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

(11) EP 0 829 776 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.03.1998 Bulletin 1998/12

(51) Int. Cl.[6]: **G03G 15/20**, G03G 15/01

(21) Application number: **97111165.3**

(22) Date of filing: **03.07.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **13.09.1996 JP 243112/96**

(71) Applicant:
MITSUBISHI DENKI KABUSHIKI KAISHA
Tokyo 100 (JP)

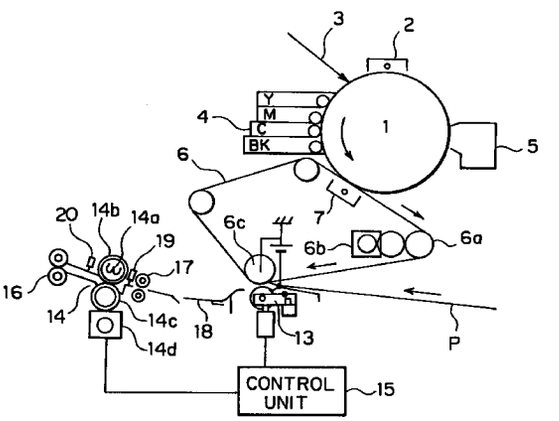
(72) Inventor: **Nakamura, Teruo**
Chiyoda-ku, Tokyo 100 (JP)

(74) Representative:
von Fischern, Bernhard, Dipl.-Ing. et al
Hoffmann - Eitle,
Patent- und Rechtsanwälte,
Arabellastrasse 4
81925 München (DE)

(54) Fixing unit for use in an electrophotographic printing apparatus

(57) A fixing unit for use in a low-cost and compact electrophotographic printing apparatus, which permits easy control of electrophotographic process and presents a stable image quality in the formation of an image requiring transmissivity, such as an image forming on a transparent sheet. When an image output medium is an overhead projector transparent sheet, the overhead projector transparent sheet is continuously held between a fixing roller and a fixing backup roller in the fixing unit and a plurality of heating and fixing process are repeated on to the overhead projector transparent sheet by repeatedly rotating both rollers in normal and reverse directions.

FIG. 1



EP 0 829 776 A1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a fixing unit that thermally fuses and fixes a toner image onto an image output medium after transferring the toner image from an image carrying medium to the image output medium in a hard-copy output apparatus such as a printer and a copying machine.

2. Description of the Related Art

Fig. 7 is a cross-sectional view of a conventional electrophotographic printing apparatus disclosed by Japanese Unexamined Patent Publication No. 4-7564. The printing operation of the electrophotographic printing apparatus includes the following processes: a charging process for charging uniformly the surface of a photoconductor body, an exposure process that forms a latent image in accordance with image information by exposing partially the photoconductor body to light to discharge partially the charged body, a development process for causing the toner as a developing agent to adhere to the latent image to form a toner image, a transfer process for transferring the toner image to an image output medium (hereinafter referred to as paper sheet), a cleaning process for removing toner particles residing on the photoconductor body, and a fixing process for fixing the transferred toner image onto the paper sheet by thermal fusing.

A cylindrical photoconductor body 1 is rotatably supported by an unshown frame. A charging unit 2 uniformly charges the surface of the photoconductor body 1 to undergo the charging process. An exposing light flux 3 is directed to the photoconductor body 1 by optical light projection means to partially discharge the charged photoconductor body 1. Namely, the optical light projection means performs the exposure process. In succession, a development unit 4 forms a toner image by causing a toner to adhere to the latent image on the photoconductor body 1. Namely, the development unit 4 performs the development process. The development unit 4 includes four color toners for yellow (Y), magenta (M), cyan (C), and black (BK).

An endless belt-like image carrying member 6 is arranged next to the photoconductor body 1. The image carrying member 6 rotates in synchronization with the photoconductor body 1. A first transfer unit 7 transfers, to the image carrying member 6, the toner that is developed on the photoconductor body 1 on a color by color basis, and thus a color toner image is formed thereon. A second transfer unit 8 is arranged below the image carrying member 6. The second transfer unit 8 electrostatically transfers the color toner image on the image carrying member 6 to a paper sheet P supplied by a paper feed unit. The first transfer unit 7 and second transfer unit 8 perform the transfer process.

A cleaner 5 is disposed between the image carrying member 6 and the charging unit 2, around the circumference the photoconductor body 1. The cleaner 5 performs the cleaning process by removing residual toner particles from the photoconductor body 1.

A fixing unit 9 is mounted to the right of the second transfer unit 8 as shown in Fig. 7. A transport belt 10 transports the paper sheet P from the second transfer unit 8 to the fixing unit 9. The fixing unit 9 thermally fuses the transferred toner image on the paper sheet P to fix the image thereon, namely, performs the fixing process. Arranged below the transport belt 10 is a recirculation path 11 that allows the paper sheet P to pass the second transfer unit 8 a plural number of times. Arranged at the output port of the fixing unit 9 is a separator which sorts one paper sheet P that is delivered out as a finished one from the other paper sheet P that is circulated back to the recirculation path 11.

The above electrophotographic printing apparatus is capable of printing an image not only on a plain paper sheet (non-transparent) but also on a transparent sheet for use with an overhead projector (OHP). In the process of fixing a toner image onto a transparent sheet, the toner image is completely fused such that the top surface of the toner image is flattened to assure transmissivity and thereby to heighten the fidelity of hue of the image. To assure transmissivity by completely fusing the toner, a transparent sheet is typically subjected to a longer fixing time in the fixing process than a plain paper sheet. To this end, the transparent sheet is routed back into the recirculation path 11 to travel past the fixing unit 9 several times and thus to allow a sufficient time for the toner to completely fuse.

Some of electrophotographic printing apparatuses prolongs the fixing time to improve the fusing state of the toner by detecting automatically transparency of the sheet P and slowing the fixing rate below that of a plain sheet to prolong the fixing time.

When the sheet P is recirculated back to the fixing unit to perform a plurality of fixing cycles, the length of a recirculation path 11 has to correspond to the size of a sheet. Specifically, the recirculation path 11 has to be long enough to accommodate a sheet with its backward edge clear of the fixing unit and its forward edge yet to come to the fixing unit. A long recirculation path 11 accommodating a variety of sheet sizes makes the apparatus bulky and pushes up the cost of the apparatus.

When a fixing operation is performed at a lowered fixing rate, the transport speed of a paper sheet is made uniform over the entire area of the paper sheet to prevent the distortion of a toner image (image degradation) due to the expansion and contraction of a paper sheet in the direction of paper transport.

To slow the fixing rate, both the rotational speed of a fixing roller and the rotational speed of the belt as the

image carrying member 6 need to be slowed. In each of both modes for fixing the color toner to the plain paper sheet and for fixing the color toner to the transparent sheet, the control of the entire electrophotographic process becomes complex. Particularly at the moment immediately subsequent to a switching from one mode to another, it is difficult to obtain optimum electrophotographic process conditions (physical property values) suitable to each imaging rate, and thus the reliability of image quality is impaired.

OHP sheets are commercially available in a wide range of thickness, and the fixing conditions for attaining an optimum transmissivity vary depending on thickness. To fix the toner to a thick transparent sheet, three to four cycles of fixing process has to be performed. Each time the sheet advances past the long sheet recirculation path 11, and thus the surface of the transparent sheet is subject to damage, and the image is possibly degraded.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a fixing unit for use in a low-cost and compact electrophotographic printing apparatus, which permits easy control of electrophotographic process and presents a stable image quality in the formation of an image requiring transmissivity, such as an image forming on a transparent sheet.

In a first aspect of the present invention, the fixing unit for use in an electrophotographic printing apparatus that heats and fixes a toner image onto an image output medium after transferring to the image output medium the toner image into which an electrostatic latent image is developed, comprises reciprocating movement means which performs a heating and fixing process a plural number of times by rotating a fixing roller in a normal direction and then a reverse direction when the image output medium is an overhead projector transparent sheet.

In a second aspect of the present invention, the number of reciprocating movement cycles is varied in accordance with the type of the transparent sheet.

In a third aspect of the present invention, the rotational speed of the fixing roller is varied in accordance with the type of the transparent sheet, when the fixing roller rotates in the reverse direction.

In a fourth aspect of the present invention, the fixing unit for use in an electrophotographic printing apparatus comprises two sensors disposed upstream of and downstream of the fixing roller, for detecting the presence or absence of the overhead projector transparent sheet, wherein the fixing roller changes the direction of rotation after the fixing roller continuously rotates to transport the transparent sheet with the transparent sheet in a continuously held state for a predetermined duration of time in succession to the detection by the sensor of a shift from the presence of the transparent sheet to the absence of the transparent sheet.

In a fifth aspect of the present invention, the fixing unit for use in an electrophotographic printing apparatus comprises a paper guide for guiding the image output medium having the toner image transferred thereon, and a paper retraction path that communicates with a slot which is disposed in the middle of the paper guide, and into which the backward edge of the image output medium is introduced when the fixing roller rotates in the reverse direction.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows the major portion of an electrophotographic printing apparatus of the present invention.

Figs. 2A through 2D show the operation of a first embodiment of the present invention.

Fig. 3 is a table listing the thicknesses of transparent sheets versus the rotational speeds of a heating roller in its reverse rotation according to a second embodiment of the present invention.

Fig. 4 diagrammatically shows a fixing unit according to a third embodiment of the present invention.

Figs. 5A through 5C show the operation of the third embodiment of the present invention.

Figs. 6A and 6B diagrammatically shows a fixing unit according to a fourth embodiment of the present invention.

Fig. 7 is a cross-sectional view showing a conventional electrophotographic printing apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

First embodiment

Fig. 1 shows the major portion of an electrophotographic printing apparatus of the present invention. Reference numerals 1 through 7 are equivalent to those already described in connection with the conventional apparatus.

A driving motor 6b is disposed inner side an image carrying member 6. The driving motor 6b transmits torque via a driving roller 6a to the image carrying member 6 to rotate it. A transfer backup roller 6c gives tension to the image carrying member 6 while serving as one of the two electrodes for a transfer unit to be described below.

A transfer roller 13 is arranged such that it is engaged and then disengaged with the image carrying member 6 with a paper sheet P therebetween. When the transfer roller 13 is engaged with the transfer backup roller 6c, the image carrying member 6 is pressed into contact with the paper sheet P. The engagement and disengagement actions of the transfer roller 13 is controlled by a control unit 15. A direct current is applied between the transfer roller 13 and the transfer backup roller 6c. The toner image on the image carrying member 6 is transferred to the paper sheet P

by the electric field induced by the direct current. The transfer roller 13 constitutes a second transfer unit.

Arranged to the left of the transfer roller 13 is a fixing unit 14. The fixing unit 14 comprises a heating roller 14b, as a fixing roller, having a heater 14a therein, a fixing backup roller 14c in contact with the heating roller 14b, and a driving roller 14d for driving the heating roller 14b. The driving roller 14d, controlled by the control unit 15, rotates the heating roller 14b. The control unit 15 controls the heating roller 14b in terms of the direction of rotation, normal or reverse and the number of rotations (rotation time).

The fixing unit 14 is provided with auxiliary rollers 16, 17 on both outward side. The auxiliary rollers 16, 17 rotate in synchronization with the heating roller 14b in the same direction and at the same circumferential speed. The auxiliary rollers 16, 17 are arranged such that both can be engaged and disengaged with the paper sheet P. A paper guide 18 is arranged between the transfer roller 13 and the fixing unit 14 to guide the paper sheet P from the transfer roller 13 to the fixing unit 14.

Sensors 19, 20 are mounted on both side of the fixing unit 14. The sensors 19, 20 detects the forward edge and backward edge of the paper sheet P or a transparent sheet Q.

When a plain paper sheet is subjected to a fixing process in the electrophotographic printing apparatus thus constructed, the paper sheet P brought in from an unshown paper cassette advances through between the transfer roller 13 and the transfer backup roller 6c, the transfer roller 13 is pressed into contact with the transfer backup roller 6c, the toner on the image carrying member 6 is transferred to the paper sheet P by means of the force of electric field.

The paper sheet P on which the toner is transferred advances past the paper guide 18. The paper sheet further advances between the heating roller 14b and the fixing backup roller 14c while being heated. The toner is thus fused and fixed onto the paper sheet P. The auxiliary rollers 17 are kept clear of the paper sheet P so that unfixed toner particles are not disturbed by the auxiliary rollers 17. This completes the electrophotographic process for the plain paper sheet.

As for an OHP transparent sheet Q, the toner needs to be completely fused on the transparent sheet Q to heighten the fidelity of hue. If the same fixing process time for the plain paper sheet is applied to a transparent sheet Q, heating for fixing process is insufficient. In the present invention, a separate sensor or a control condition setting unit beforehand notifies the control unit 15 that a transparent sheet is going to be fixed. Once the sensor 20 detects the backward edge of the transparent sheet that advances past the fixing unit 14, the heating roller 14b is rotated in the reverse direction to return the transparent sheet Q to the fixing unit 14 to heat it again. When the sensor 19 detects the end of the second fusing and fixing process, the heating roller 14b is rotated in the normal direction to continue the fusing and fixing process.

The above operation is further discussed referring to Figs. 2A through 2D.

(A) The toner on the image carrying member 6 is transferred to the transparent sheet Q by the transparent roller 13. The forward edge of the transparent sheet Q reaches the fixing unit 14. The heating roller 14b rotates in the normal direction to fuse and fix the toner onto the transparent sheet Q. The auxiliary rollers 17 are kept clear of the transparent sheet Q.

(B) When the backward edge of the transparent sheet Q is detected by the sensor 20, the heating roller 14b stops rotating and then starts rotating in the reverse direction.

(C) With the heating roller 14b rotating in the reverse direction, the toner is heated and fused. When the sensor 19 detects the forward edge of the transparent sheet Q, the heating roller 14b stops reverse rotation. The auxiliary rollers 17 are now in contact with the transparent sheet Q, while the transfer roller 13 is parted from the image carrying member 6.

(D) In succession, the heating roller 14b starts rotating in the normal direction to pressurize and heat the toner on the transparent sheet Q for the third time, and the transparent sheet Q is transported to its delivery side. The toner transferred on the transparent sheet Q is sufficiently fused to a level enough to assure transmissivity. The transparent sheet Q is delivered out of the fixing unit 14, and the fixing process ends.

(E) Depending on the type and thickness of the OHP transparent sheet, the number of reciprocating fixing cycles may be increased to completely fuse the toner.

Second embodiment

Since OHP transparent sheets are available in different types such as different thicknesses, an integer multiplication of a constant heating and fixing time not necessarily results in an optimum toner fusing and fixing result. Occasionally, the transparent sheet Q is heated excessively enough to be deformed. The rotational speed of the heating roller 14b may be varied depending on the type of the transparent sheet Q. However, the change of the rotational speed of the transfer roller degrades the image as already described in connection with the background art, and is not acceptable. The rotational speed of the heating roller 14b in its reverse rotation only is controlled to its optimum value to ensure the complete fusing of the toner but to prevent the deformation of the transparent sheet Q. Fig. 3 shows one example of the relationship between the thickness of the transparent sheet and the reverse rotation speed of the

heating roller.

Third embodiment

Fig. 4 shows diagrammatically shows a fixing unit according to a third embodiment of the present invention. Reference numerals 6, 13, 14, 18 through 20 are equivalent to those described with reference to the first embodiment. A delivery roller 21 does not necessarily rotate in synchronization with the circumferential speed of the heating roller 14b. The sensors 19, 20 are spaced apart from the nip between the heating roller 14b and the fixing backup roller 14c, by distances L1 and L2, respectively. These spacings are needed because the effect of heat from the heating roller 14b on the sensors 19, 20 needs to be reduced and the heating roller 14b itself needs a certain diameter to accommodate the heater 14a therein.

Referring to Fig. 5A through Fig. 5C, the operation of the third embodiment is discussed. As shown in Fig. 5A, the toner is transferred to the transparent sheet Q, and the forward edge of the transparent sheet Q is introduced into the fixing unit. From this state, the transparent sheet Q is transported upward left, and the backward edge of the transparent sheet Q is detected by the sensor 19 as shown in Fig. 5B. The distance L1 from the sensor 19 to the nip between the heating roller 14b and the fixing backup roller 14c is known, and the rotational speed of the heating roller 14b is also known. The transparent sheet Q is continuously transported further for a predetermined duration after the sensor 19 detects the backward edge of the transparent sheet Q, and the heating roller 14b stops, and then starts rotating in the reverse direction. Namely, with the transparent sheet Q at its backward edge margin still held between the heating roller 14b and the fixing backup roller 14c, the heating roller 14b starts rotating in the reverse direction. Fig. 5C shows the state where the forward edge of the transparent sheet 5C is detected by the sensor 20 after the heating roller 14b rotates reversely. With the transparent sheet Q at its forward edge margin still held between the heating roller 14b and the fixing backup roller 14c, the heating roller 14b stops reverse rotation and then starts rotating in the normal direction.

In this way, the transparent sheet Q is always held between the heating roller 14b and the fixing backup roller 14c while the transparent sheet Q is reciprocated. The auxiliary rollers 16, 17 described with reference to the first embodiment are dispensed with. The apparatus is thus of a simple construction and a compact design is implemented.

Fourth embodiment

Fig. 6A and 6B diagrammatically show a fixing unit according to a fourth embodiment of the present invention. As shown, reference numerals 6, 13, 14, and 18 through 21 are equivalent to those described with reference to the third embodiment. The description of them remains the same. A slot disposed in the middle of the paper guide 18 communicates with a paper retraction path 22.

The operation of the fourth embodiment is now discussed. The forward edge of the transparent sheet Q onto which the transfer roller 13 transferred the toner from the image carrying member 6 reaches the fixing unit 14. Fig. 6A shows this state. The slot 18a has a step structure so that the forward edge of the transparent sheet Q skips over the slot 18a. When the heating roller 14b shifts its fixing process in the normal direction to its fixing process in the reverse direction, the reverse moving transparent sheet Q at its backward edge enters the step of the slot 18a into the paper retraction path 22.

By retracting the backward edge of the transparent sheet Q into the paper retraction path 22 during the reverse rotation of the heating roller 14b, the backward edge of the transparent sheet Q is kept out of contact with the image carrying member 6, and thus the smearing of the image with toner particles residing on the image carrying member 6 is avoided. Without the paper retraction path, the printing speed is slowed, particularly when the transparent sheet Q needs a long fixing time; without the paper retraction path, the backward edge of the transparent sheet Q will be in contact with the image carrying member 6 and will destroy a developed toner image, if the development of the next toner image is attempted on the image carrying member 6, and thus the development of the next image must wait until the completion of the fixing process for the current transparent sheet Q. By allowing the transparent sheet Q to escape into the paper retraction path 22, the next image is developed onto the image carrying member 6 regardless of the fixing process.

According to the first aspect of the present invention, the heating and fixing process is repeated a plural number of times by causing the fixing roller in the fixing unit to rotate in the normal direction and reverse direction when the image output medium is an overhead projector transparent sheet. The toner is thus well fused and a resulting image presents a good transmissivity on the overhead projector transparent sheet.

According to the second aspect of the present invention, the number of reciprocating movement cycles is varied in accordance with the type of the transparent sheet. The toner is thus well fused and a good color hue image results.

According to the third aspect of the present invention, the speed of the fixing roller is varied in accordance with the type of the transparent sheet, only when the fixing roller rotates in the reverse direction. The overhead projector transparent sheet is prevented from being heated excessively, and thus thermal deformation of the sheet is avoided.

According to the fourth aspect of the present invention, the sensor is used to keep the overhead projector transparent sheet held during reciprocating movement

for fixing process. The auxiliary rollers for transporting the overhead projector transparent sheet in reciprocating movement are dispensed with.

According to the fifth aspect of the present invention, the apparatus comprises the paper retraction path into which the backward edge of the overhead projector transparent sheet is introduced when the fixing roller rotate in its reverse direction. The backward edge of the transparent sheet is kept out of contact with the image carrying member, and thus the smearing of the image with toner particles residing on the image carrying member is avoided.

Claims

1. A fixing unit for use in an electrophotographic printing apparatus that heats and fixes a toner image onto an image output medium (P,Q) after transferring to said image output medium (P,Q) said toner image into which an electrostatic latent image is developed, said fixing unit comprising:

   reciprocating movement means which performs a heating and fixing process a plural number of times by rotating a fixing roller (14a) in a normal direction and then a reverse direction when said image output medium (P,Q) is an overhead projector transparent sheet (Q).

2. A fixing unit for use in an electrophotographic printing apparatus according to Claim 1, wherein the number of reciprocating movement cycles is varied in accordance with the type of said transparent sheet (Q).

3. A fixing unit for use in an electrophotographic printing apparatus according to Claim 1, wherein the rotational speed of said fixing roller (14b) is varied in accordance with the type of said transparent sheet (Q), when said fixing roller (14b) rotates in said reverse direction.

4. A fixing unit for use in an electrophotographic printing apparatus according to any one of Claims 1 through 3, comprising two sensors (19,20) disposed upstream of and downstream of said fixing roller (14b), for detecting the presence or absence of said overhead projector transparent sheet (Q), wherein said fixing roller (14b) changes the direction of rotation after said fixing roller (14b) continuously rotates to transport said transparent sheet (Q) with said transparent sheet (Q) in a continuously held state for a predetermined duration of time in succession to the detection by said sensor (19,20)of a shift from the presence of said transparent sheet (Q) to the absence of said transparent sheet.

5. A fixing unit for use in an electrophotographic printing apparatus according to any one of Claims 1 through 4, comprising a paper guide (18) for guiding said image output medium (P,Q) having the toner transferred thereon, and

   a paper retraction path (22) that communicates with a slot which is disposed in the middle of the paper guide (18), and into which the backward edge of said image output medium (P,Q) is introduced when the fixing roller (14b) rotates in the reverse direction.

FIG. 1

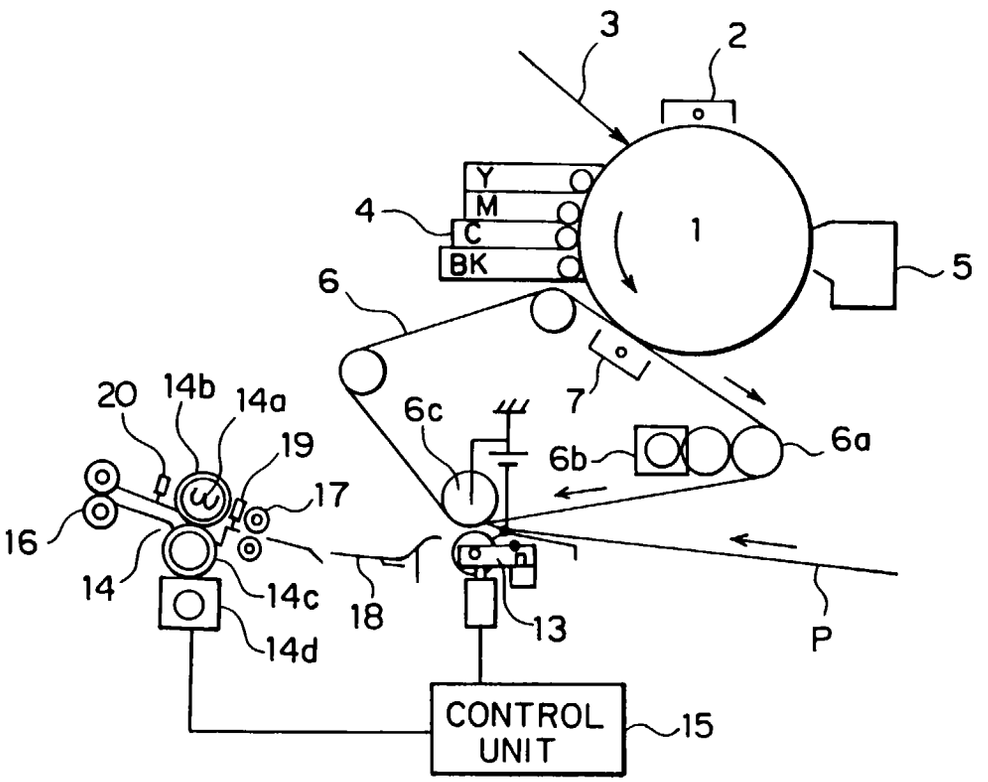

3
2
Y
M
C
BK
4
1
5
6
7
20
14b
14a
19
17
6c
6b
6a
16
14
14c
14d
18
13
P
CONTROL UNIT
15

FIG. 2A

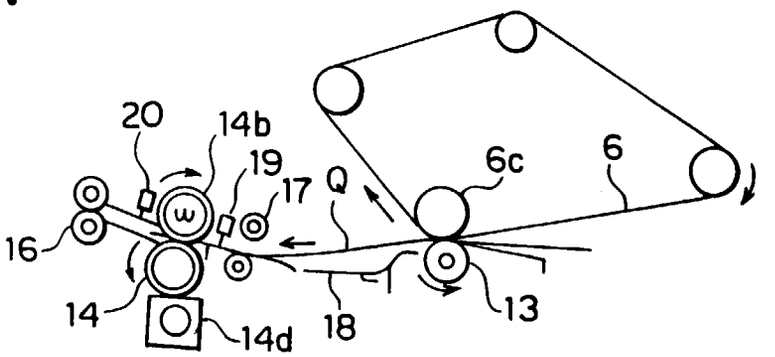


FIG. 2B

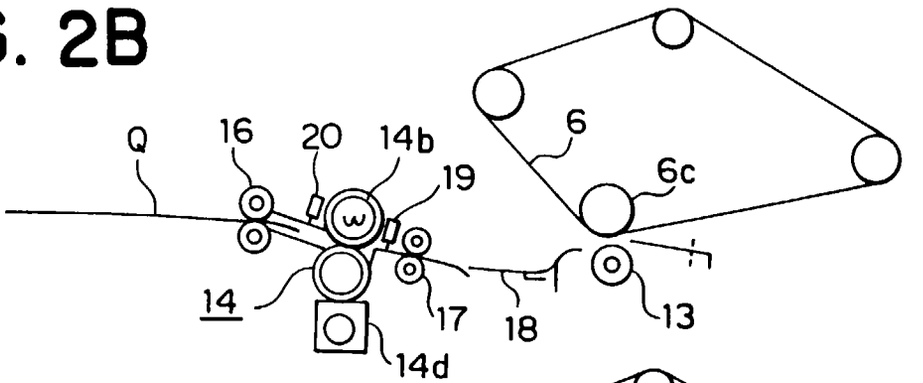


FIG. 2C

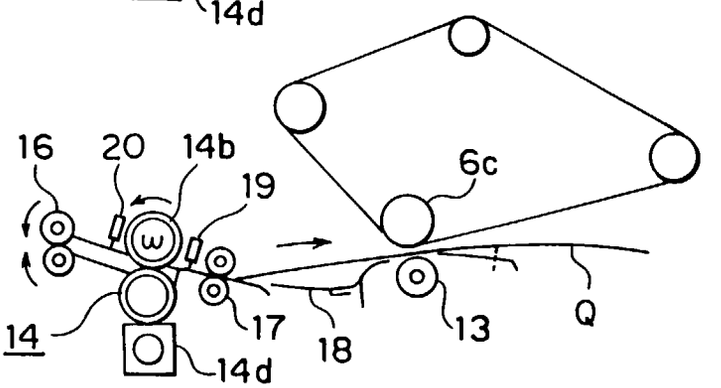


FIG. 2D

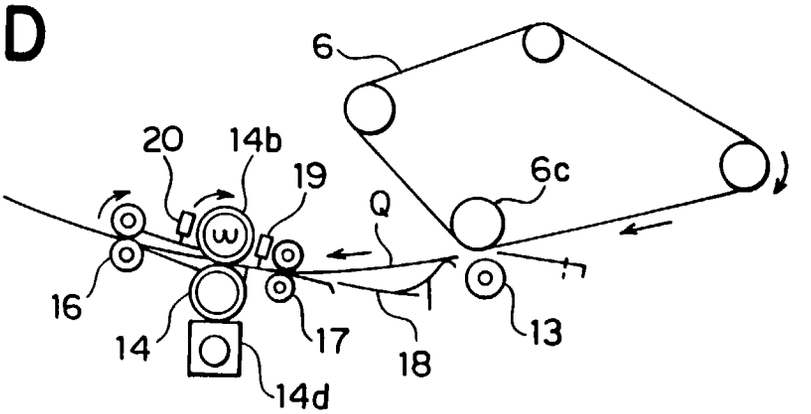


FIG. 3

THICKNESS OF TRANSPARENT SHEET	SPEED OF HEATING ROLLER IN REVERSE ROTATION
70 μm	RELATIVE SPEED 1
80 μm	5 / 6
90 μm	4 / 5
100 μm	3 / 4
110 μm	2 / 3
120 μm	1 / 2
130 μm	1 / 3

FIG. 4

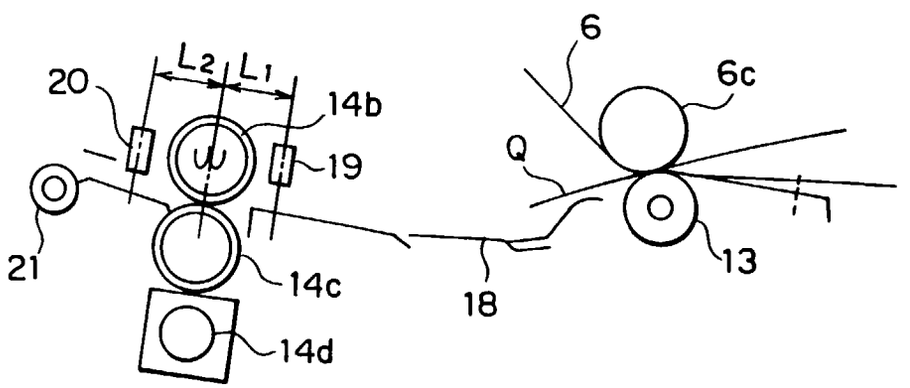


FIG. 5A

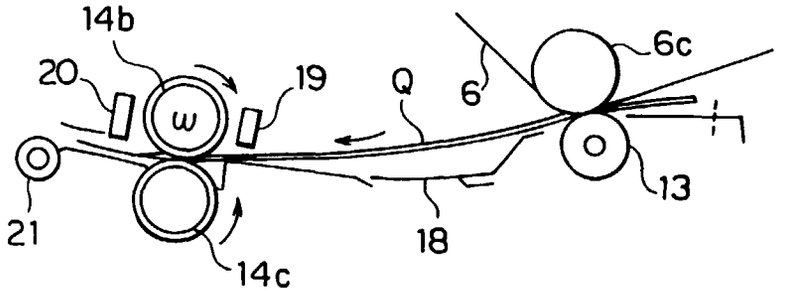


FIG. 5B

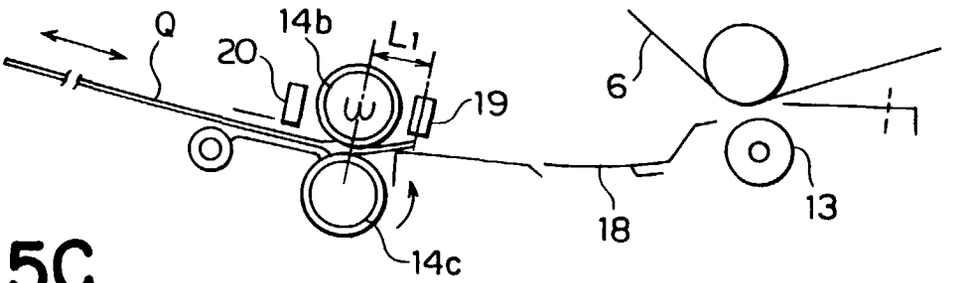


FIG. 5C

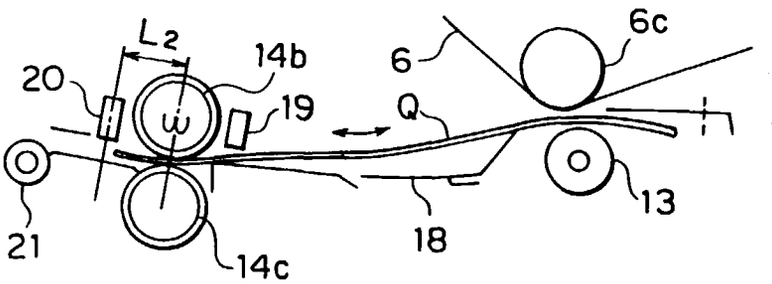


FIG. 6A

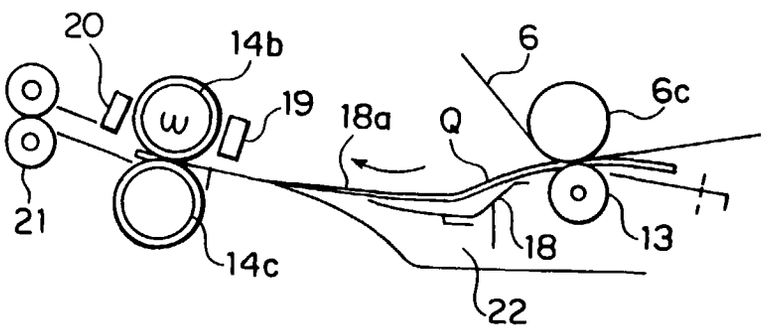


FIG. 6B

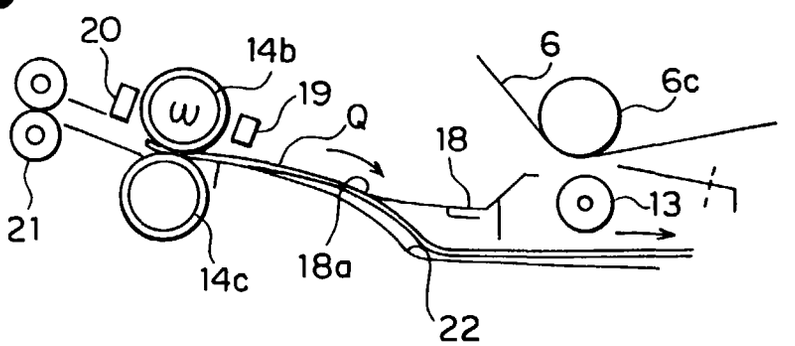
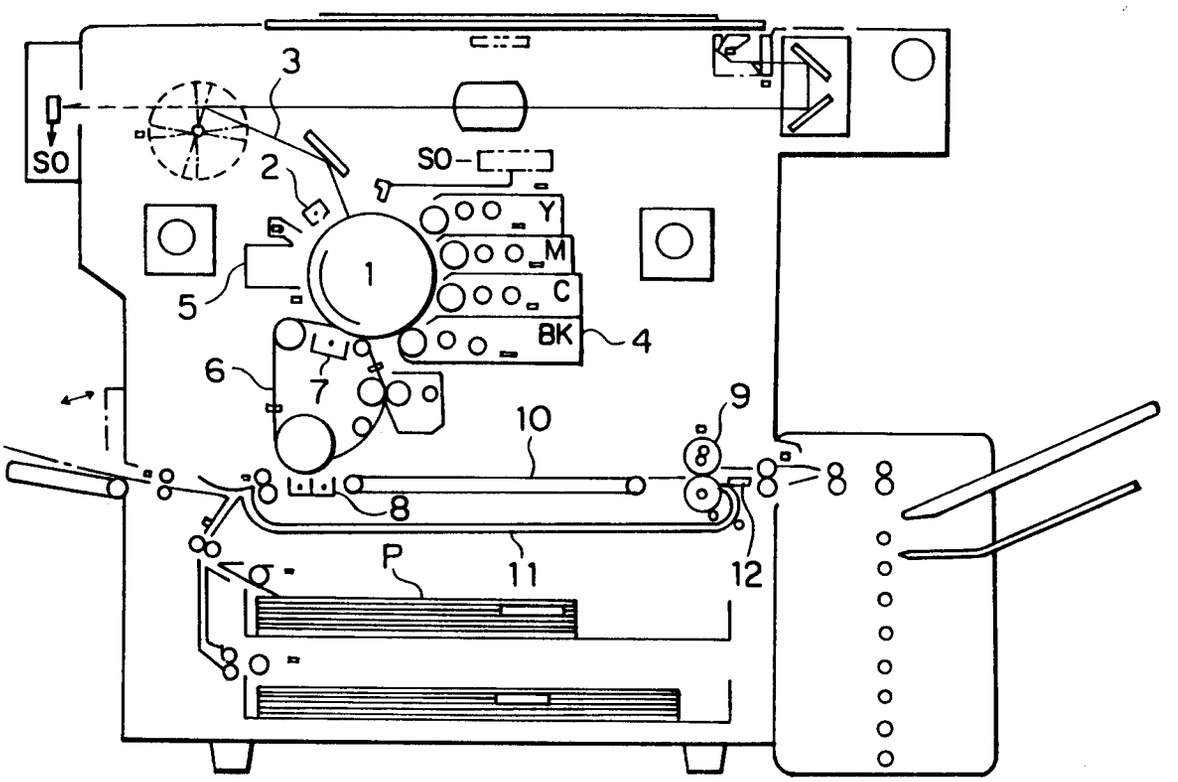


FIG. 7

PRIOR ART



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 1165

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	PATENT ABSTRACTS OF JAPAN vol. 017, no. 416 (P-1584), 3 August 1993 & JP 05 080672 A (HITACHI LTD), 2 April 1993, * abstract *	1,5	G03G15/20 G03G15/01
X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 329 (P-1076), 16 July 1990 & JP 02 109064 A (KONICA CORP), 20 April 1990, * abstract *	1	
X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 337 (P-1079), 20 July 1990 & JP 02 114275 A (KONICA CORP), 26 April 1990, * abstract *	1	
X	PATENT ABSTRACTS OF JAPAN vol. 017, no. 138 (P-1505), 22 March 1993 & JP 04 313784 A (RICOH CO LTD), 5 November 1992, * abstract *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.6) G03G
A D	US 5 138 392 A (KINOSHITA NAOYOSHI ET AL) * abstract; figure 1 * & JP 04 007 564 A	1	
A	EP 0 560 304 A (SHARP KK) * claim 1; figure 1 *	1	
A	EP 0 532 344 A (XEROX CORP) * the whole document *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	17 December 1997	Hoppe, H

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

EPO FORM 1503 03.82 (P04C01)