CLAIMS

Claim 1. A toner cartridge comprising:

(i) a casing including (i-i) a toner accommodation chamber containing toner, (i-ii) a discharge opening through which toner can be discharged from the toner cartridge, (i-iii) a toner discharging chamber in fluid communication with the discharge opening such that toner in the toner discharging chamber can move to the discharge opening, and (i-iv) a communication passage for fluid communication between the toner accommodation chamber and the toner discharging chamber such that toner can move from the toner accommodation chamber to the toner discharging chamber;

(ii) a feeding member movable relative to the casing and configured to feed the toner from the toner accommodation chamber through the communication passage into the toner discharging chamber, with at least a part of the feeding member being positioned in the communication passage; and

(iii) a pump configured to provide air for discharging the toner through the discharge opening ,

wherein, (a) in a first cross-sectional plane perpendicular to the toner feeding direction of the feeding member, a minimum cross-sectional area of the communication passage is Asmin, (b) in a second cross-sectional plane perpendicular to the toner feeding direction, the toner discharging chamber has a cross-sectional area Bs larger than Asmin, and (c) in a third cross-sectional plane perpendicular to the toner feeding

direction, the toner accommodation chamber has a cross-sectional area Cs larger than Asmin.

Claim 2. A toner cartridge according to Claim 1, wherein the casing includes a vent provided at a position different from than a position of the communication passage, the vent being configured to permit airflow between the toner discharging chamber and the toner accommodation chamber.

Claim 3. A toner cartridge according to Claim 2, wherein when the toner cartridge is oriented with the discharge opening is directed downward in the gravitational direction, the vent is above an uppermost extent of the communication passage.

Claim 4. A toner cartridge according to Claim 2, wherein when the toner cartridge is oriented with the discharge opening is directed downward in the gravitational direction and the toner cartridge is unused such that the toner contained in the toner accommodation chamber is at an initial level, the vent is above a top level of the toner contained in the toner accommodation chamber.

Claim 5. A toner cartridge according to Claim 2, wherein when the toner cartridge is oriented with the discharge opening directed downward in the gravitational direction and the toner cartridge is unused such that the toner contained in the toner accommodation chamber is at an initial level, a top level of the toner contained in the toner accommodation chamber is above the uppermost extent of the pump, and the vent is above the top level of the toner contained in the toner accommodation chamber.

Claim 6. A toner cartridge according to Claim 2, wherein when the toner cartridge is oriented with the discharge opening directed downward in the gravitational direction, the vent is above an uppermost extent of the pump.

Claim 7. A toner cartridge according to Claim 2, wherein the vent is provided with a filter for suppressing passage of the toner through the vent.

Claim 8. A toner cartridge according to Claim 1, further comprising a first vent configured to permit airflow between inside of the toner accommodation chamber and outside of the toner cartridge, and a second vent configured to permit airflow between inside of the toner discharging chamber and outside of the toner cartridge.

Claim 9. A toner cartridge according to Claim 8, wherein in a state that the toner cartridge is oriented with the discharge opening is directed downward in the gravitational direction and the toner cartridge is unused such that the toner contained in the toner accommodation chamber is at an initial level, the second vent is above a top level of the toner contained in the toner accommodation chamber.

Claim 10. A toner cartridge according to Claim 8 , wherein in a state that the toner cartridge is oriented with the discharge opening is directed downward in the gravitational direction and the toner cartridge is unused such that the toner contained in the toner accommodation chamber is at an initial level, a top level of the toner contained in the toner accommodation chamber is above an uppermost extent of the pump, and the second vent is above the top level of the toner contained in the toner accommodation chamber.

Claim 11. A toner cartridge according to Claim 8 , wherein at least one of the first vent and the second vent is provided with a filter for suppressing passage of the toner therethrough.

Claim 12. A toner cartridge according to of Claim 1, wherein the feeding member is rotable relative to the casing.

Claim 13. A toner cartridge according to Claim 12, wherein the feeding member is rotatable about an axis thereof and is configured to feed the toner in the direction of the axis.

Claim 14. A toner cartridge according to Claim 1, wherein the feeding member is a screw.

Claim 15. A toner cartridge according to Claim 1, wherein, in the toner feeding direction of the feeding member, the pump is positioned adjacent to a downstream end portion of the casing.

Claim 16. A toner cartridge according to Claim 1, wherein the cross-sectional area Bs of the toner discharging chamber is at a position downstream of the communication passage in the toner feeding direction of the feeding member.

Claim 17. A toner cartridge according to Claim 1, wherein the cross-sectional area Bs of the toner discharging member is adjacent to a position of the discharge opening, and, in a fourth cross-sectional plane perpendicular to the toner feeding direction of the feeding member, an area Csmax is a maximum cross-sectional area of the toner

accommodation chamber that is larger than the area Asmin and larger than the area Bs.

Claim 18. A toner cartridge according to Claim 1,
wherein, in a fourth cross-sectional plane that is perpendicular to the toner feeding direction of the feeding member, an area Csmax is a maximum cross-sectional area of the toner accommodation chamber , and in a fifth cross-sectional plane that is perpendicular to the toner feeding direction of the feeding member, an area Bsmax is a maximum cross-sectional area of the toner discharging chamber that is small than the area Csmax.

Claim 19. A toner cartridge according Claim 1,
wherein in a fourth cross-sectional plane that is perpendicular to the toner feeding direction of the feeding member, an area Csmax is a maximum cross-sectional area of the toner accommodation chamber that is more than 10 times larger than the area Asmin.

Claim 20. A toner cartridge according to Claim 1,
wherein a volume of the toner discharging chamber is less than a volume of the toner accommodation chamber.

Claim 21. A toner cartridge according to Claim 1,
wherein the casing includes a partition member separating the toner accommodation chamber and the toner discharging chamber, with the communication passage being formed in the partition member.

Claim 22. A toner cartridge according to Claim 1,
further comprising a drive input member configured to receive a rotational force for driving the feeding member and the pump.

Claim 23. A toner cartridge according to Claim 22, wherein the drive input member is a coupling member.

Claim 24. A toner cartridge according to Claim 23, wherein the coupling member is rotatable about an axis thereof, the coupling member is provided with a projection projecting toward the axis of the coupling member, and the projection is configured to receive the rotational force for driving the feeding member and the pump.

Claim 25. A toner cartridge according to Claim 24, wherein an open space is provided between the projection of the coupling member and the axis of the coupling member.

Claim 26. A toner cartridge according to Claim 22, wherein the drive input member and the pump are positioned in a downstream part of the toner cartridge in the toner feeding direction of the feeding member.

Claim 27. A toner cartridge according to Claim 1, further comprising a suction opening, wherein the pump is configured to pump through the discharge opening air that is suctioned through the suction opening.

Claim 28. A toner cartridge according to Claim 1, wherein the pump is configured to suction air into the toner discharging chamber through the discharge opening.

Claim 29. A toner cartridge according to Claim 1, wherein the pump is a reciprocating pump.

Claim 30. A toner cartridge according to Claim 29, wherein the pump includes a flexible movable portion, and the volume of the pump is changed by deformation of the movable portion.

Claim 31. A toner cartridge according to Claim 29, further comprising a rotatable member and a reciprocation member that is engageable with the rotatable member to reciprocate by rotation of the rotatable member, wherein the pump is driven by reciprocating motion of the reciprocation member.

Claim 32. A toner cartridge according to Claims 31, wherein the pump includes a movable portion that reciprocates in a moving direction by the reciprocation member, wherein, the rotatable member and the reciprocation member are engaged with each other at an engagement point, and
wherein, as viewed in a direction perpendicular to the moving direction, the rotatable member is rotatable to a position such that the engagement point overlaps the moavable portion.

Claim 33. A toner cartridge according Claim 1, wherein the pump is a centrifugal pump.

Claim 34. A toner cartridge according Claim 1,
further comprising:

a first engaging portion forming an opening;

a second engaging portion forming an opening; and

a storing element provided with an electrical contact,

wherein the pump is provided with a connecting portion connected to the the casing,

wherein the first engaging portion, the second engaging portion, the pump and the storing element are positioned in a downstream part of the toner cartridge in the toner feeding direction of the feeding member, and

wherein, as viewed in the toner feeding direction of the feeding member, the connecting portion of the pump and the electrical contact of the storing element are positioned on opposite sides of a line passing through the first engaging portion and the second engaging portion.

Claim 35. A toner cartridge according to Claim 1, wherein the feeding member is a first feeding member, and the toner cartridge further comprising a second feeding member configured to feed the toner toward the first feeding member.

Claim 36. A toner cartridge according to Claim 35, wherein the first feeding member and the second feeding member are configured to feed the toner in different directions.

Claim 37. A toner cartridge according to Claim 35 , wherein the second feeding member includes a sheet configured to feed the toner by rotation of the sheet.

Claim 38. A toner cartridge according Claim 1, wherein the communication passage extends in the toner feeding direction of the feeding member.

Claim 39. A toner cartridge according to Claim 1, wherein a part of the feeding member is inside of the toner accommodation chamber.

Claim 40. A toner cartridge according to Claim 1, wherein a part of the feeding member is inside of the toner discharging chamber.

Claim 41. A toner cartridge according to Claim 1, wherein when the toner cartridge is oriented with the discharge opening is directed downward in the gravitational direction, (i) a part of the toner accommodation chamber and a part of the communication passage are arranged along a vertical direction, with the part of the toner
accommodation chamber is above the part the communication passage, and (ii) another part of the toner accommodation chamber and another part of the communication passage are arranged in a direction perpendicular to the vertical direction.

Claim 42. A toner cartridge according to Claim 1,
wherein when the toner cartridge is oriented with discharge opening is directed downward in the gravitational direction, the feeding member is configured to feed the toner in a direction perpendicular to a vertical direction.

Claim 43. An image forming apparatus comprising: a cartridge according to Claim 1; and a main assembly configured such that the toner cartridge mounted thereto, with the main assembly being configured to receive toner discharged from the toner cartridge.

Claim 44. An image forming apparatus according to Claim 43, further comprising a second cartridge including a developing roller, wherein the main assembly is configured to supply toner discharged from the toner cartridge into the second cartridge.

Claim 45. A toner cartridge comprising:

(i) a casing including (i-i) a toner accommodation chamber containing toner, (i-ii) a discharge opening through which toner can be

discharged from the toner cartridge, (i-iii) a toner discharging chamber in fluid communication with the discharge opening such that toner in the toner discharging chamber can move to the discharge opening, and (i-iv) a communication passage for fluid communication between the toner accommodation chamber and the toner discharging chamber such that toner can move from the toner accommodation chamber to the toner discharging chamber;

(ii) a feeding member movable relative to the casing and configured to feed the toner from the toner accommodation chamber through the communication passage into the toner discharging chamber, with at least a part of the feeding member being positioned in the communication passage;

(iii) a pump configured to provide air for discharging the toner through the discharge opening; and

(iv) a coupling member configured to receive a rotational force for driving the feeding member and the pump,

wherein, (a) in a first cross-sectional plane perpendicular to a rotational axis direction of the coupling member a minimum cross-sectional area of the communication passage is Asmin, (b) in a second cross-sectional plane perpendicular to the rotational axis direction of the coupling member, the toner discharging chamber has a cross-sectional area Bs that is larger than Asmin, and (c) in a third cross-sectional plane perpendicular to the rotational axis direction of the coupling member, the toner accommodation chamber has a cross-sectional area Cs that is larger than Asmin.

Claim 46. A toner cartridge according to claim 45, wherein the casing includes a vent provided at a position different than a position of the communication passage, the vent being configured to permit airflow

between the toner discharging chamber and the toner accommodation chamber.

Claim 47. A toner cartridge according to claim 45, wherein in a fourth cross-sectional plane that is perpendicular to the toner feeding direction of the feeding member, an area Csmax is a maximum cross-sectional area of the toner accommodation chamber that is more than 10 times larger than the area Asmin.

Claim 48. A toner cartridge according to claim 45, further comprising a coupling member configured to receive a rotational force for driving the feeding member and the pump, and

wherein the coupling member is provided with a projection projecting toward an axis of the coupling member, and the coupling member is configured to transmit the rotational force from the projection toward the pump and the feeding member.

Claim 49. A toner cartridge according to claim 48, wherein the coupling member and the pump are disposed in a downstream part of the toner cartridge in the toner feeding direction of the feeding member.

Claim 50. A toner cartridge according to claim 45, wherein the feeding member is a first feeding member, and the toner cartridge further comprising a second feeding member configured to feed the toner toward the first feeding member, and

wherein the first feeding member and the second feeding member feed the toner in different directions.

Claim 51. A toner cartridge according to claim 50, wherein the second feeding member includes a sheet configured to feed the toner by rotation thereof.