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

(11) EP 3 312 340 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
25.04.2018 Bulletin 2018/17

(21) Application number: **15896383.5**

(22) Date of filing: **26.06.2015**

(51) Int Cl.:
D21H 27/00 *(2006.01)* ***A24D 1/02*** *(2006.01)*

(86) International application number:
PCT/JP2015/068521

(87) International publication number:
WO 2016/208065 (29.12.2016 Gazette 2016/52)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA

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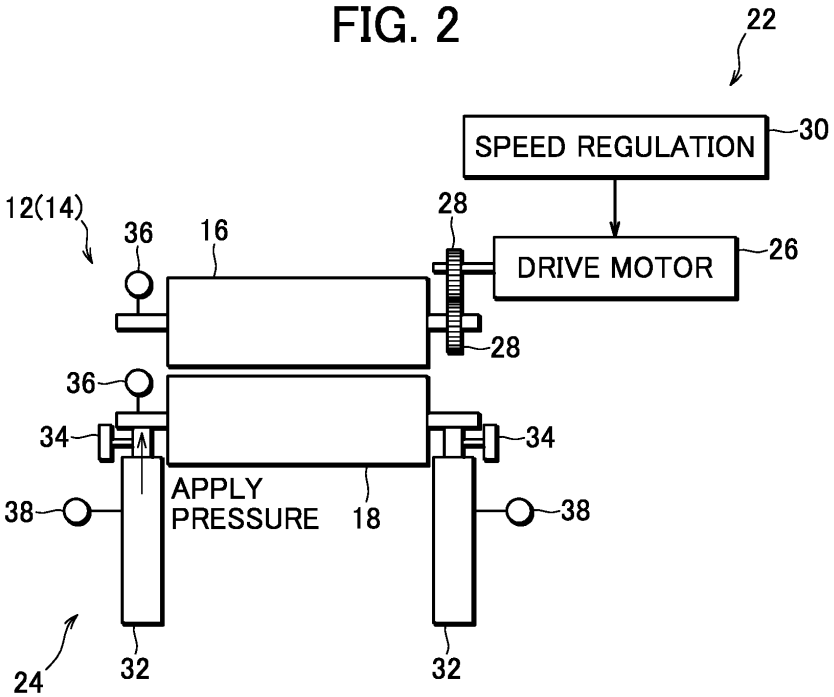
(54) **CIGARETTE PAPER, MANUFACTURING METHOD AND MANUFACTURING DEVICE THEREOF, AND CIGARETTE**

(57) In the cigarette paper making method and apparatus according to the present invention, a paper web (W) containing a filler for increasing gloss is prepared, and while traveling, the paper web is supercalendered and thereby formed into cigarette paper, wherein supercalendering allows the cigarette paper to have glossiness of 10 % or higher. The present invention also provides a cigarette comprising cigarette paper with the glossiness specified above.

FIG. 2



EP 3 312 340 A1

Description

Technical Field

[0001] The present invention relates to cigarette paper, a method and an apparatus for making same, and a cigarette.

Background Art

[0002] In the field of papermaking, calendering is publicly known as disclosed in Patent Documents 1 and 2 identified below. Soft calendering of Patent Document 1 is used to improve gloss and smoothness of a paper web without reducing its bulk, while calendering of Patent Document 2 is used to form a laminate from a metal foil strip and a paper strip.

Prior Art Document

Patent Document

[0003]

Patent Document 1: International Application Japanese Translation Publication No. 2003-520910 (WO01/055505)
Patent Document 2: Japanese Unexamined Patent Application Publication No. Hei 6-344462 (US 5,169,481)

Summary of the Invention

Problems to be solved by the Invention

[0004] The calendering of Patent Document 1 is suitable for offset printing papers, but not suitable for cigarette papers which are thin as compared with such printing papers. A laminate formed by the calendering of Patent Document 2 is used to form tubular members for non-combustion smoking articles, and thus, not usable as cigarette paper which is to be burned.

[0005] Further, neither Patent Document 1 nor 2 discloses or suggests a calendering process which allows relatively thin cigarette paper to have a glossiness of at least 10% or higher.

[0006] An object of the present invention is to provide cigarette paper having a glossiness of at least 10% or higher, and a method and an apparatus for making same.

Means for Solving the Problems

[0007] The above object is achieved by the method of making cigarette paper according to the present invention, which comprises
causing a paper web containing a filler for increasing gloss of the web to travel, and
supercalendering the traveling paper web, thereby forming the paper web into cigarette paper, wherein supercalendering is performed under processing conditions that allow the cigarette paper to have glossiness of at least 10% or higher.

[0008] The present invention also provides an apparatus for making cigarette paper, which comprises
a traveling path along which a paper web containing a filler for increasing gloss of the web is caused to travel, and
a processing section arranged on the traveling path to supercalender the paper web, thereby forming the paper web into cigarette paper, wherein the processing section is adapted to perform supercalendering under processing conditions that allow the cigarette paper to have glossiness of at least 10% or higher.

[0009] The present invention further provides a cigarette comprising cigarette paper having glossiness of at least 10% or higher.

Advantageous Effects of the Invention

[0010] The method and apparatus for making cigarette paper according to the present invention can make cigarette paper having glossiness of at least 10% or higher. The present invention can also provide a cigarette comprising such cigarette paper.

Brief Description of the Drawings

[0011]

FIG. 1 is a schematic front view of a cigarette paper making apparatus according to an embodiment of the present invention.

FIG. 2 is a schematic side view showing a processing section of the making apparatus of FIG. 1.

FIG. 3 is a graph showing the relation between filler content and glossiness on supercalendered cigarette paper.

FIG. 4 is a graph showing the results of sensory evaluation in which grade of supercalendered cigarette papers was evaluated based on their whiteness and the glossiness.

FIG. 5 shows a scale used in sensory evaluation.

FIG. 6 is a graph showing the results of sensory evaluation in which grade of supercalendered cigarette papers was evaluated based on their opacity and glossiness.

FIG. 7 is a graph showing the results of sensory evaluation in which feel of supercalendered cigarette papers was evaluated based on their smoothness.

FIG. 8 is a picture showing how a filtered cigarette comprising non-supercalendered cigarette paper burns, when left after ignited.

FIG. 9 is a picture showing how a filtered cigarette comprising supercalendered cigarette paper burns, when left after ignited.

Mode of Carrying out the Invention

[0012] A cigarette paper making method according to an embodiment of the present invention is carried out by a making apparatus shown in FIGS. 1 and 2. First, the making apparatus will be outlined below.

[0013] The making apparatus comprises a traveling path 10 for a paper web W. The traveling path 10 extends from a feed roll R1 to a wind-up roll R2, for example horizontally. The paper web W can be fed from the feed roll R1 and wound onto the wind-up roll R2.

[0014] The making apparatus further comprises a calendering section 12. The calendering section 12 comprises a roller set 14. The roller set 14 includes a metal roller, which is, for example a steel roller 16, and a resin roller 18. The resin roller 18 is arranged below the traveling path 10, while the steel roller 16 is arranged immediately above the traveling path 10. The traveling path 10 thus is sandwiched between the steel roller 16 and the resin roller 18. The steel roller 16 is made of steel, while the resin roller 18 has an outer cylindrical surface formed of a synthetic resin coating. The hardness of the resin roller, which means the surface hardness of the coating of the resin roller 18, is between D-50 and D-120, preferably between D-80 and D-100 in durometer values. The durometer value is obtained by the measuring method specified in JIS K6253.

[0015] As indicated by broken lines in FIG 1, the steel roller 16 as well as the resin roller 18 has an electric heater 20 within themselves. The electric heaters 20 are electrically connected to a power supply (not shown). The power supply can maintain the temperatures of the outer cylindrical surfaces of the steel and resin rollers 16, 18, referred to as "roller temperatures", at a set value by means of the heaters 20. Desirably, the set value for roller temperature is selected in the range of 25 to 160°C, for example.

[0016] As seen in FIG. 2, in the present embodiment, the making apparatus further comprises a drive source 22 for rotating the steel roller 16 in one direction and an elevating mechanism 24 for moving up and down the resin roller 14 relative to the steel roller 16.

[0017] The drive source 22 includes a drive motor 26. The drive motor 26 is connected to a roller shaft of the steel roller 16 by means of a pair of power transmission gears 28. The drive source 22 further includes a speed regulator 30 electrically connected to the drive motor 26. The speed regulator 30 can regulate the circumferential speed of the steel roller 16 to a set value by means of the drive motor 26.

[0018] The elevating mechanism 24 includes a pair of hydraulic cylinders 32. The hydraulic cylinders 32 are connected to the opposite ends of a roller shaft of the resin roller 18, respectively. The hydraulic cylinders 32 are connected to a hydraulic pressure source (not shown) including a hydraulic pump. The hydraulic pressure source controls supply and discharge of a hydraulic fluid to and from the respective hydraulic cylinders 32. The hydraulic pressure source can thus move up and down the resin roller 18 while maintaining it in a horizontal position. Thus, the paper web W traveling on the traveling path 10 is compressed as it passes between the steel roller 16 and the resin roller 18.

[0019] Further, the elevating mechanism 24 includes pressure regulation valves (not shown) assigned to the respective hydraulic cylinders 32. The pressure regulation valves regulate the pressure applied to the steel roller 16 by the resin roller 18. The pressure regulation valves can thus regulate the compressive pressure applied to the paper web W to a set value. In the present embodiment, the pressure regulation valves are operated manually. FIG. 2 shows operating handles 34 for the pressure regulation valves arranged near the respective hydraulic cylinders 32.

[0020] Further, temperature sensors 36 are provided to the steel roller 16 and the resin roller 18 to measure the roller temperatures, while pressure sensors 38 are provided to the respective hydraulic cylinders 32 to measure the compressive pressures (linear pressures) applied to the paper web W.

[0021] In the making method using the above-described making apparatus, a paper web W is fed from the feed roll

R1, where the paper web has desirably a moisture content of 3 to 7wt%. The moisture content is obtained by the measuring method specified in JIS P8123. The paper web W fed passes through the calendering section 12 while sandwiched between the steel roller 16 and the resin roller 18. The steel roller 16 and the resin roller 18 compress the paper web W. In the present making method, the paper web W is supercalendered in this manner, and then, the calendered paper web W is wound onto the wind-up roll R2.

[0022] Here, it is to be noted that in the present embodiment, the paper web W is supercalendered with its top side and back side in contact with the resin roller 18 and the steel roller 16, respectively.

[0023] In the present embodiment, the paper web W is formed from a pulp material suited for cigarette paper in a paper machine. The paper web W has, for example a basis weight of 40 to 63gsm or an apparent density of 600 to 900kg/m^3. Such paper web is formed into cigarette paper by the above-described supercalendering. In other words, the paper web W wound onto the roll R2 is used as cigarette paper to make cigarettes. For example, FIG. 1 shows a cigarette, specifically a filtered cigarette FC. The filtered cigarette FC comprises a length of cigarette paper CP. Such cigarette paper CP is 20 to 100μm thick, preferably 30 to 90μm thick.

[0024] Supercalendering increases the apparent density of the paper web W. It gives an apparent density of 800 to 1500kg/cm^3, preferably 1000 to 1300kg/cm^3 to the paper web W. Tensile force applied to the paper web W in supercalendering only needs to be at a level that the paper web W can withstand. For example, the tensile force is 20.0N/15mm or less, preferably 12.5N/15mm or less.

[0025] In the present embodiment, the paper web W contains a filler which is effective in improving gloss of the cigarette paper CP in cooperation with supercalendering. Here, the filler may be calcium carbonate, for example.

[0026] To validate the gloss improving effect of the filler, paper webs W having differing filler contents were prepared. Those paper webs W were superecalendered under specified processing conditions. The results of validation test are shown in FIG. 3. FIG. 3 shows the relation between filler content and glossiness of cigarette paper CP.

[0027] In FIG. 3, marks ○, Δ, □ represent cases in which paper web W was supercalendered under differing processing conditions, or in other words, with differing hardness (D-XX) of the resin roller 18 and differing roller temperature (°C). Mark ◊ represents cases in which paper web W was not supercalendered. The hardness of the resin roller 18 is expressed in aforementioned durometer values.

[0028] The results of validation test shown in FIG. 3 were obtained with the other processing conditions fixed. Specifically, the traveling speed of paper web W and the compressive pressure (linear pressure) were fixed at 5m/min and 5.6 N/mm, respectively. Incidentally, the traveling speed of paper web W and the compressive pressure may be set appropriately. For example, the traveling speed is selected within the range of 3 to 1000m/min, and the compressive pressure is selected within the range of 3 to 10N/mm.

[0029] The glossiness of cigarette paper CP was obtained by the measuring method specified in JAPAN TAPPI (the Technical Association of the Pulp and Paper Industry) No. 72.

[0030] The filler content was measured by the measuring method described below.

[0031] First, a solution that can dissolve the filler (an acidic solution or a basic solution, for example) is prepared. Then, paper web W is immersed in the solution to cause all the filler to transfer from the paper web W into the solution. Then, the amount of the filler in the solution is measured by an analytical instrument based on capillary electrophoresis or gas-chromatography.

[0032] With regard to the glossiness of cigarette paper CP, FIG. 3 shows the following:

(i) With regard to cigarette paper CP not subjected to supercalendering (see ◊), an increase in filler content does practically not increase the glossiness of cigarette paper CP.
(ii) Supercalendering with higher filler content increases the glossiness of cigarette paper CP to greater extent.
(iii) Provided that the roller temperature is the same, supercalendering with higher hardness of the resin roll 18 increases the glossiness of cigarette paper CP to greater extent.
(vi) Provided that the hardness of the resin roll 18 is the same, supercalendering at higher temperature of the resin roll 18 increases the glossiness of cigarette paper CP to greater extent.

[0033] Accordingly, in order to increase the glossiness of cigarette paper CP, it is necessary to increase the filler content or make the processing conditions concerning the roller temperature and hardness of the resin roll 18 harsher for the paper web W. For example, as seen from FIG. 3, if the cigarette paper CP needs to have glossiness of 10% or higher, the filler content needs to exceed at least 10gsm, and in order to give the cigarette paper CP glossiness of 15% or higher, the filler content needs to exceed at least 20gsm. However, too high filler content may lead to decreased tensile strength of the paper web W. Thus, the filler content is desirably higher than 20gsm and lower than 50gsm.

[0034] The inventers have confirmed that with regard to variations in glossiness of cigarette paper CP, the same tendency as seen in FIG. 3 is observed with different types of paper webs W. This has been confirmed with four types of paper webs indicated in Table 1 below

[Table 1]

W	Pulp type	Basis weight [gsm]	Filler content [gsm]	Pulp content [gsm]
#1	Wood	62.7	29.9	32.8
#2	Wood	47.4	23	24.4
#3	Flax	32	8.3	23.7
#4	Flax	26	8.3	17.7

[0035] Table 2 below shows the relation between pulp type and glossiness and smoothness of cigarette paper CP.

[Table 2]

W	Pulp type	Basis weight [gsm]	Pulp content [gsm]	Filler content [gsm]	Hardness	Roller temperature [°C]	Glossiness [%]	Smoothness [s]
#5	Flax	23.5	16.8	6.7	-	-	5.1	49.8
					D-83 Resin	25	11.4	99.6
						80	16.1	433
#6	Wood		16.2	7.3	-	25	5.7	137.9
					D-83 Resin		11.4	450.6
						80	15.8	480.5

[0036] Table 3 below shows the relation between pulp content and glossiness and smoothness of cigarette paper CP.

[Table 3]

W	Pulp type	Basis weight [gsm]	Pulp content [gsm]	Filler content [gsm]	Hardness	Roller temperature [°C]	Glossiness [%]	Smoothness [s]
#3	Flax	32	23.7	8.3	-	-	4.1	20.1
					D-83 Resin	25	9.6	210.1
						80	14.2	320
#4		26	17.7		-	25	4.6	58.9
					D-83 resin		9.4	275.7

[0037] In Tables 2 and 3, the sign "-" in the "Hardness" column indicates that supercalendering was not performed.

[0038] As is clear from Table 2, glossiness of cigarette paper CP does practically not vary with differing pulp type. Further, as is clear from Table 3, glossiness of cigarette paper CP does practically not vary with differing pulp content.

[0039] When calcium carbonate is added as a filler, it is known that calcium carbonate increases whiteness and opacity of a paper web W, and thus, of cigarette paper CP. Whiteness and opacity as well as glossiness serve as an index of grade of cigarette paper CP.

[0040] FIG. 4 shows the results of sensory evaluation in which eleven assessors evaluated grade of each paper web CP based on glossiness and whiteness. The scale used in the sensory evaluation is shown in FIG. 5. FIG. 4 shows that cigarette paper CP with glossiness of 10% or higher and with whiteness of 88 to 90 gives an impression of "high grade", where the glossiness of cigarette paper CP is preferably 15 to 40%. The whiteness of cigarette paper CP was measured by the measuring method specified in JIS P 8148-2001 (ISO 2470).

[0041] Sensory evaluation of grade of cigarette paper CP can be made based on glossiness and opacity in place of whiteness. The results of sensory evaluation made this way are shown in FIG. 6. Also in this sensory evaluation, the scale shown in FIG. 5 was used.

[0042] FIG. 6 shows that cigarette paper CP with glossiness of 10% or higher and with opacity of 82 to 92, or in other

word, at least 82 or higher gives an impression of "high grade". The opacity of cigarette paper was measured by the measuring method specified in ISO 2471.

[0043] Further, supercalendering increases smoothness of cigarette paper CP. Sensory evaluation of feel of cigarette paper CP can be made based on smoothness using the scale shown in FIG. 5. The results of evaluation made this way are shown in FIG. 7. The smoothness of cigarette paper CP was measured by the measuring method specified in JIS P 8119 (ISO 5627). FIG. 7 shows that cigarette paper with a smoothness of 400" or higher, preferably 700" or higher gives a good feel. Increase in smoothness of cigarette paper CP is also effective in reducing paper dust produced from cigarette paper CP in the process of making filtered cigarettes. Further, increase in smoothness of cigarette paper CP is also effective in increasing ease of removing a filtered cigarette FC from a cigarette package. Too high smoothness of cigarette paper CP may cause a slip of cigarette paper CP in the wrapping process, or process of wrapping smokable materials including tobacco shreds with the cigarette paper CP, which may lead to reduced productivity in making cigarette rods, and thus, making cigarettes. As a result, the smoothness of cigarette paper CP is desirably 3000" or lower, for example.

[0044] Supercalendering increases the density of cigarette paper CP, and thus, is effective in suppressing flying of ash produced by smoking a filtered cigarette comprising cigarette paper CP.

[0045] FIG. 8 shows how a filtered cigarette made using a paper web W (#1) not subjected to supercalendeing burns, when left after ignited, and FIG. 9 shows how a filtered cigarette FC made using cigarette paper CP formed by supercalendering a paper web W (#1) burns, when left after ignited, where supercalendering was performed under conditions of resin roll hardness D-90 and roller temperature 80 °C. Comparison between FIGS. 8 and 9 shows that the filtered cigarette comprising supercalendered cigarette paper produces a stable mass of ash, so that flying of ash is effectively suppressed.

[0046] Further, supercalending, which increases the density of cigarette paper CP, reduces the burning rate of the cigarette paper CP, reduces minute pin holes in the cigarette paper CP and reduces the air permeability of the cigarette paper CP. Controlling of burning rate serves to provide a required appropriate number of puffs per filtered cigarette FC. Here, the controlling is effective when cigarette paper CP not subjected to supercalendering has too high a burning rate to provide an appropriate number of puffs per filtered cigarette FC. Reduction of minute pin holes serves to reduce the amount of visible sidestream smoke from a filtered cigarette FC, and reduction of air permeability serves to improve a sensation of resistance caused by drawing on a filtered cigarette FC at initial puffs.

[0047] The present invention is not restricted to the described embodiment but may be altered in various ways. For example, a filler for improving gloss of cigarette paper CP other than calcium carbonate may be used alone or in combination with calcium carbonate. It goes without saying that the processing conditions for supercalendering other than those concerning the hardness of the resin roller 18 and the roller temperature may be varied. For example, the traveling speed of the paper web W and the compressive pressure applied to it may be varied appropriately.

[0048] The cigarette diameter representing the transverse size (cross-sectional area) of the filtered cigarette FC comprising cigarette paper CP according to the present invention is not restricted to a specified value. Ordinary cigarettes have a diameter of 7.5 to 8.5mm. Among slim-sized cigarettes smaller in diameter than ordinary cigarettes, there are known cigarettes with a diameter of 6.5 to 7.5mm and cigarettes with a diameter of 5.0 to 6.5mm. Thus, the diameter of the cigarette according to the present invention may be selected in the range of 5.0 to 8.5mm. However, the consumer's perceived glossiness of cigarette paper CP depends on the angular displacement of the consumer's line of sight. Cigarette of smaller diameter, or in other words, cigarette circumference of greater curvature results in greater angular displacement of the consumer's line of sight per unit length of cigarette circumference, so that the consumer perceives higher glossiness of cigarette paper.

Explanation of Reference Signs

[0049]

10 Traveling path
12 Processing section
14 Roller set
16 Steel roller (metal roller)
18 Resin roller
20 Electric heater
22 Drive source
24 Elevating mechanism
36 Temperature sensor
38 Pressure sensor
W Paper web

CP Cigarette paper
FC Filtered cigarette

Claims

1. A method of making cigarette paper, comprising
causing a paper web containing a filler for increasing gloss to travel, and
supercalendering the traveling paper web, thereby forming the paper web into cigarette paper, wherein supercalendering is performed under processing conditions that allow the cigarette paper to have glossiness of at least 10% or higher.

2. The method of making cigarette paper according to claim 1, wherein
the paper web is supercalended by a roller set including a metal roller and a resin roller which applies compressive pressure to the paper web passing between the metal roller and the resin roller, and
the processing conditions include conditions concerning roller temperature of the roller set, hardness of the resin roller, and the compressive pressure.

3. The method of making cigarette paper according to claim 2, wherein the filler is a substance which increases not only gloss but also opacity of the cigarette paper.

4. The method of making cigarette paper according to claim 3, wherein the filler is calcium carbonate.

5. The method of making cigarette paper according to claim 3, wherein the filler is contained in the paper web in the amount exceeding at least 10gsm when the paper web has a basis weight of 40 to 63gsm.

6. An apparatus for making cigarette paper, comprising
a traveling path along which a paper web containing a filler for increasing gloss is caused to travel, and
a processing section arranged on the traveling path to supercalender the paper web, thereby forming the paper web into cigarette paper, wherein the processing section is adapted to perform supercalendering under processing conditions that allow the cigarette paper to have glossiness of at least 10% or higher.

7. The apparatus for making cigarette paper according to 6, wherein
the processing section comprises a roller set including a metal roller and a resin roller to applies compressive pressure to the paper web passing between the metal roller and the resin roller, and
the processing conditions include conditions concerning roller temperature of the roller set, hardness of the resin roller, and the compressive pressure.

8. The apparatus for making cigarette paper according to 7, wherein the filler is a substance which increases not only gloss but also opacity of the cigarette paper.

9. The apparatus for making cigarette paper according to 8, wherein the filler is calcium carbonate.

10. The apparatus for making cigarette paper according to 8, wherein the filler is contained in the paper web in the amount exceeding at least 10gsm when the paper web has a basis weight of 40 to 63gsm.

11. A cigarette comprising cigarette paper with glossiness of 10% or higher.

12. The cigarette according to claim 11, wherein the cigarette paper is supercalendered paper.

13. The cigarette according to claim 11, wherein the cigarette paper has opacity of 82 or higher.

14. The cigarette according to claim 11, wherein the cigarette paper has smoothness of 400" or higher.

FIG. 1

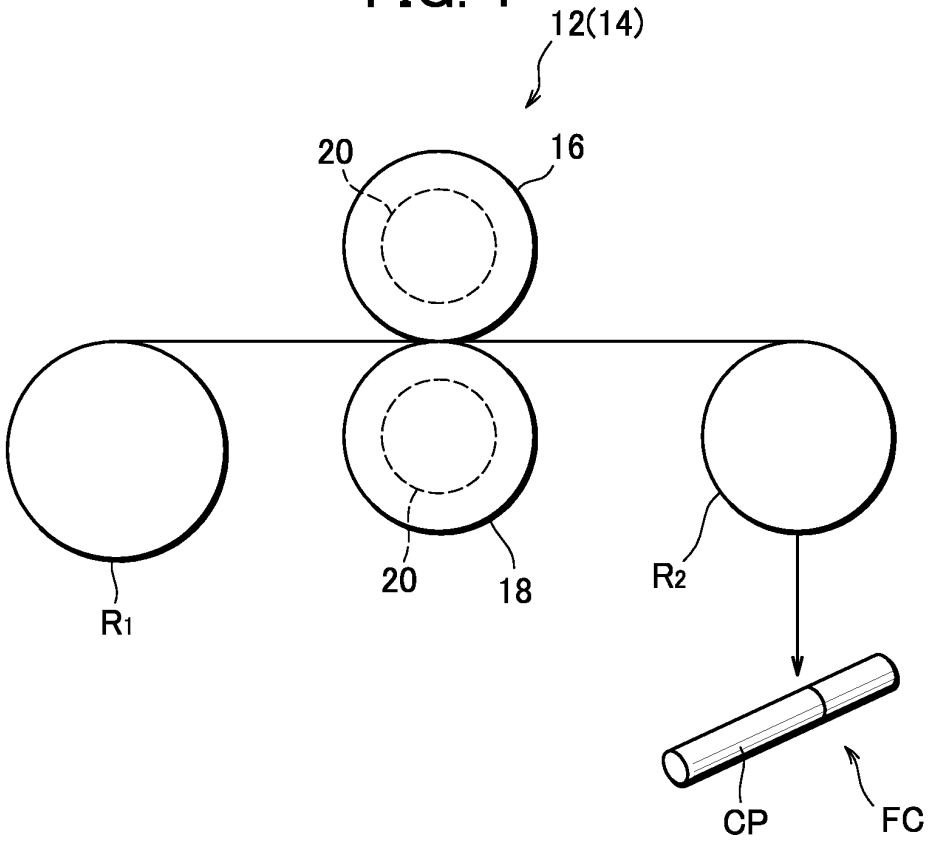

12(14)
20
16
20
18
R1
R2
CP
FC

FIG. 2

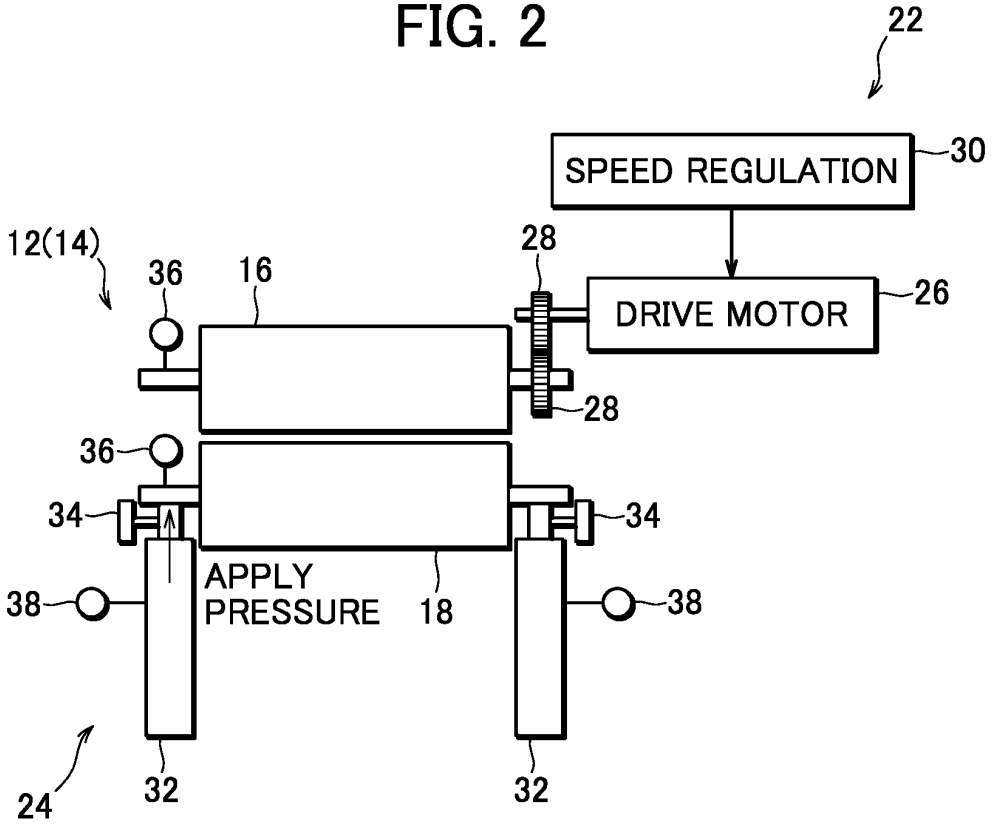

22
SPEED REGULATION
30
12(14)
36
16
28
DRIVE MOTOR
26
28
36
34
34
APPLY
PRESSURE
18
38
38
24
32
32

FIG. 3

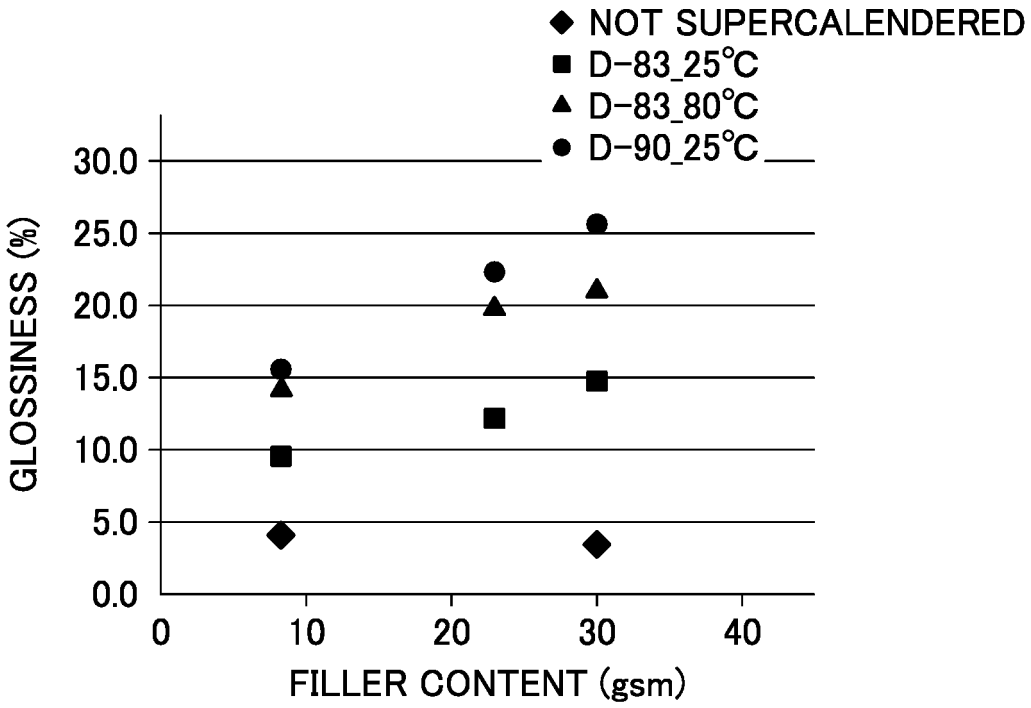

NOT SUPERCALENDERED
D-83_25℃
D-83_80℃
D-90_25℃
GLOSSINESS (%)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0
10
20
30
40
FILLER CONTENT (gsm)

FIG. 4

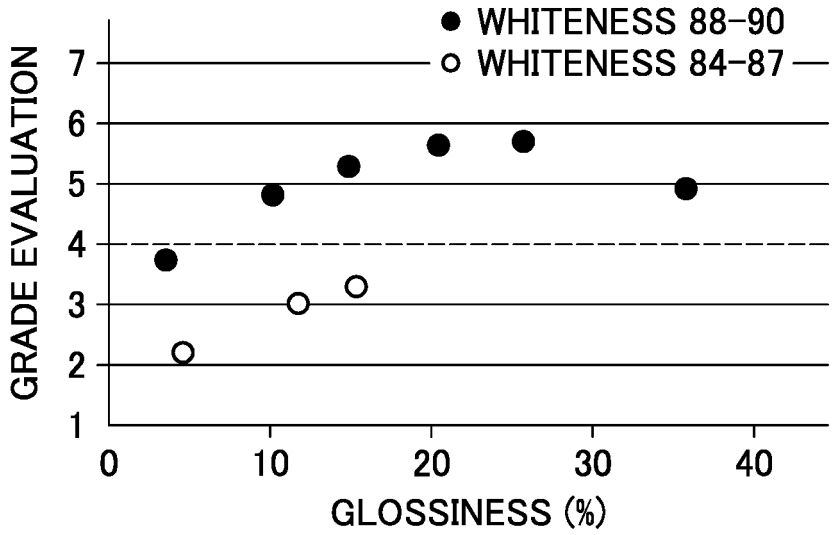
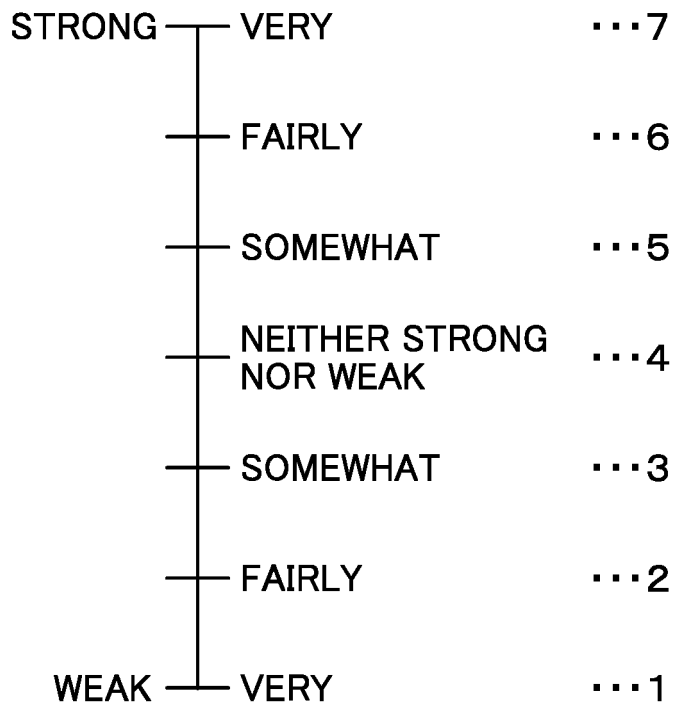

WHITENESS 88-90
WHITENESS 84-87
GRADE EVALUATION
7
6
5
4
3
2
1
0
10
20
30
40
GLOSSINESS (%)

FIG. 5



SCALE FOR SENSORTY EVALUATION

FIG. 6

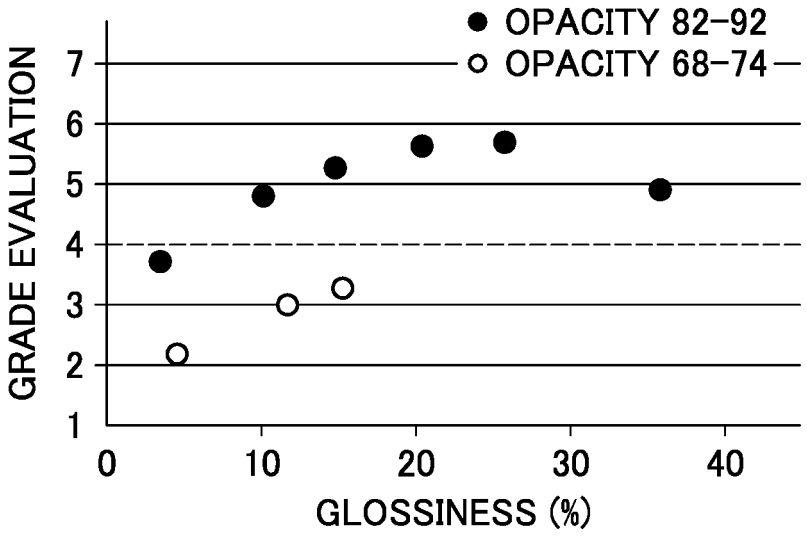


FIG. 7

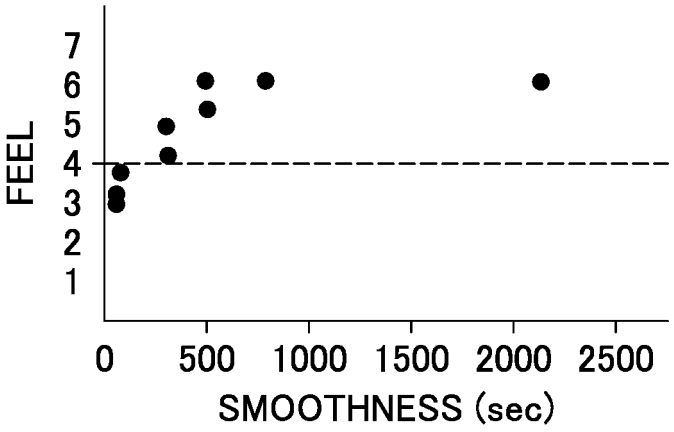


FIG. 8

W(#1)

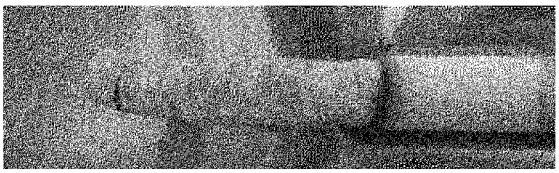
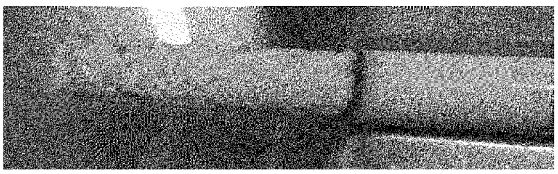


FIG. 9

W(#1)＋SUPERCALENDERING



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2015/068521

A. CLASSIFICATION OF SUBJECT MATTER
D21H27/00(2006.01)i, *A24D1/02*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D21B1/00-1/38, D21C1/00-11/14, D21D1/00-99/00, D21F1/00-13/12,
D21G1/00-9/00, D21H11/00-27/42, D21J1/00-7/00, A24D1/00-3/18

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2015
Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 09-049198 A (Mishima Paper Co., Ltd.), 18 February 1997 (18.02.1997), claims; paragraphs [0026] to [0028], [0045]; examples & US 5722433 A & EP 758532 A2	1,6,11-14 2-5,7-10
X Y	JP 08-246396 A (Mishima Paper Co., Ltd.), 24 September 1996 (24.09.1996), claims; paragraphs [0017] to [0020], [0025]; examples (Family: none)	1,6,11-14 2-5,7-10
Y	JP 05-279983 A (Oji Paper Co., Ltd.), 26 October 1993 (26.10.1993), claims; paragraphs [0002], [0007], [0014], [0015], [0020]; comparative examples (Family: none)	2-5,7-10

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
14 September 2015 (14.09.15)	06 October 2015 (06.10.15)
Name and mailing address of the ISA/ Japan Patent Office 3-4-3,Kasumigaseki,Chiyoda-ku, Tokyo 100-8915,Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 55-029955 A (Michiharu NAKAYAMA), 03 March 1980 (03.03.1980), entire text (Family: none)	1-14
A	CN 101935962 A (Mudanjiang Hengfeng Paper Co., Ltd.), 05 January 2011 (05.01.2011), entire text (Family: none)	1-14

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2003520910 A **[0003]**
- WO 01055505 A **[0003]**
- JP HEI6344462 B **[0003]**
- US 5169481 A **[0003]**