CLAIMS

[Claim 1] A fluid transfer device comprising:

an outer cylinder;

a stator that has an insertion hole as a female-screw-shaped through-hole and is provided on an inner periphery of the outer cylinder; and

a male-screw-shaped rotor that is connected to a rotor driving part and eccentrically rotates in contact with an inner periphery of the stator,

wherein the fluid transfer device is capable of transferring a fluid in a transport path formed by the stator and the rotor, by eccentrically rotating the rotor inserted through the insertion hole,

wherein the stator includes an inlet portion that spans a certain range through a longitudinal direction from an inlet of the transport path, an outlet portion that spans a certain range through the longitudinal direction from an outlet of the transport path, and a central portion located between the inlet portion and the outlet portion,

wherein the stator is subject to smaller contact force by the rotor at the inlet portion and the outlet portion than contact force by the rotor at the central portion.

[Claim 2] The fluid transfer device according to claim 1, wherein the stator has a smaller amount of interference by the rotor at the inlet portion and the outlet portion than an amount of interference by the rotor at the central portion, whereby the stator is subject to smaller contact force by the rotor at the inlet portion and the outlet portion than contact force by the rotor at the central portion.

[Claim 3] The fluid transfer device according to claim 2, wherein an amount of interference by the rotor decreases gradually from the central portion toward the outlet or the inlet.

[Claim 4] The fluid transfer device according to any one of claims 1 to

3, wherein contact force by the rotor at the central portion is uniform through the longitudinal direction.

[Claim 5] The fluid transfer device according to claim 4, wherein (A) contact force A1, A2, A3, A4 satisfies a relationship A4 > A2 > A3 > A1, where A1 denotes contact force between the rotor and the stator at the inlet of the transport path, A2 denotes contact force between the rotor and the stator at a position that is one turn of the rotor from the inlet of the transport path, A3 denotes contact force between the rotor and the stator at a position between the inlet of the transport path and the position that is one turn of the rotor from the inlet of the transport path, and A4 denotes contact force between the rotor and the stator at a longitudinally central portion of the transport path, and

(B) contact force B1, B2, B3, B4 satisfies a relationship B4 > B2 > B3 > B1, where B1 denotes contact force between the rotor and the stator at the outlet of the transport path, B2 denotes contact force between the rotor and the stator at a position that is one turn of the rotor from the outlet of the transport path, B3 denotes contact force between the rotor and the stator at a position between the outlet of the transport path and the position that is one turn of the rotor from the outlet of the transport path, and B4 denotes contact force between the rotor and the stator at the longitudinally central portion of the transport path.

[Claim 6] The fluid transfer device according to any one of claims 1 to 3, wherein an amount of interference by the rotor at a longitudinally central portion of the insertion hole is uniform through the longitudinal direction.

[Claim 7] The fluid transfer device according to claim 6, wherein (A) amounts of interference A1, A2, A3, A4 satisfy a relationship A4 > A2 > A3 > A1, where A1 denotes an amount of interference between the rotor and the stator at the inlet of the transport path, A2 denotes an amount of interference between the rotor and the stator at a position that is one

turn of the rotor from the inlet of the transport path, A3 denotes an amount of interference between the rotor and the stator at a position between the inlet of the transport path and the position that is one turn of the rotor from the inlet of the transport path, and A4 denotes an amount of interference between the rotor and the stator at a longitudinally central portion of the transport path, and

(B) amounts of interference B1, B2, B3, B4 satisfy a relationship B4 > B2 > B3 > B1, where B1 denotes an amount of interference between the rotor and the stator at the outlet of the transport path, B2 denotes an amount of interference between the rotor and the stator at a position that is one turn of the rotor from the outlet of the transport path, B3 denotes an amount of interference between the rotor and the stator at a position between the outlet of the transport path and the position that is one turn of the rotor from the outlet of the transport path, and B4 denotes an amount of interference between the rotor and the stator at the longitudinally central portion of the transport path.

[Claim 8] The fluid transfer device according to any one of claims 4 to 7, wherein a longitudinally central portion of the insertion hole spans a range of two turns of the rotor or more.

[Claim 9] The fluid transfer device according to any one of claims 4 to 8, wherein the inlet portion is within a range exceeding one turn of the rotor from the inlet of the transport path, and

the outlet portion is within a range exceeding one turn of the rotor from the outlet of the transport path.

[Claim 10] The fluid transfer device according to any one of claims 4 to 9, wherein a longitudinal range of the central portion of the stator is longer than respective longitudinal ranges of the inlet portion and the outlet portion.

[Claim 11] The fluid transfer device according to any one of claims 4 to 10, wherein an interference amount ratio of interference by the rotor at

the inlet portion and the outlet portion of the stator to interference by the rotor at the central portion of the stator is within 0.4:1 to 0.7:1.

[Claim 12] The fluid transfer device according to any one of claims 1 to 11, wherein a shape and/or a material property of the inlet portion and the outlet portion of the stator is specified differently from the central portion of the stator such that contact force with the rotor at the inlet portion and the outlet portion is smaller than contact force with the rotor at the central portion.

[Claim 13] The fluid transfer device according to any one of claims 1 to 11, wherein either one element of a material property and a thickness of the stator, along with an amount of interference of the stator, at an inlet portion of the transport path, is specified differently from a central portion of the insertion hole such that contact force with the rotor at the inlet portion of the stator is smaller than contact force with the rotor at the central portion of the stator, and

either one element of a material property and a thickness of the stator, along with an amount of interference of the stator, at an outlet portion of the transport path, is specified differently from the central portion of the insertion hole such that contact force with the rotor at the outlet portion of the stator is smaller than contact force with the rotor at the central portion of the stator.

[Claim 14] The fluid transfer device according to any one of claims 1 to 11, wherein the longitudinally central portion of the stator is made of material with greater elasticity than material of the inlet portion and/or the outlet portion of the stator.

[Claim 15] The fluid transfer device according to any one of claims 1 to 14, wherein an upstream end portion and a downstream end portion of the outer cylinder have inner peripheries with a larger diameter than a longitudinally central portion of the outer cylinder.

[Claim 16] The fluid transfer device according to claim 15, wherein the

longitudinally central portion of the outer cylinder has an inner periphery with a constant diameter.

[Claim 17] The fluid transfer device according to claim 16, wherein the longitudinally central portion of the outer cylinder has a female-screw-shaped inner periphery with a same pitch as the stator.

[Claim 18] The fluid transfer device according to claim 17, wherein an outer periphery of the outer cylinder has an uneven shape at a position corresponding to the female-screw-shaped inner periphery.

[Claim 19] The fluid transfer device according to any one of claims 15 to 18, wherein the inner periphery at the upstream end portion of the outer cylinder is formed by a tapered surface of which diameter increases toward an upstream end of the outer cylinder, and the inner periphery at the downstream end portion of the outer cylinder is formed by a tapered surface of which diameter increases toward a downstream end of the outer cylinder.

[Claim 20] The fluid transfer device according to any one of claims 15 to 19, wherein the outer cylinder includes an upstream end portion inner periphery of which inner periphery diameter is constant, an inlet-side tapered surface connecting the upstream end portion inner periphery with the central portion, a downstream end portion inner periphery of which inner periphery diameter is constant, and an outlet-side tapered surface connecting the downstream end portion inner periphery with the central portion.

[Claim 21] The fluid transfer device according to any one of claims 15 to 20, wherein a range of the inner periphery with the larger diameter at the upstream end portion of the outer cylinder is longer than a range of the inner periphery with the larger diameter at the downstream end portion of the outer cylinder.

[Claim 22] The fluid transfer device according to any one of claims 4 to 21, wherein a ratio of a range of the inlet portion of the stator to a range

of the central portion of the stator is within 3:5 to 3:10, and a ratio of a range of the outlet portion of the stator to the range of the central portion of the stator is within 2:5 to 2:10.

[Claim 23] The fluid transfer device according to any one of claims 1 to 22, wherein the stator includes a transport action zone having interference by the rotor and a non-transport action zone that is located on an upstream side from the transport action zone and is not in contact (has no interference) with the rotor.

[Claim 24] The fluid transfer device according to claim 23, wherein an inner periphery of the insertion hole constituting the non-transport action zone is formed by a tapered surface of which diameter increases from a center side of the insertion hole toward an inlet side.

[Claim 25] The fluid transfer device according to claim 23 or 24, wherein a capacity of the non-transport action zone is smaller than a capacity of any of transport spaces within the insertion hole that are located in the transport action zone and are opened and closed by eccentric rotation of the rotor.

[Claim 26] The fluid transfer device according to any one of claims 1 to 25, wherein contact force with the rotor at the inlet portion and/or the outlet portion of the stator is weakest when the rotor is at a highest position and a lowest position.

[Claim 27] The fluid transfer device according to any one of claims 1 to 26, wherein the fluid transfer device is a liquid-material discharge device further including a nozzle member having a discharge port through which the fluid flowing out from the outlet of the transport path is discharged.

[Claim 28] An application device comprising:

the fluid transfer device according to any one of claims 1 to 27; and

a relative movement device that moves the fluid transfer device and an application target relative to each other.

[Claim 29] An application method of drawing a line with a uniform width on a work surface using the application device according to claim 28.