



(51) International Patent Classification:
G03G 15/08 (2006.01)

(21) International Application Number:
PCT/US2017/063422

(22) International Filing Date:
28 November 2017 (28.11.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PCT/CN2017/103905
28 September 2017 (28.09.2017) CN

(71) Applicant: **HEWLETT-PACKARD DEVELOPMENT COMPANY, L.P.** [US/US]; 11445 Compaq Center Drive W., Houston, Texas 77070 (US).

(72) Inventors: **WU, Ting**; 1-4F, 2727 Jinke Road, Block C, Jinke Building, Zhangjiang Pudong, Shanghai 201203 (CN). **LIU, Kun**; 1-4F, 2727 Jinke Road, Block C, Jinke Building, Zhangjiang Pudong, Shanghai 201203 (CN). **GUO, Jian-Li**; 1-4F, 2727 Jinke Road, Block C, Jinke Building, Zhangjiang Pudong, Shanghai 201203 (CN). **LIN, Chen Lin**; 1-4F, 2727 Jinke Road, Block C, Jinke Building, Zhangjiang Pudong, Shanghai 201203 (CN).

SHEN, JianHua; 1-4F, 2727 Jinke Road, Block C, Jinke Building, Zhangjiang Pudong, Shanghai 201203 (CN). **DENG, Yi-Wei**; 1-4F, 2727 Jinke Road, Block C, Jinke Building, Zhangjiang Pudong, Shanghai 201203 (CN).

(74) Agent: **MORRIS, Jordan** et al.; HP Inc., 3390 E. Harmony Road, Mail Stop 35, Fort Collins, Colorado 80528-9599 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,

(54) Title: PRINT MATERIAL TRANSFER COMPONENT

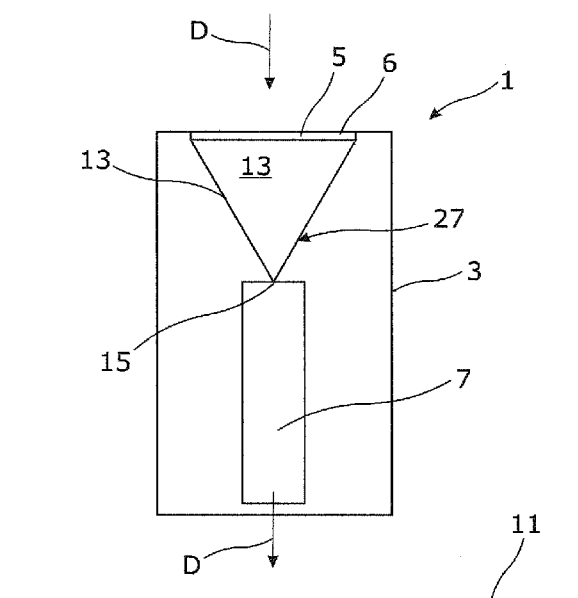


Fig. 1

(57) Abstract: In an example a print material transfer component includes a funnel to guide print material received through the entrance opening to the at least one transfer part, and to inhibit backflow of funneled print material out of the entrance opening.

MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i))*

Published:

— *with international search report (Art. 21(3))*

Print Material Transfer Component

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to co-pending International Application S.N. PCT/CN2017/103905, filed September 28, 2017, which is incorporated by reference herein in its entirety.

BACKGROUND

[0002] Print material transfer components may include 2D imaging material transfer devices and 3D print powder supply devices. For example, print material transfer components can include 3D print powder reservoirs, toner reservoirs or toner laser imaging units. In this disclosure, print material may refer to any material that is disposed onto media or a stage to print an image or object. Print media may contain print particles such as toner particles or 3D print powder particles.

[0003] Print material transfer components are replaceable print components, adapted to be connected to or disconnected from a host system such as a 2D or 3D printer. The printer material transfer components may form part of a larger print material delivery system in the host system wherein the print delivery system may include one or more of such replaceable parts. For example, a laser printer may include a replaceable toner reservoir and a replaceable imaging unit, either separately replaceable or replaceable together with respect to the host printer, the imaging unit to dispose a toner image onto 2D print media.

DRAWINGS

[0004] Fig. 1 illustrates a diagram of an example of a print material transfer component.

[0005] Fig. 2 illustrates a diagram of an example of a print material transfer component.

[0006] Figs. 3 and 4 illustrate an example of a portion of a print material transfer component having a funnel.

[0007] Fig. 5 illustrates an example of the funnel of Figs. 3 and 4.

[0008] Fig. 6 illustrates an example of parts of a toner print system.

DESCRIPTION

[0009] Print systems may comprise replaceable parts that are to be replaced for different purposes. Such purposes may include connecting a print material supply or taking out a component for servicing. In one example a toner developing unit may be replaced in a laser print system. In operation, such toner developer unit receives toner from a toner reservoir and transfers toner images to print media. The toner develop unit may comprise a window or the like to receive toner from the reservoir. After first usage there may be certain amounts of toner present in the toner developer unit. When the toner developer unit is taken out of the laser printer, e.g., for servicing, it can be accidentally tilted whereby there is a risk that toner particles fall out of said window. When that happens, it may be difficult to clean the affected parts, which in different examples may include the printer housing or operator hands or the environment. Also for other print components such as 3D print powder supplies it may be desirable to prevent spilling of print material particles.

[0010] In general, when dealing with replaceable or movable components that transfer or supply print material particles, care needs to be taken to prevent such particles to unintentionally leak from that component, in particular when in certain circumstances such component may be tilted to an orientation that is different from its operational orientation. Print material particle transfer components other than toner developer units may include toner cartridges, 3D powder supplies, and/or other components of toner or 3D print particle delivery

systems for respective 2D and 3D printers. Other print material components not specifically described in this disclosure may still fall within the scope of this disclosure.

[0011] Fig. 1 illustrates a print material transfer component 1. In operational and/or installed condition, the print material transfer component 1 may form part of a larger print system to transfer print material particles onto print media 11 or a stage. In one example toner particles are to be transferred to print media such as paper. In another example 3D print powder particles are to be transferred to a stage or onto previously disposed powder layers.

[0012] When installed, the print material transfer component may form part of a print particle travel path. In this example, the print material transfer component 1 comprises a housing or at least one chamber 3. The print material transfer component 1 has a print material entrance opening 5 to allow print material to enter the chamber 3. The opening 5 may be comprised of a frame or window through which print material particles are to flow. The print material flow direction P is indicated in the drawing.

[0013] The print material transfer component 1 may include a print material transfer part 7. While the print material transfer part 7 is diagrammatically indicated with a rectangle, in different examples the transfer part 7 includes at least one wheel, guide structure, gear, roller, screw, Archimedes screw, slide, etc. for transporting print material particles, or an assembly of a selection of these different parts. The transfer part 7 facilitates transporting and/or disposing the print material onto print media 11.

[0014] The print material transfer component 1 includes a funnel 9. The funnel 9 may include at least one wall 13, for example having a coned or pyramid-shape. The funnel 9 is provided in the print material transfer path between the entrance opening 5 and the transfer part 7, for example downstream of the entrance opening 5 and upstream of the transfer part 7. In operation, print material enters the funnel 9 in the flow direction D through the entrance opening 5 and is guided along the at least one diverging wall 13 towards a funnel end 15. The funnel end 15 may be relatively pointy, rounded or truncated. The funnel end 15 may be closed or open. For example, a truncated

version can have a cut out at the end 15 to allow print material to exit the funnel 9 through the end 15. In another example the funnel has narrow slots along at least one edge 27 of adjacent pyramid walls 13, near the end 15, through which the particles are to flow. Figs. 3 and 4 illustrates such slots and will be addressed below.

[0015] In one example the entrance opening 5 is rectangular and has a window frame 6. The funnel 9 may have a corresponding upside-down pyramid shape. In one example upper edges of the funnel may conveniently extend along the entrance window frame 6. In another example there may be some distance between the funnel upper edges and the window 6. In operation, all print material particles entering the entrance opening 5 pass through the funnel 9 towards the transfer component 7. In one example the window frame 6 may be in direct contact with the entrance edges of the funnel 9, or may be very proximate to the entrance edges of the funnel 9.

[0016] In one example, the flow direction D of the print material at the entrance opening 5 is in a direction of gravity, or at least has one directional component that is in the direction of gravity, to allow the print material to flow or slide through the funnel 9 by gravity alone. The print material is to exit the funnel 9 through at least one slot or cut out near the end 15, from where it reaches the at least one transfer part 7.

[0017] Fig. 2 illustrates the same example print material transfer component 1 in a non-operational tilted orientation. For example a service operator may tilt the component 1 when taking it out of its host print system. In the illustrated tilted orientation the print material does not flow out of the entrance opening 5 because this is inhibited by the at least one funnel wall 13 that blocks the entrance opening 5. Hence, the print material largely remains in the chamber 3 and does not reach the environment.

[0018] Hence, in an embodiment, the funnel 9 is to guide the print material to an interior of the component 1 by gravity, in an operational orientation of the component 1. For example Fig. 1 may illustrate an operational orientation while Fig. 2 illustrates a tilted non-operational orientation. Fig. 2 illustrates a non-operational, tilted orientation wherein the print material 17 is inhibited from

exiting the entrance opening 5 by the funnel 9. In one example the window 6 is in an approximately horizontal orientation in an operational orientation of the component 1. The window 6 may be tilted over approximately 90 degrees or more, approximately 120 degrees or more, or even approximately 180 degrees with respect to the operational orientation while inhibiting back flow of print material out of the entrance opening 5 because the funnel walls 13 largely block back flow of the particles. The slot or cut out near the end 15 may be relatively small so that almost no particles flow back. In one example the transfer part 7 includes a roller to transfer toner and a tilt angle axis is parallel to the roller axis.

[0019] Fig. 3 and 4 illustrate a portion of a print material transfer component 101. The component 101 includes a housing 103. The housing 103 includes a housing wall 104 and an internal volume 119. An entrance opening 105 for print material to access the internal volume 119 of the housing 103 is defined by a window 106. The window 106 is defined by a raised rib around the opening 105. Print material is to flow into the housing 103 through the opening 105.

[0020] A funnel 109 is provided downstream of the opening 105. The funnel 109 of Fig. 3 and 4 is separately illustrated in Fig. 5. The funnel 109 is square pyramid shaped, in operation forming an upside down pyramid. The funnel 109 has an input opening 123 downstream of, and/or aligned with, the entrance opening 105. The input opening 123 forms a virtual base of the funnel 109 on the upper side of the upside down pyramid. The virtual base may extend parallel to the entrance opening 105. The funnel 109 may have four walls 113 diverging from the virtual base to the funnel end 115. The funnel end 115 may be a point, rounded or pointy, or truncated. The edges of the walls 113 near the base may extend along or around the edges of the entrance opening 105 to ensure catching most or all print material flowing through the entrance opening 105.

[0021] In another example, not illustrated here, the funnel 109 can be a triangle pyramid-shaped with only three diverging walls. In yet other examples the funnel 109 can have more than four diverging walls. In again another example the funnel 109 can be a cone.

[0022] Back to Figs. 3 – 5, adjacent funnel walls 113 are connected to form closed corner edges 125. The closed corner edges 125 extend from the input

opening 123 (i.e. virtual base) towards the end 115 but not reaching the end 115. Near the end 115, parts of the adjacent walls 113 are not connected, forming a slot 127. These cut outs or slots 127 may extend from a respective end of each closed corner edge 125 up to the end 115 of the funnel 109. Hence, four closed corner edges 125 and subsequently slots 127 diverge from the virtual base to the end 115 of the funnel 109.

[0023] In one example each complete edge 125, 127 between each adjacent pair of walls 113 consist of the closed corner edge 125 and slot 127. In another example, only one, two or three of the corner edges between adjacent walls 113 include a slot 127 while the other corner edges 125 are closed.

[0024] In one example a length of the slot 127 is two thirds or less of a length of the closed corner edge 125. In other examples the slot 127 is approximately half the length of the closed corner edge 125 or less, or less than approximately one third of the closed corner edge 125. Each slot 127 may have a slot width, between opposite wall edges, of less than approximately 2 mm, or less than approximately 1 mm, less than approximately 500 micron, or less than approximately 100 micron. The chosen slot width may depend on average toner particle volume-based diameter sizes which may range, for example, from 5 to 60 micron. A length of each slot 127 along the wall edge may be at least 2 mm, at least 5 mm or at least 10 mm. The four slots 127 diverge to the funnel end 115. The funnel end 115 may be open or closed. Where the end 115 is closed, the end 115 may form an end of each slot 127 and also connect the funnel walls 113, thereby stabilizing the funnel structure. Where the end 115 is open print material may flow through the slots 127 and the end output opening. Such output opening could have a diameter of approximately 2 mm or less, approximately 1 mm or less or approximately 500 micron or less.

[0025] In operation toner particles flow into the funnel through the input opening 123 along each wall's inner surface 131, entering the interior of the component 101 through the slots 127. The slots 127 facilitate, on the one hand, sufficient throughput of print material while, on the other hand, sufficiently preventing backflow out of the entrance opening 105.

[0026] In a further example, inner surfaces 131 of the walls 113 have a lower friction coefficient than outer surfaces 133 of the walls 113. For example a friction coating may be provided on the outside. Choosing an appropriate friction coefficient on the inside surfaces 131 versus the outside surfaces 133 may facilitate that print material particles readily flow through the funnel 109 while preventing backflow. An example of a funnel wall thickness is less than 1 mm or less than 500 micron. Appropriate wall materials or coatings for facilitating flow may include plastics such as Mylar, Teflon, PE or low friction coefficient plastic materials. Clogging or sticking may be prevented with such materials.

[0027] Fig. 6 illustrates an example of a toner print system 237. A toner travel path TP runs through the system 237. Along the toner travel path TP the toner print system includes a toner reservoir 239 also known as toner cartridge, and a toner imaging unit 201 that includes toner transfer parts. The toner reservoir 239 and toner imaging unit 201 are separate replaceable parts. The toner transfer parts include a toner developer roller 243 and an OPC (organic photo conductor) 241. In one example the print system 237 is such that the toner reservoir 239 is more frequently replaced than the imaging unit 201. A funnel 209 is provided at an entrance opening of the imaging unit 201 to receive toner from an output of the toner reservoir 239.

[0028] Along the toner travel path TP, toner is moved by augers 245 out of the toner reservoir 239 into the funnel 209 of the imaging unit 201. After the funnel 209 the toner may move along stirring members 247 that may also charge the toner, from where it moves to the developer roller 243. From there it moves to the OPC 241 or to a waste transport 249 and storage. The OPC 241 transfers an image of toner onto print media.

[0029] The funnel 209 facilitates that toner particles conveniently flow into the interior of the imaging unit 201. In fact, in some examples the funnel 209 may provide for some guidance of the toner particles which may allow for better toner flow control in the imaging unit 201. When the imaging unit 201 is taken out of the toner print system 237, for example for service or replacement, the funnel 209 may prevent that too many toner particles leak through the toner entrance opening out of the imaging unit 201.

[0030] The various features addressed in this disclosure can be defined by any selection or combination of the following examples: In one example, the print material transfer component for transferring print particles to media, comprising a print material entrance opening; at least one print material transfer part for transferring print material towards media; and a funnel to guide print material received through the entrance opening to the at least one transfer part, and inhibit backflow of funneled print material out of the entrance opening when the transfer component is tilted. In one example the funnel is to guide the print material into an interior of the component by gravity, in an operational orientation of the print material transfer component, while in a non-operational, tilted orientation the print material is inhibited from exiting the entrance opening by the funnel, wherein a tilt angle is at least approximately 90 degrees. In a further example the funnel is provided downstream of the entrance opening and upstream of the at least one transfer part, in a particle flow direction. In a further example the print material is toner and the at least one print material transfer part includes a roller. In a further example a toner imaging unit includes said print material transfer component wherein the entrance opening is defined by a toner particles receiving window that in operation receives toner particles; and the at least one print material transfer part includes a roller for transferring toner towards the media. In a further example the at least one transfer part includes an organic photo conductor drum. In a further example a toner print system comprising said toner imaging unit and further comprising a toner reservoir upstream of the entrance opening of the toner imaging unit, the toner reservoir having an output opening to provide toner to the toner imaging unit through the entrance opening, wherein the entrance opening of the toner imaging unit and the output opening of the toner reservoir are aligned in installed condition of both the toner reservoir and toner imaging unit. In again a further example the funnel comprises at least three diverging walls extending away from the entrance opening, diverging towards a funnel end; partly closed corner edges that connect adjacent walls at least upstream of the funnel end; and at least one open slot forming a longitudinal through hole between adjacent walls, downstream of a respective closed corner edge, stretching from the closed

corner edge up to the end, wherein print material is to flow towards the transfer part through the at least one slot. In again a further example the slot covers less than two thirds of a respective wall's edge. In yet a further example the funnel is square pyramid shaped. In a further example an inner surface of the funnel has a lower friction coefficient than an outer surface of the funnel.

[0031] In one example of a print particles funnel, comprises a relatively wide input opening and a relatively narrow end; at least three diverging walls diverging from the input opening towards the end; closed corner edges between adjacent walls stretching from the input opening towards the end; and at least one slot between adjacent walls stretching from the closed corner edge towards to the end. In a further example the slice covers less than two thirds of a respective wall's edge. In again a further example the funnel is square pyramid shaped. In again a further example the funnel end is closed so that print particles do not flow out of the funnel end but through the at least one longitudinal slot.

CLAIMS

What is claimed is:

1. A print material transfer component for transferring print particles to media, comprising
 - a print material entrance opening;
 - at least one print material transfer part for transferring print material towards media; and
 - a funnel to
 - guide print material received through the entrance opening to the at least one transfer part, and
 - inhibit backflow of funneled print material out of the entrance opening when the transfer component is tilted.
2. The print material transfer component of claim 1 wherein the funnel is to guide the print material into an interior of the component by gravity, in an operational orientation of the print material transfer component, while in a non-operational, tilted orientation the print material is inhibited from exiting the entrance opening by the funnel, wherein a tilt angle is at least approximately 90 degrees.
3. The print material transfer component of claim 1 wherein the funnel is provided downstream of the entrance opening and upstream of the at least one transfer part, in a particle flow direction.
4. The print material transfer component of claim 1 wherein the print material is toner and the at least one print material transfer part includes a roller.
5. A toner imaging unit including the print material transfer component of claim 1 wherein the entrance opening is defined by a toner particles receiving window that in operation receives toner particles; and the at least one print material transfer part includes a roller for transferring toner towards the media.

6. The toner imaging unit of claim 5 wherein the at least one transfer part includes an organic photo conductor drum.

7. A toner print system comprising the toner imaging unit of claim 6 and further comprising a toner reservoir upstream of the entrance opening of the toner imaging unit, the toner reservoir having an output opening to provide toner to the toner imaging unit through the entrance opening, wherein the entrance opening of the toner imaging unit and the output opening of the toner reservoir are aligned in installed condition of both the toner reservoir and toner imaging unit.

8. The print material transfer component of claim 1 wherein the funnel comprises

at least three diverging walls extending away from the entrance opening, diverging towards a funnel end,

partly closed corner edges that connect adjacent walls at least upstream of the funnel end, and

at least one open slot forming a longitudinal through hole between adjacent walls, downstream of a respective closed corner edge, stretching from the closed corner edge up to the end, wherein print material is to flow towards the transfer part through the at least one slot.

9. The print material transfer component of claim 1 wherein the slot covers less than two thirds of a respective wall's edge.

10. The print material transfer component of claim 1 wherein the funnel is square pyramid shaped.

11. The print material transfer component of claim 1 wherein an inner surface of the funnel has a lower friction coefficient than an outer surface of the funnel.

12. A print particles funnel, comprising
a relatively wide input opening and a relatively narrow end;
at least three diverging walls diverging from the input opening
towards the end;
closed corner edges between adjacent walls stretching from the
input opening towards the end; and
at least one slot between adjacent walls stretching from the closed
corner edge towards to the end.
13. The print particles funnel of claim 12 wherein the slice covers less
than two thirds of a respective wall's edge.
14. The print particles funnel of claim 12 wherein the funnel is square
pyramid shaped.
15. The print particles funnel of claim 12 wherein the funnel end is
closed so that print particles do not flow out of the funnel end but through the at
least one longitudinal slot.

1/3

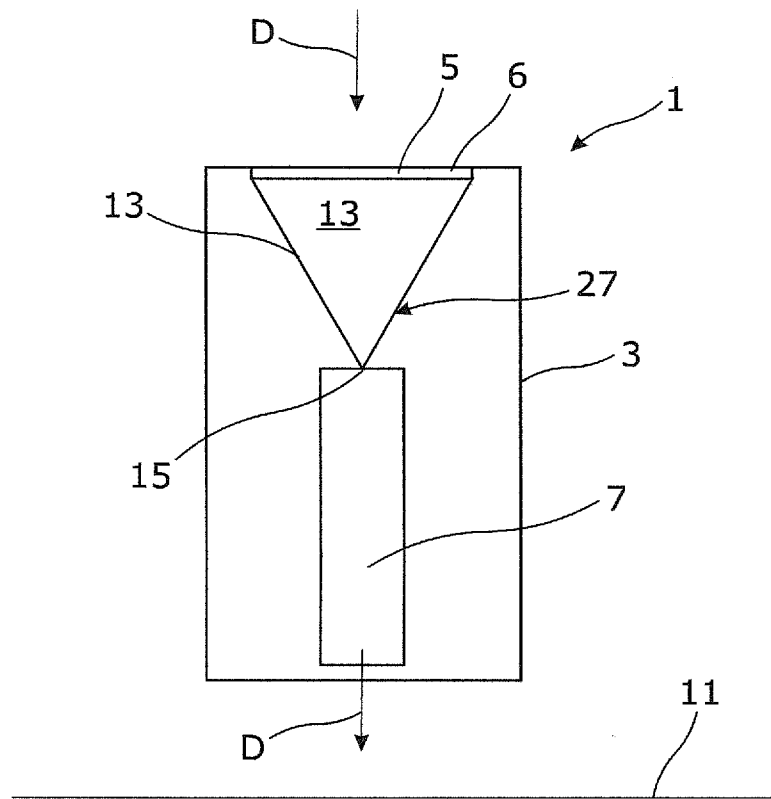


Fig. 1

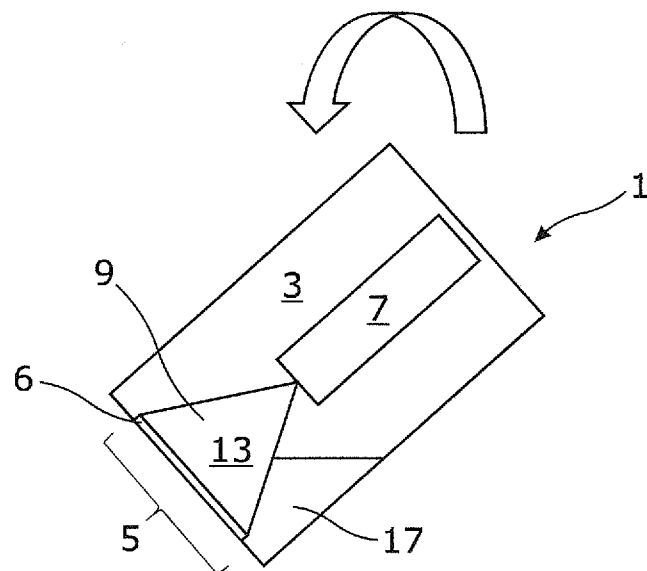
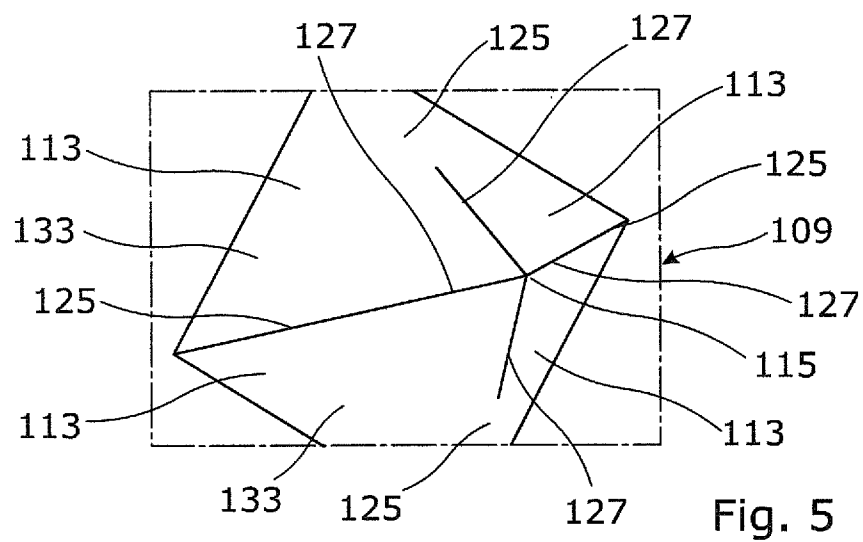
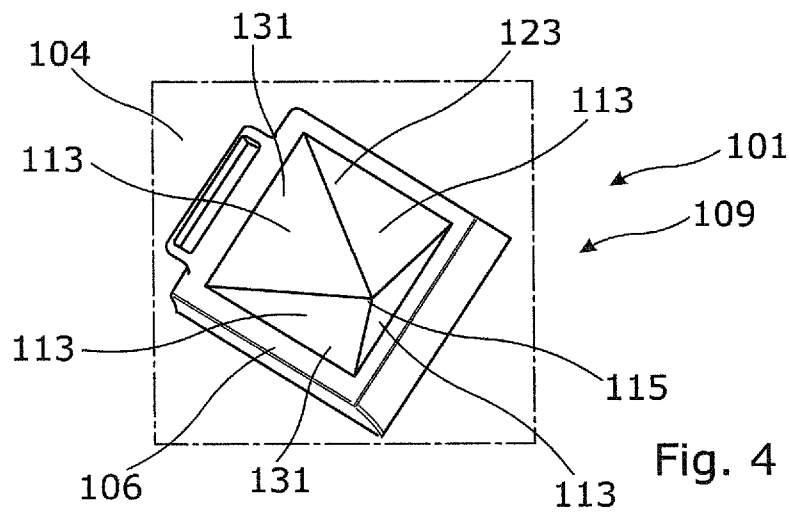
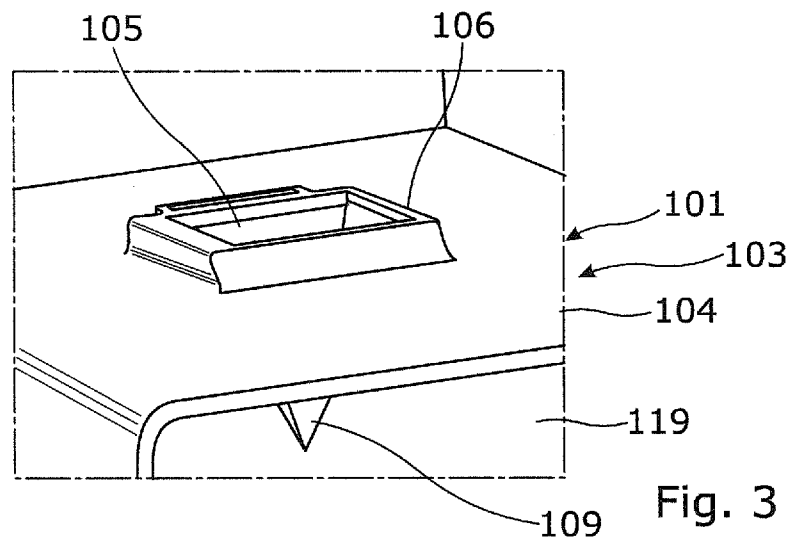


Fig. 2

2/3



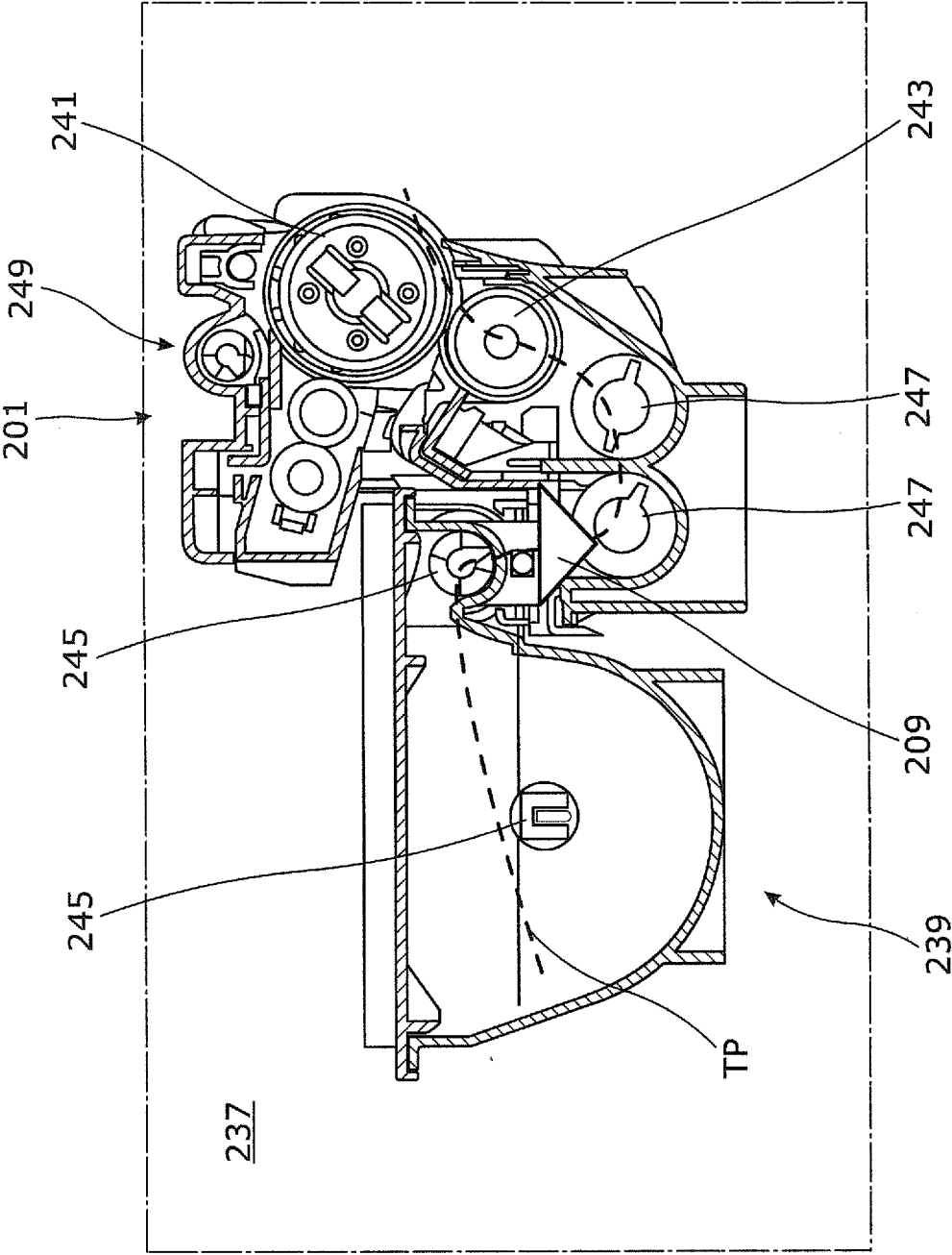


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/063422

A. CLASSIFICATION OF SUBJECT MATTER
INV. G03G15/08
ADD.

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)
G03G B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012/051791 A1 (OHMURA TOMOYA [JP] ET AL) 1 March 2012 (2012-03-01)	1-7
Y	paragraph [0040] - paragraph [0076];	10,11
A	figures 1-4	8,9

X	US 4 660 960 A (FUKUNAGA TAKAHIRO [JP] ET AL) 28 April 1987 (1987-04-28)	1-6
Y	column 2, line 4 - column 3, line 41;	10,11
	figures 1-3	

X	US 3 954 331 A (SMITH RICHARD E) 4 May 1976 (1976-05-04)	1-7
Y	column 2, line 50 - column 6, line 31;	10,11
	figures 1-4	

	-/--	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

13 June 2018

Date of mailing of the international search report

08/08/2018

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Billmann, Frank

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2017/063422

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2009 286413 A (KAO CORP) 10 December 2009 (2009-12-10)	12,13
Y	abstract; figures 1-4	14
A	paragraphs [0002], [0014] - [0024] -----	15
Y	JP S63 137798 U (APPLICANT) 12 September 1988 (1988-09-12) figures 3, 4 -----	10,14
Y	US 6 275 675 B1 (CORNELIUS LESTER E [US]) 14 August 2001 (2001-08-14) column 3, line 7 - line 11 -----	11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2017/063422

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012051791 A1	01-03-2012	JP 5569260 B2	13-08-2014
		JP 2012048017 A	08-03-2012
		US 2012051791 A1	01-03-2012

US 4660960 A	28-04-1987	DE 3522296 A1	02-01-1986
		JP S617865 A	14-01-1986
		US 4660960 A	28-04-1987

US 3954331 A	04-05-1976	CA 1058855 A	24-07-1979
		US 3954331 A	04-05-1976

JP 2009286413 A	10-12-2009	NONE	

JP S63137798 U	12-09-1988	NONE	

US 6275675 B1	14-08-2001	NONE	
