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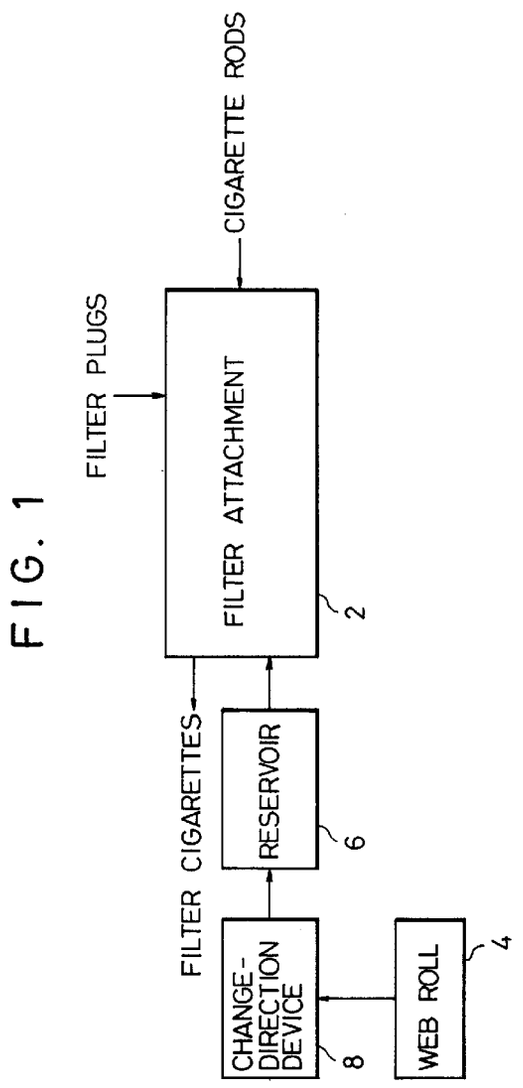
(54) Device for changing the travelling direction of a strip material.

(57) A change-direction device is located between a web roll for supplying a paper web and a filter attachment for manufacturing filter cigarettes, and comprises a frame(10) and a shaft(36) inclined against the direction of access of the paper web and having two opposite ends supported on the frame(10) in a nonrotatable manner by means of a pair of brackets(32,34). The paper web paid out from the web roll(4) proceeds to the filter attachment(2) after being passed around the inclined shaft(36).



F I G. 1

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BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a device for changing the traveling direction of a strip material or a paper web used in the manufacture of cigarettes or filter cigarettes, while the paper web is being supplied to a cigarette or filter cigarette manufacturing machine.

Description of the Related Art

A filter cigarette manufacturing machine or so-called filter attachment is supplied with cigarette rods, each having a length twice that of each individual cigarette, filter plugs, and a paper web and it manufactures filter cigarettes.

More specifically, in the filter attachment, each of cigarette rods is first cut into two equal parts, whereby two coaxial cigarettes are obtained. A filter plug is interposed between these cigarettes, and all these elements are fed to a rolling section of the filter attachment.

The rolling section is also supplied with paper pieces obtained by cutting the paper web. In this section, the two cigarettes and the filter plug are connected to one another by being wrapped in one of the paper pieces, whereupon a double-size filter cigarette is prepared. Thereafter, the double-size cigarette is cut into two equal parts or regular filter cigarettes.

In the manufacture of the filter cigarettes described above, the cutting of the cigarette rod and the supply of the filter plug between the cigarettes are carried out as each cigarette rod is transported on a drum train toward the rolling section. Likewise, the double-size filter cigarette is cut as it is transported on another drum train which extends from the rolling section.

Since the drum trains thus extend individually from the two opposite sides of the rolling section, the filter attachment is inevitably long.

As mentioned before, on the other hand, the paper pieces are obtained by cutting the paper web into equal parts with a predetermined length. Accordingly, the direction of the path of supply of the paper web to the filter attachment should be substantially in line with the direction of the drum trains.

Thus, the filter attachment and a source of supply of the paper web must be arranged on a straight line, and their layout is subject to substantial restrictions.

In order to replace a web roll, for use as the paper web source from which the paper web is paid out, without suspending the operation of the filter attachment, a reservoir must be provided for previously storing a predetermined volume of the paper web before the replacement. This reservoir should be located between the filter attachment and the web source.

Accordingly, the supply path for the paper web to be guided from the web source to the filter attachment via the reservoir extends long in a straight line, so that the whole system is inevitably very long.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a change-direction device for a strip material, ensuring a higher degree of freedom for the layout of a strip material source and a material consuming machine and suited for the reduction of the overall length of a system including the material source and the consuming machine.

The above object is achieved by a change-direction device according to the present invention, which comprises a shaft disposed between a material source and a consuming machine and used to guide a strip material in traveling motion such that the strip material is passed around the shaft as it travels past the shaft, and supporting means for supporting the shaft in a manner such that the shaft is inclined against the direction of access of the strip material.

When the strip material supplied from the material source is guided to the shaft, it is passed around the shaft. In this process, the traveling direction of the strip material is changed in accordance with the angle of inclination of the shaft against the direction of access of the strip material. After passing the shaft, the strip material is guided to the consuming machine.

According to the change-direction device described above, the traveling direction of the strip material can be changed with use of only a simple arrangement such that the shaft is located in the path of travel of the strip material, which extends from the material source to the consuming machine. Thus, the degree of freedom of the layout of the consuming machine and the material source can be improved, so that the whole system including the consuming machine and the material source can be installed with ease.

Preferably, the opposite ends of the shaft of the device are supported in a nonrotatable manner by means of brackets, individually. Accordingly, the shaft never rotates as the strip material travels past it, so that the position where the strip material is passed around the shaft. After passing the shaft, therefore, the strip material can be guided to the consuming machine with reliability.

If the shaft is nonrotatable, frictional force between the shaft and the strip material increases. This frictional force can, however, be attenuated by means of a coating layer formed on the outer peripheral surface of the shaft.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given herein below and the accompanying drawings which are given by way of illustration only, and thus, are not limitative of the present invention, and wherein:

Fig. 1 is a block diagram schematically showing an outline of a system including a filter attachment with a change-direction device;

Fig. 2 is a side view of the change-direction device shown in Fig. 1;

Fig. 3 is a plan view of the change-direction device;

Fig. 4 is an enlarged view showing part of Fig. 3;

Fig. 5 is a sectional view showing another direction changing shaft; and

Fig. 6 is a block diagram schematically showing an outline of a system including a cigarette manufacturing machine with a change-direction device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the block diagram of Fig. 1, there is shown a system including the aforementioned filter attachment. The filter attachment 2 is supplied with a paper web as well as filter plugs and cigarette rods each having a length twice that of each individual cigarette.

As mentioned before, each cigarette rod is transported on a drum train of the filter attachment 2 toward a rolling section. In this process of transportation, the cigarette rod is cut into two equal parts or a pair of coaxial cigarettes. Thereafter, the paired cigarettes are separated from each other so that a predetermined space is secured between-the cigarettes.

Filter plugs are obtained by cutting each filter rod, taken out one by one from a hopper, into a plurality of pieces as the filter rod is transported toward the drum train for cigarettes. Each filter plug is fed to the space between each pair of cigarettes transported on the drum train.

The paper web is paid out from its source of supply or a web roll 4, and is supplied to the filter attachment 2 through a reservoir 6.

The web source is provided with a pair of web rolls (not shown) and an automatic changer (not shown) therefor. The paper web is paid out from one of the web rolls, for use as a working roll. When the web on the working roll runs short, the automatic changer connects the paper web from the other web roll to the web from the working roll, and cuts the web from the working roll on the upstream side of the junction between the two webs. From this time on, therefore, the paper web is paid out from the other web roll.

Before changing the web roll, the speed of paper web supply from the working roll is increased, so that the reservoir 6 is stored with the paper web in a predetermined quantity. Even during the roll changing operation, the paper web stored in the reservoir 6 goes on being supplied to the filter attachment 2, so that the operation of the attachment 2 can be continued.

A change-direction device 8 is disposed between the web source or the web roll 4 and the reservoir 6. The paper web paid out from the working roll 4 is fed to the reservoir 6 or the filter attachment 2 via the changing device 8.

The paper web supplied from the reservoir 6 is cut into paper pieces in the filter attachment 2 by means of a cutting device. Thereafter, the paper pieces are delivered from the cutting device to the rolling section.

As each two cigarettes and the filter plug between them are rolled in the rolling section, each paper piece is wound around them, whereupon a double-size filter cigarette is obtained.

Subsequently, the double-size filter cigarette is transported on another drum train which extends from the rolling section. In this process of transportation, the double-size cigarette is cut into two equal parts or regular filter cigarettes. Thereafter, these filter cigarettes are fed from the filter attachment 2 to a wrapping machine (not shown).

Fig. 2 shows the change-direction device 8 as viewed from the side of the filter attachment 2. The changing device 8 comprises a frame 10, which is arranged on a same straight line with respect to the lengthwise direction of the attachment 2.

The frame 10 has a front 12 which faces the paper web source side, and a bracket 14 is mounted on a middle- level portion of the front 12. The bracket 14, which projects toward web source side, supports a guide roller 18 for rotation.

Further, a pair of brackets 16 and 28 are mounted on a top surface 24 of the frame 10. The one bracket 16 projects from the front 12, while the other bracket 28, which is kept apart from the bracket 16, projects upward from the top surface 24. The brackets 16 and 28 support guide rollers 20 and 26 for rotation. The roller 26 is situated on a higher level than the roller 20.

The guide rollers 18, 20 and 26 are arranged horizontally, and their axes extend substantially at right angles to the path of travel or traveling direction of the paper web P paid out from the web roll 4.

Furthermore, a rectangular movable table 30 is mounted on the top surface of the frame 10 so as to be situated between the guide rollers 20 and 26. The table 30 is held between a pair of guide rails 33, and is movable in the direction of the arrow of Fig. 2 or 3 between the guide rollers 20 and 26.

A mounting plate 31 is mounted on the movable

table 30 so as to extend along a diagonal thereof.

A pair of brackets 32 and 34 are set up individually on the opposite ends of the mounting plate 31. As seen from Fig. 3, a segment which connects the brackets 32 and 34 diagonally crosses the path which connects the guide rollers 20 and 26.

A shaft 36 is horizontally stretched between the brackets 32 and 34. The opposite ends of the shaft 36 are supported in a nonrotatable manner by means of the brackets 32 and 34, individually.

As seen from Fig. 2, the shaft 36 is situated on a higher level than the guide roller 26. As seen from Fig. 3, moreover, the axis of the shaft 36 is inclined at a predetermined angle to the axes of the guide rollers 20 and 26. In the present embodiment, the shaft 36 is inclined at 45° to the rollers 20 and 26.

When the paper web P paid out from the web roll 4 reaches the change-direction device 8, it is guided from a guide roller 22 on the web roll side to the guide rollers 18 and 20 on the frame 10, extends along the front 12 of the frame 10 in parallel relation, and reaches the side of the top surface 24 of the frame 10, as shown in Fig. 2. Thereafter, the paper web P extends parallel to the top surface 24 of the frame 10, between the guide rollers 20 and 28, and is passed around the roller 26 from below and turned back toward the shaft 36.

When the paper web P reaches the shaft 36, it is passed around the shaft 36 from below, whereby its traveling direction is shifted by 90°. Thereafter, the web P is directed to the filter attachment 2 via side edge guides 38 (see Fig. 3) and the reservoir 6.

As the paper web P is passed around the shaft 36, as shown in Fig. 4, its traveling direction is changed in accordance with the angle of inclination or intersection of the shaft 36 against the direction of access of the web.

If the change-direction device 8 is located between the web roll 4 and the filter attachment 2, therefore, the web roll 4 or the source of the paper web can be situated on a straight line which extends at right angles to the lengthwise direction of the attachment 2, as seen from Fig. 1. Thus, the layout of the web source can enjoy a higher degree of freedom.

Even if a wide linear space cannot be secured, therefore, the whole system including the filter attachment 2 can be installed in place.

If the paper web source and the filer attachment 2 are arranged with the layout shown in Fig. 1, the distance between the web source and an operator usually attending to the attachment 2 on the front side thereof can be shortened. Accordingly, the operator can quickly access the web source to cope with a trouble on the web source side, if any, without delay.

Even though the width of the paper web delivered from the web source is varied, moreover, the center line of the paper web can be accurately aligned with a regular supply line on the filter attachment side by moving the movable table 30.

Since the shaft 36 is nonrotatable, the position where the paper web P is passed around the shaft 36 cannot be dislocated with respect to the axial direction of the shaft 36 as the web P travels past the shaft 36, so that the traveling direction of the web P can be changed with reliability.

If the shaft 36 is nonrotatable, then the paper web P is in sliding contact with the shaft 36, so that the traveling resistance of the web P increases. In the present embodiment, however, the reservoir 6 is located on the downstream side of the change-direction device 8, so that the paper web P can be fed to the cutting device of the filter attachment 2 by means of a feed roller or pulling roller of the reservoir 6 itself. Thus, on the cutting device side, there is no possibility of the paper web lacking in tensile force.

It is to be understood that the present invention is not limited to the embodiment described above, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention.

According to the above embodiment, for example, the direction changing shaft 36 is inclined at 45° to the traveling direction of the paper web P from the web source side so that the traveling direction of the web P is shifted by 90° . However, the angle of intersection between the shaft 36 and the paper web P need not always be 45° . In other words, the intersection angle of the shaft 36 can be suitably selected in accordance with the layout of the web source and the filter attachment 2.

In the case of the foregoing embodiment, moreover, the paper web P is guided to the shaft 36 after its traveling direction is reversed by the guide roller 26. Alternatively, however, the traveling direction of the paper web P may be changed in like manner by reversing the direction of intersection of the shaft 36 so that the web P is guided directly from the guide roller 20 to the shaft 36.

If a coating layer 36a (e.g., nitride layer) with a low coefficient of friction and high wear resistance is formed on the outer peripheral surface of the shaft 36, as shown in Fig. 5, the traveling resistance of the paper web P can be lowered.

According to the embodiment described herein, furthermore, the change-direction device is applied to the manufacturing system for filter cigarettes including the filter attachment.

Alternatively, however, a change-direction device may be applied to a cigarette manufacturing system for cigarettes or double-size cigarettes. As shown in Fig. 6, the cigarette manufacturing system comprises a cigarette manufacturing machine 40, a web source or a web roll 42, a reservoir 44 and the change-direction device 46 arranged between the web roll 42 and the reservoir 44. A paper web is paid

out from the web roll 42 and supplied to the machine 40 by means of the change-direction device 46 and the reservoir 44. When the paper web is passed around a shaft of the change-direction device 46, its traveling direction is shifted toward the machine 40. The cigarette manufacturing machine 40 is further supplied with cut cigarettes and manufactures the double-size cigarettes.

Claims

1. A device for changing the traveling direction of a strip material supplied from a material source(4,42) to a consuming machine(2,40), said device including guide means for guiding the strip material in traveling motion,

   characterized in that said guide means comprises:

   a shaft(36) disposed between the material source(4,42) and the consuming machine(2,40) in a manner such that the strip material proceeds to the consuming machine(2,40) after being passed around said shaft(36); and

   supporting means for supporting said shaft(36) in a manner such that said shaft(36) is inclined against the direction of access of the strip material.

2. A device according to claim 1, characterized in that said supporting means includes a pair of brackets(32,34), and said shaft(36) has two opposite ends supported by the brackets(32,34), individually.

3. A device according to claim 2, characterized in that the pair of brackets(32,34) individually support the opposite ends of said shaft(36) in a non-rotatable manner.

4. A device according to claim 3, characterized in that said shaft(36) has an outer peripheral surface and a coating layer(36a), the coating layer(36a) serving to decrease a frictional force acting on the strip material when the strip material passes around said shaft(36).

5. A device according to claim 4, characterized in that the coating layer(36a) is a nitride layer.

6. A device according to claim 3, characterized in that said supporting means further includes a table(30) fitted with the pair of brackets(32,34) and movable in the direction of access of the strip material.

7. A device according to claim 6, characterized in that said device further comprises a guide roller(20,26) situated in the vicinity of said shaft(36) and determining the direction of access of the strip material to said shaft(36).

8. A device according to claim 3, characterized in that the consuming machine is a machine(2) for manufacturing a filter cigarette by connecting a cigarette and a filter, and said device guides a paper web as the strip material used to connect the cigarette and the filter.

9. A device according to claim 3, characterized in that the consuming machine is a machine(40) for manufacturing a cigarette having a paper web and cut cigarette enclosed in the paper web, and said device guides the paper web as the strip material used to enclose the cut cigarettes.

FIG. 1

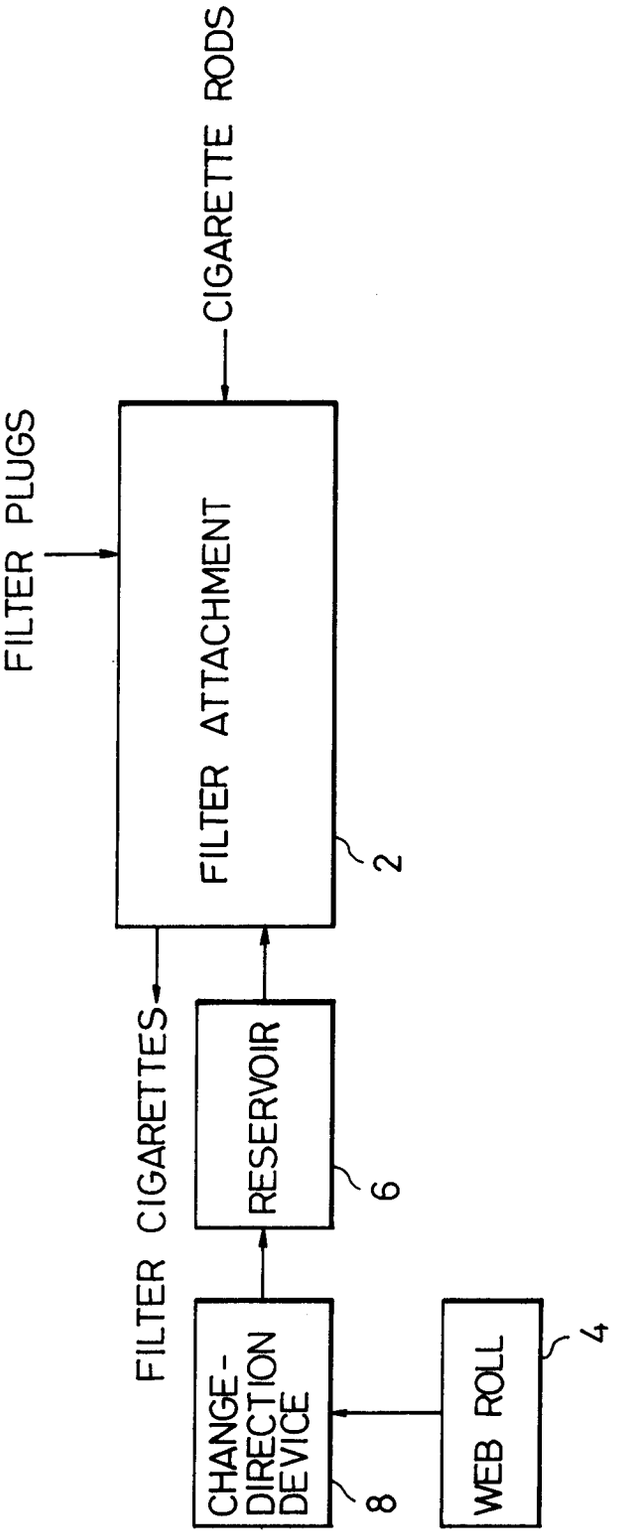

FILTER PLUGS
CIGARETTE RODS
FILTER ATTACHMENT
2
FILTER CIGARETTES
RESERVOIR
6
CHANGE-DIRECTION DEVICE
8
WEB ROLL
4

FIG. 2

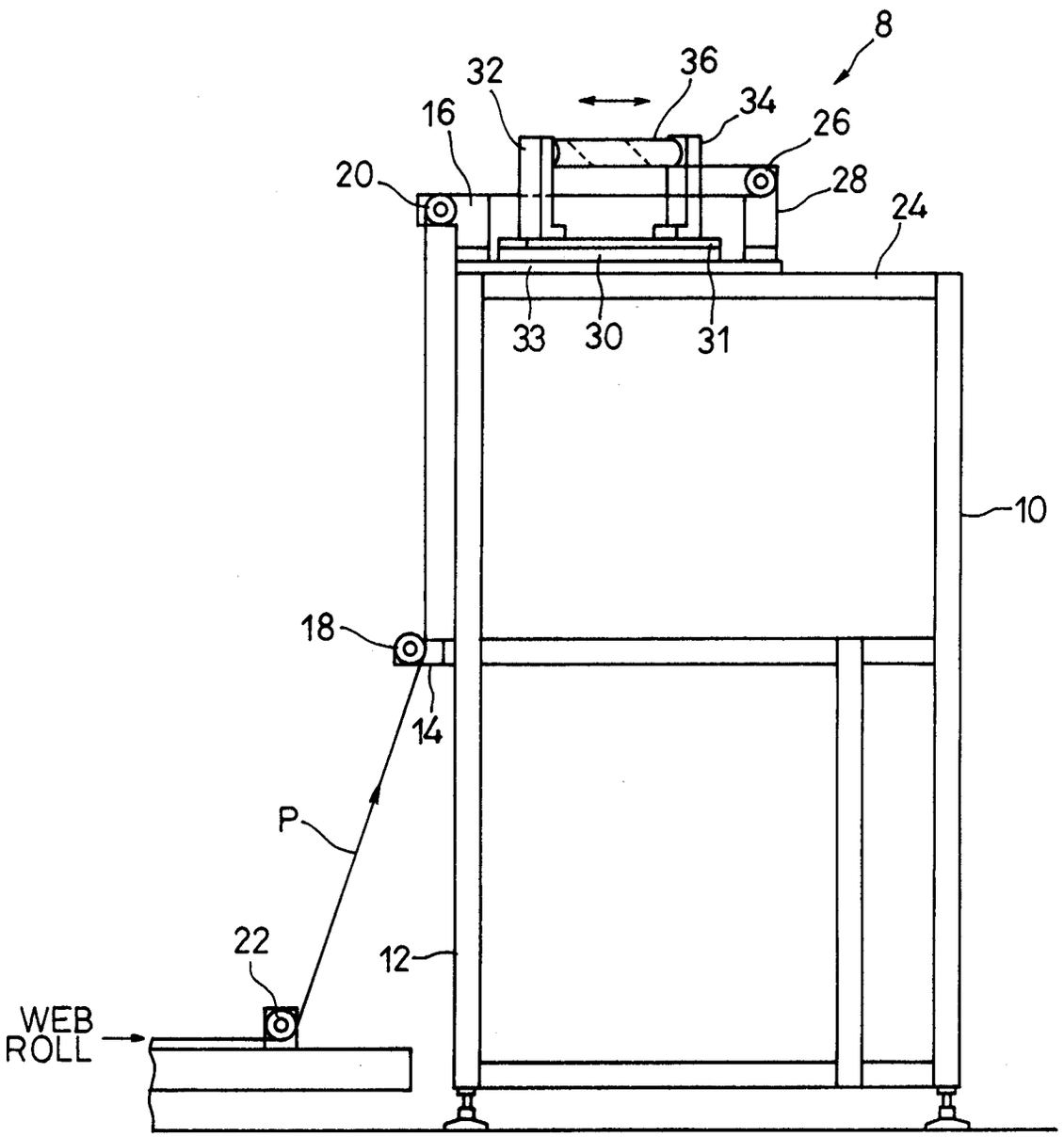


FIG. 3

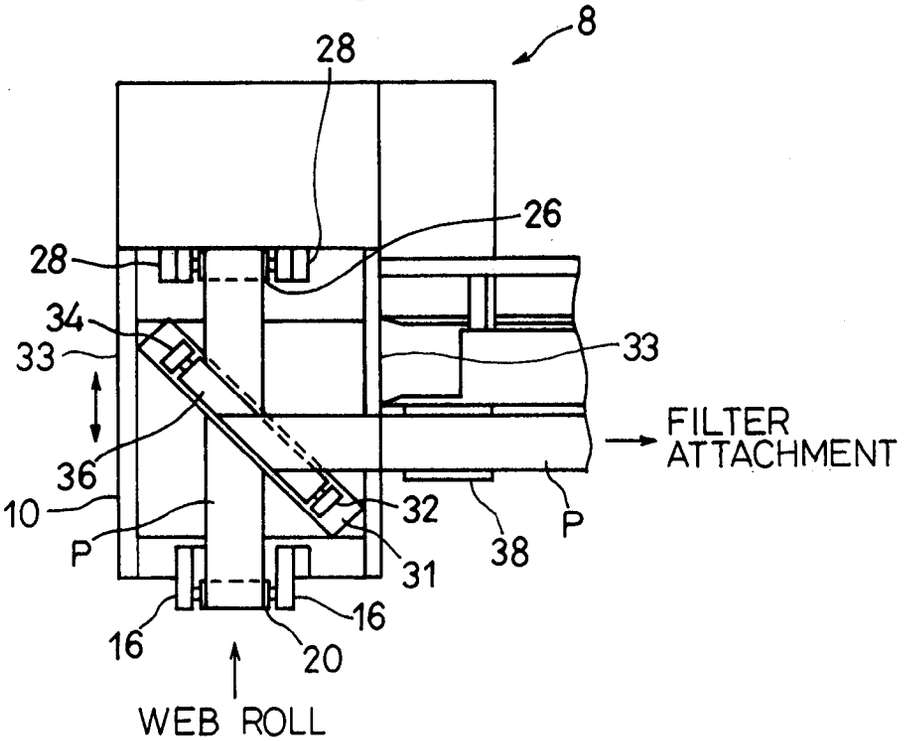

8
28
26
28
34
33
33
FILTER
ATTACHMENT
36
10
32
P
38
P
31
16
16
20
WEB ROLL

FIG. 4

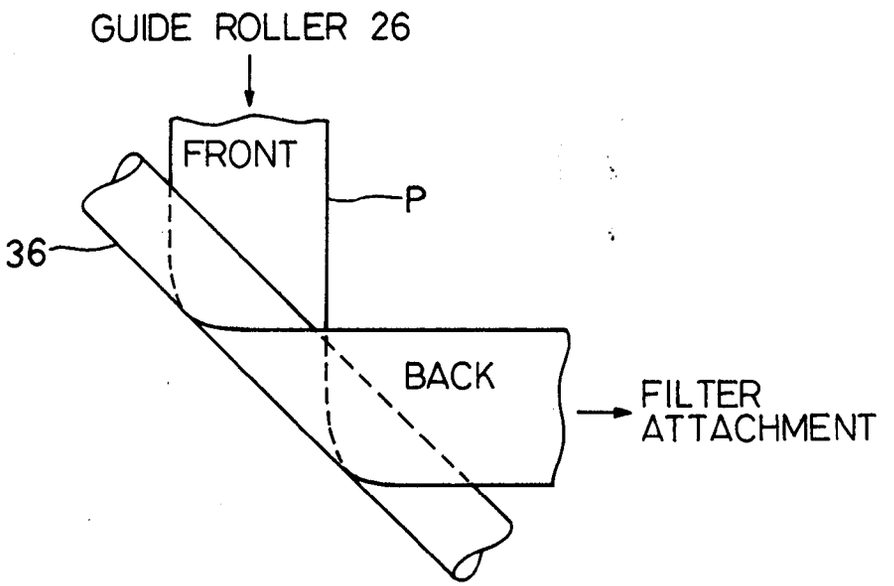

GUIDE ROLLER 26
FRONT
P
36
BACK
FILTER
ATTACHMENT

FIG. 5

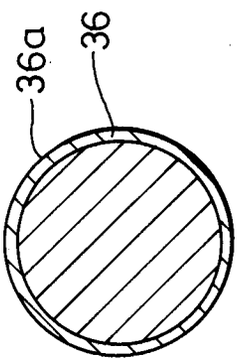
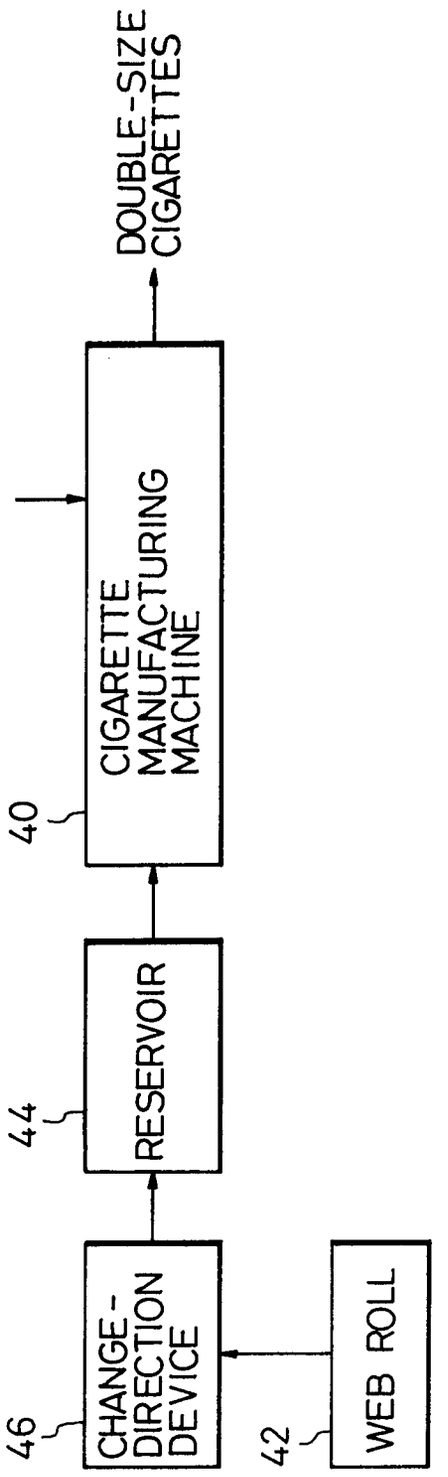

36a
36

FIG. 6


CUT TOBACCO
40
CIGARETTE MANUFACTURING MACHINE
DOUBLE-SIZE CIGARETTES
44
RESERVOIR
46
CHANGE-DIRECTION DEVICE
42
WEB ROLL

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 31 0081

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.5)
X	US-A-5 156 169 (HOLMES) * column 4, line 7 - column 5, line 4; figures 2,3 *	1,9	A24C5/20 B65H23/32
X	FR-A-2 311 507 (MOLINS LIMITED) * page 5, line 26 - line 39; figures 1,8 *	1,8	
X	EP-A-0 118 984 (GALLAHER LIMITED) * page 13, line 23 - page 14, line 15; figure 2 *	1,9	
X	US-A-4 863 087 (KOHLER) * the whole document *	1-3,6,7	
X	DE-A-33 34 879 (ERHARDT & LEIMER) * the whole document *	1-3	
X	WO-A-92 15513 (SIEMENS NIXDORF INFORMATIONSSYSTEME AKTIENGESELLSCHAFT) * page 4, line 26 - page 8, line 7; figures 1-4 *	1,2	
A	EP-A-0 401 886 (STORK SCREENS) * claims 1-4 *	4,5	TECHNICAL FIELDS SEARCHED (Int.Cl.5) A24C B65H A24D
A	GB-A-2 202 127 (KORBER AG)		
A	DE-U-84 23 013 (SÜKA SÜDDEUTSCHE SPEZIALDRUCKEREI HERMANN JUNG)		
A	EP-A-0 342 491 (M.A.N.-ROLAND DRUCKMASCHINEN AKTIENGESELLSCHAFT)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 March 1994	Riegel, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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