in the periphery of which are formed grooves extending to the mouth end and constituting channels for secondary air admitted through co-operating openings in the tipping paper. Through these openings and channels, secondary air is sucked in to dilute the smoke when the article is smoked.

It is an object of the present invention to provide an article of the aforementioned type simply and effectively with secondary air channels.

In accordance with this invention the filter rod is peripherally impermeable to air and that between the tipping material and the filter rod is interposed an intermediate sheet of substantially impermeable material provided with slits extending from the mouth end but occupying only part of the periphery of the intermediate sheet, thereby forming channels which communicate with perforations in the tipping material.

The intermediate sheet employed according to the invention for providing channels, can be applied in essentially the same way as the tipping paper of conventional cigarettes, so that it is sufficient to provide for the intermediate sheet an additional means for supply and adhesive application, corresponding to

that provided for the tipping paper.

The channels formed by the slits have the same cross-sectional depth throughout, They will not be completely compressed, and thus made ineffective, by the lip pressure of the smoker because they still remain open in the areas along their lateral cut edges, even in the case of strong lip pressure. For this purpose it is particularly preferred that the edges of the slits should be cut perpendicular to the plane of the sheet. This result is the opposite to that with channels formed by grooves in the filter rod because, unless it is possible to accept considerable additional cost, the grooves must be of V or U-shaped cross-section and therefore cannot withstand strong lip pressure in the edge areas and, in certain circumstances, may be unintentionally blocked and made ineffective.

In order to provide channels with an adequate cross-section, the intermediate sheet must be correspondingly thick. The preferred thickness is from 0.1 to 0.6 mm. If such an intermediate sheet is inserted without special precautions, a shoulder forms at the end of the sheet remote from the mouth. However, this can easily be avoided by a construction in which the intermediate sheet extends from the mouth end of the filter rod to the end remote from the mouth, with the exception of a tolerance gap, and in which the filter rod together with the adherent intermediate sheet has the same cross-section as the tobacco rod.

It has proved advantageous for the channels to have dimensions whereby the slits are uniformly distributed round the periphery of the filter rod, extend in the longitudinal direction of the filter rod, and occupy from 25 to 60% of the filter rod periphery at the mouth end and from 40 to 80% of the total filter rod length.

Apparatus for producing elongated smoking articles of the aforementioned type can easily be converted to produce articles according to the invention,

and equipment of the type already used for supplying the tipping paper can be correspondingly used for the intermediate sheet.

The apparatus according to the invention accordingly includes means for supplying and advancing double-width intermediate sheet material, stamping or punching means arranged to make slits in the double-width intermediate sheet, a first adhesive applicator to apply adhesive to the side of the intermediate sheet to be stuck to the tipping paper combining means to assemble the intermediate sheet material into the tipping paper, with their longitudinal axes coincident, to for a combined strip, a second adhesive applicator to apply adhesive to the double-width combined strip, and tipping paper cutting means arranged to to cut the double-width combined strip into the said portions. If the perforations for air in the tipping paper are, in the preferred manner, holes communicating with the channels, then the perforations can be made initially in the tipping paper strips, or an appropriate stamping or other perforating means can be provided for the strips.

It is desirable that the intermediate sheet should enclose the filter rod with a butt joint and that only the tipping paper should overlap round the rod. This can be achieved by apparatus in which intermediate sheet cutting means are disposed next before the combining means to cut the intermediate sheet strip into intermediate sheet portions, the combining means is adapted to apply the intermediate sheet portions at spaced intervals to the tipping paper strip, and that the tipping paper cutting means is synchronised to cut along the edge of each intermediate sheet portion and leave an overlapping edge of the tipping paper strip at the appropriate edge of the resulting cut portion of the combined strip.

It is desirable to apply adhesive in such a way that no adhesive gets into the vicinity of the channels, so that they cannot be blocked by undesired adhesive. This can be ensured if the first adhesive applicator has an applicator roller which peripherally rolls on the surface of the double-width intermediate sheet strip to be coated with adhesive, and is rotated synchronously with movement of the intermediate sheet strip in such a way that adhesive free zones on the roller contact the slits and prevent the filling thereof with adhesive.

The invention will be described in greater detail, by way of example, with reference to the drawings, in which:

Fig. 1 is a longitudinal section of the mouth end of a smoking article according to the invention, in the form of a cigarette;

Fig. 2 is a view in the direction of the arrow II in Fig. 1.

Fig. 3 shows a double-width intermediate sheet with an underlying double-width tipping paper, whereof half is employed for the single cigarette of Figs. 1 and 2;

Fig. 4 is a diagram of apparatus for inserting the intermediate sheet in producing the article shown in Figs. 1 and 2; and,

Fig. 5 is a perspective view of the adhesive roller of Fig. 4.

In Figs. 1 and 2, a filter rod is permeable to air in the axial direction and is enclosed by an air impermeable wrapper 3. Outside the wrapper3, the filter rod 1 us surrounded by an intermediate sheet 4, which is made from air impermeable material and has peripherally distributed slits 6 to 10 (Fig. 3) extending in the axial direction. These slits form channels in the finished article, e.g. the slits 6 and 10 form channels 11 and 12 (Figs. 1 and 2). These channels, like the slits, may extend over only 60% but preferably about 70% of the total length 13 of the filter rod 1 and there-

fore do not reach the end 14 remote from the mouth. The channels occupy 45% of the periphery of the filter rod and are therefore somewhat narrower than the remaining portions of the sheet. The intermediate sheet 4 is preferably 0.2 mm thick, The lateral edges of the slits are cut perpendicular to the plane of the intermediate sheet so that the resulting channels have the cross-section of a curved rectangle, as can be seen in Fig. 2. With the exception of a tolerance gap 15, the intermediate sheet 4 extends up to the end of 14 of the filter rod 1 remote from the mouth and surrounds the filter rod with a butt joint 16, i.e. without overlap.

At the end of the filter rod remote from the mouth is fitted a tobacco rod 17, the cross-section 18 of which, including its air impermeable wrapper 19, is the same as the total cross-section 20 of the filter rod 1 and the intermediate sheet 4. The filter rod, including the wrapper 3 thus has a cross-section which is smaller than the cross-section of the tobacco rod by an amount depending on the thickness of the intermediate sheet.

The profile of the tobacco rod 17, including the wrapper 20 is continued without a shoulder by the filter rod 1 together with the intermediate sheet 4. A tipping paper 21, which surrounds the filter rod with an overlap 22, extends the entire length of the filter rod and overlaps at 23 an adjacent region of the tobacco rod, thereby combining the parts into a single article in the form of a cigarette. In the tipping paper strip shown in Fig. 3, it is the projecting region 24 of the tipping paper that covers the tolerance gap 15 and the adjacent region of the tobacco rod.

The tipping paper 21 contains groups of air holes 26, which communicate with the slits and, in the finished cigarette, form inlets for the flow of secondary air into the channels.

Except for the groups of openings 26, the tipping paper 21 is impermeable to air. The intermediate sheet 4 is stuck to the filter rod 1 on the side and the tipping paper 21 on the other side. When applying the necessary adhesive the slits are avoided as far as possible so as to prevent the channels from becoming constricted by the adhesive. The channels 11 and 12 are open for the flow of secondary air through the corresponding groups of air holes and for the escape of such air at the mouth end, but for the rest are completely airtight. They can if desired be narrowed by the smoker's lips by pressing in the tipping paper in order to reduce the dilution ratio, but cannot be completely closed unintentionally.

In the apparatus shown in Fig. 4, a reel 30 supplies a double-width tipping paper strip 31. The strip 31 passes round a guide roll 32, where it meets cut portions of the intermediate sheet material and then passes to cutting means 33 where it is cut into portions, which then pass to the manufacture of cigarettes, as hereinafter described.

A double-width strip 35 of intermediate sheet material is supplied by a reel 36, from which it is removed by driven rolls 37. The double-width strip 35 passes through a punching device 38 where slits are punched in it as shown at 6 to 10 in Fig. 3. Adhesive is applied to the upper surface of the punched strip 35 by a first adhesive applicator 40. The strip 35 is then cut by a rotary cutter 43 into intermediate sheet portions 44, so dimensioned that each portion can surround a double-length filter rod with a butt joint as shown at 16 in Fig. 2. In combining means 45, which includes the guide roll 32 and is positioned directly behind the intermediate sheet cutting device 43, the portions 44 are brought together with the double-width tipping paper strip 31, to which the portions adhere to form a combined strip 47.

The rate of advance of the intermediate sheet strip 35 is approximately 10% lower than the rate of advance of the tipping paper strip 31. A suction roller 46, forming part of the combining means 45, rotates at a circumferential speed corresponding to the speed of passage of the tipping paper strip 31. The intermediate sheet portions 44 held by the suction roller 46 move faster than the tipping paper strip, so that spacings are formed which correspond to the desired overlap 22. The intermediate sheet portions 44 and the tipping paper strip 31 are brought together in such a way that the ultimate mouth ends, i.e. the mid-lines of the two strips 31 and 35 coincide at the broken line 34 in Fig. 3.

The underside 49 of the resulting combined strip 47 is coated with adhesive in a second applicator 50 and the combined strip is then severed in the cutting means 33. The cut is made along the leading or trailing edge of the associated intermediate sheet portion 44, so that portions 51 are formed with an edge of the tipping paper projecting to one side, which can form the overlap 22. As in known cigarettes without an intermediate sheet, the tipping paper portions are stuck round the ends of two tobacco rods and intermediately positioned double-length filter rod. The resulting double filter cigarettes are then cut into two filter cigarettes in the centre of the double-length filter rods, as along the broken line 34 in Fig. 3.

The groups of air holes 26 are formed by perforations in the tipping paper 21. For this purpose, continuous perforations can be provided which thus also extend over the gaps between the slits. In this case, it is possible to use a reel 30 of preperforated tipping paper strip. However, one may also use a reel 30 of unperforated paper and then make the perforations in the strip 31 as it is withdrawn from the reel. In this case, perforating apparatus 52 is provided, which is positioned upstream of the combining means 45 and makes

air holes 26 in those regions of the tipping paper which will subsequently face the slits.

Although not absolutely necessary, it is desirable that adhesive should not pass into the slits of the intermediate sheet or into the gaps between the intermediate sheet portions. To this end, the furnishing rollers 53 and 54 of the adhesive applicators 40 and 50 transfer a pattern of adhesive to the associated applicator rollers 55 and 56 that provide adhesive-free zones on the latter, as at 57 in Fig. 5. The adhesive-free zones are so arranged and, through appropriate synchronisation, rotate in such a way that they contact the portions 58 of the strip 47 which are not to be coated i.e. the slits and/or the gaps. Such an adhesive pattern can be obtained on an adhesive furnishing roller by providing projections on the periphery thereof which extend over the adhesive-free zones and from which applied adhesive is removed by means of a doctor blade (not shown). The pattern of adhesive on the periphery of the applicator roller 56 has, in addition to adhesive-free zones for the slits, as are formed on the roller 55, adhesive-free zones for the gaps between the intermediate sheet portions 44.

Synchronisation can be brought about by the use of synchronised, synchronous drives 59, 60 which, as indicated by the chain-dotted arrows, respectively drive the stamping or punching device 38, the pair of rolls 37, the first adhesive applicator 40 and the rotary cutter 43 on the one hand, and the perforating mechanism 52, combining apparatus 45, the second adhesive applicator 50 and the tipping paper cutter 33 on the other, in such a way that the groups of perforations 26 face the slits and the slits are left untouched by adhesive.

CLAIMS

1. A smoking article having a filter at the mouth end of a tobacco rod, the filter being in the form of a rod surrounded by a tipping material suitable for contact with the lips, which overlaps a wrapper surrounding the tobacco rod and having at its periphery channels for secondary air covered by the tipping material, characterised in that the filter rod (1) is peripherally impermeable to air and that between the tipping material (21) and the filter rod (1) is interposed an intermediate sheet (4) of substantially impermeable material provided with slits (6 to 10) extending from the mouth end (5), but occupying only part of the periphery of the intermediate sheet, thereby forming channels (11, 12) which communicate with perforations (26) in the tipping material (21).

2. An article according to claim 1, characterised in that the slits (6 to 10) have lateral edges cut perpendicular to the plane of the intermediate sheet.

3. An article according to claim 1 or 2, characterised in that the tipping paper (21) is paper having a thickness of from 0.1 to 0.6 mm.

4. An article according to any of the preceding claims, characterised in that the intermediate sheet (4) extends from the mouth end of the filter rod (1) to the end (14) remote from the mouth, with the exception of a tolerance gap (15).

5. An article according to any of the preceding claims, characterised in that the tipping material (21) surrounds the intermediate sheet (4) with an overlap (22), but the intermediate sheet surrounds the filter rod (1) with a butt joint (24).

6. An article according to claim 4 or 5, characterised in that the filter rod (1), together with the intermediate sheet (4) has the same total cross-section (20) as the tobacco rod (17).

7. An article according to any of the preceding claims, characterised in that the slits (6 to 10) are uniformly distributed round the periphery of the filter rod (1), extend in the longitudinal direction of the filter rod, and occupy from 25 to 60% of the filter rod periphery at the mouth end and from 40 to 80% of the total length of the filter rod.

8. Apparatus for producing an article according to claim 1, including means for supplying a strip of double-width tipping paper, means for cutting the tipping paper into portion, means for applying adhesive to the said portions, and means for wrapping the portions individually round double-length filter rods and the adjacent regions of two contiguous tobacco rods and for dividing the resulting double-length cigarettes into single cigarettes, characterised by means (36,37) for supplying and advancing a strip of double-width intermediate sheet material (35), stamping or punching means (38) arranged to make slits (6 to 10) in the double-width intermediate sheet, a first adhesive applicator (40) to apply adhesive to the side of the intermediate sheet tc be stuck to the tipping paper (31) combining means 45 to assemble the intermediate sheet material with the tipping paper (31), with their longitudinal axes (34) coincident, to form a combined strip (47), a second adhesive applicator (50) to apply adhesive to the double-width combined strip (47), and tipping paper cutting means (33) arranged to cut the double-width combined strip (47) into the said portions.

9. Apparatus according to claim 8, characterised in that intermediate sheet cutting means (43) are disposed next before the combining means (45) to cut the intermediate sheet strip (35) into intermediate sheet portions (44), that the combining means (45) is adapted to apply the intermediate sheet portions at spaced intervals to the tipping paper strip (31), and that the tipping paper cutting means (33) is synchronised to cut along one edge of each intermediate sheet portion and leave an overlapping edge of the tipping paper strip (31) at the opposite edge of the resulting cut portion (51) of the combined strip (47).

10. Apparatus according to claim 8 or 9, characterised in that the first adhesive applicator (40) and/or the second adhesive applicator (50) has an applicator roller (55,56) which peripherally rolls on the surface of the double-width intermediate sheet strip (35) to be coated with adhesive, and is rotated synchroncusly with the movement of the intermediate sheet strip in such a way that adhesive-free zones (57) on the roller contact the slits (6 to 10) and prevent the filling thereof with adhesive.

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Fig. 1

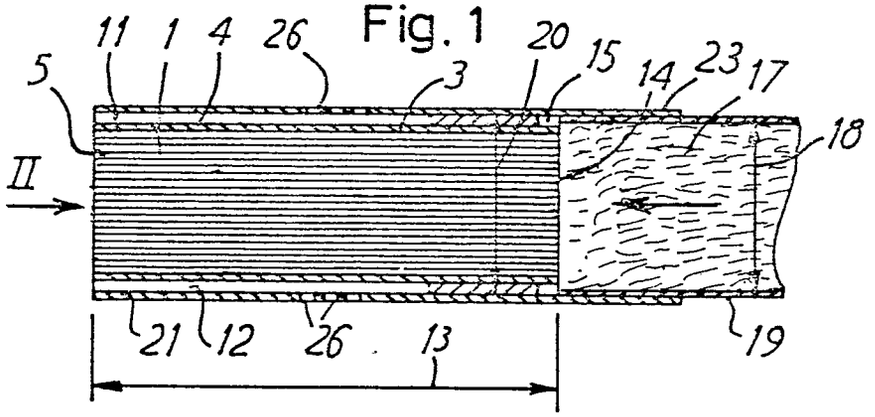

Fig. 2

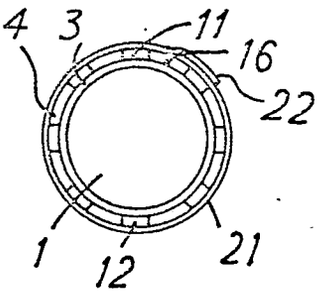

Fig. 3

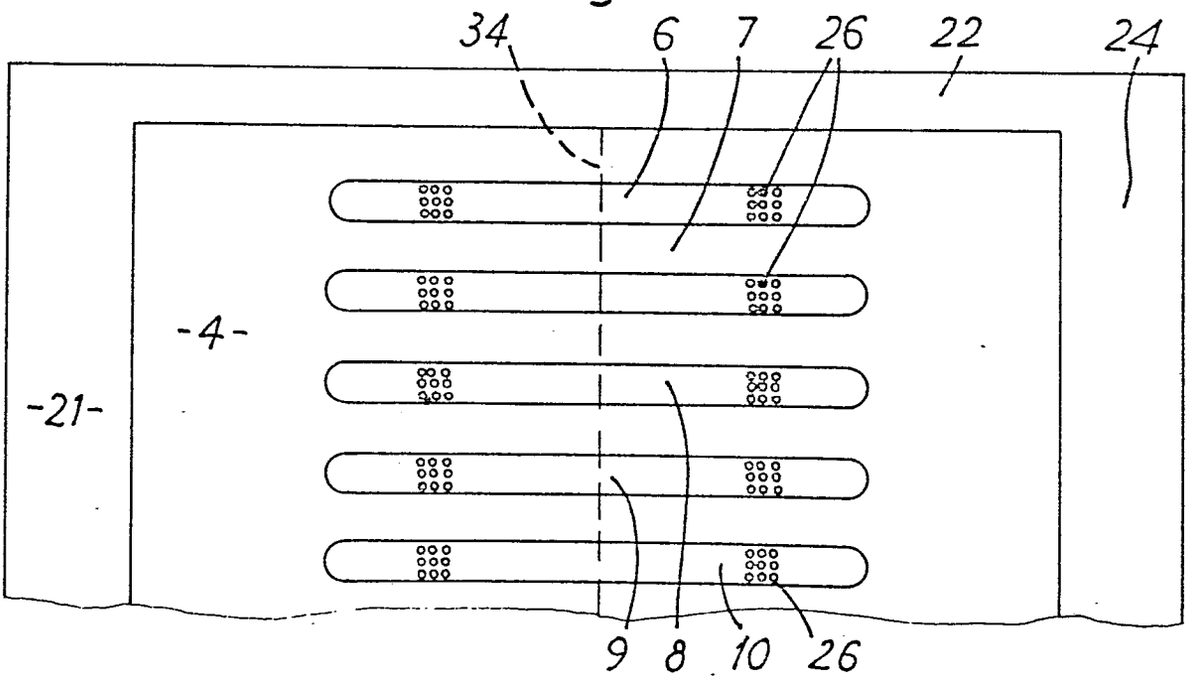

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Fig. 5

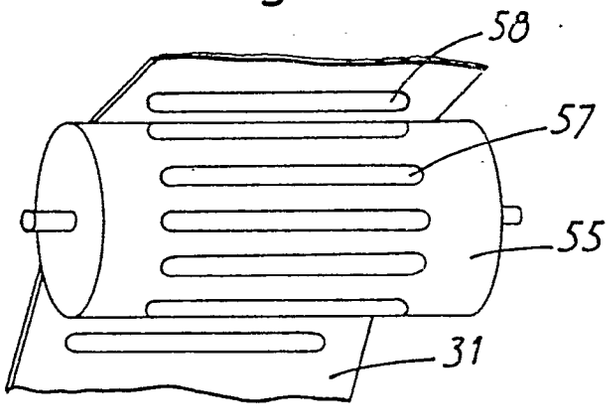
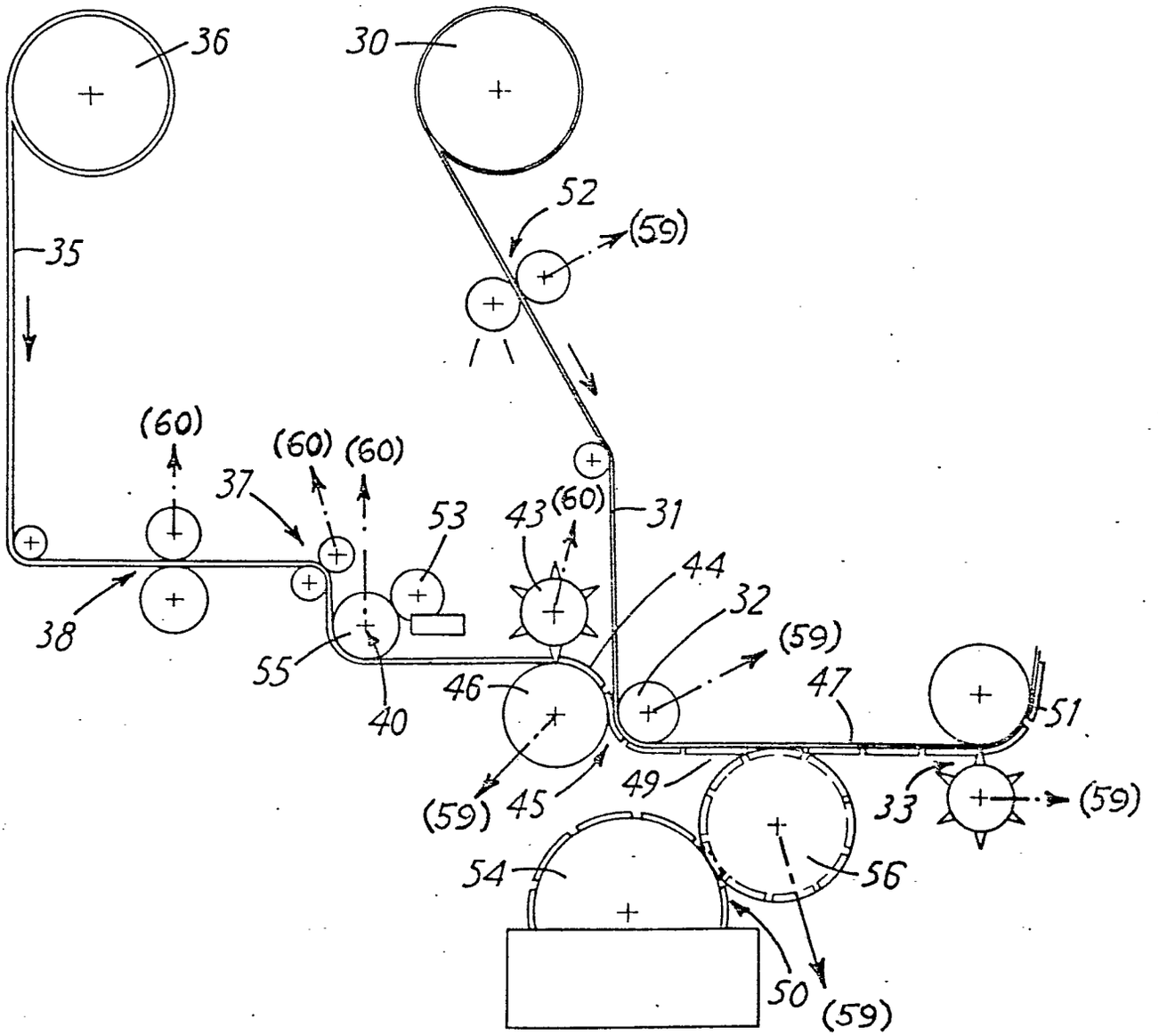


Fig. 4



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EUROPEAN SEARCH REPORT

0059042
Application number

EP 82 30 0637

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,D	DE-A-2 849 904 (PHILIP MORRIS INC.) *Figures 6,7; page 16, line 23 to page 17, line 16*	1	A 24 D 3/04 A 24 D 3/02
A	GB-A-2 046 573 (BROWN & WILLIAMSON TOBACCO CORP.)		
A	US-A-4 023 576 (NORMAN)		
A	US-A-3 733 246 (THOMSON)		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

A 24 D
A 24 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25-05-1982	RIEGEL R.E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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