Claims

[Claim 1] A composite valve device, comprising:

a fixed-side valve body having:

a plurality of flow ports being independent of each other; and

branching/mixing flow ports, which are formed such that at least two branching/mixing flow ports correspond to each of the flow ports, the branching/mixing flow ports each allowing a fluid flowing through each of the flow ports to be branched or mixed and flow; and

a movable valve body movably arranged in close contact with the fixed-side valve body, the movable valve body having a plurality of variable communication paths, each allowing communication of each of the flow ports and the at least two branching/mixing flow ports corresponding to the flow port while the fluid is branched or mixed at a variable branching/mixture ratio,

wherein the composite valve device is configured to function simultaneously as a plurality of valve devices.

[Claim 2] The composite valve device according to claim 1,

wherein the fixed-side valve body is formed of a fixed disc having a circular shape in plan view,

wherein the plurality of flow ports are arranged on an inner periphery side in a circumferential direction on the fixed disc, and

wherein the at least two branching/mixing flow ports formed corresponding to each of the flow ports are arranged on an outer periphery side of the corresponding one of the flow ports of the fixed disc in a radial direction.

[Claim 3] The composite valve device according to claim 2, wherein, when the number of flow ports is represented by N, the plurality of flow ports are arranged at positions obtained by equally dividing the fixed disc by N in the circumferential direction of the fixed disc.

[Claim 4] The composite valve device according to claim 2, wherein the branching/mixing flow ports, which are formed such that at least two branching/mixing flow ports correspond to each of the flow ports, are arranged adjacent to each other or spaced apart from each other in the circumferential direction of the fixed disc.

[Claim 5] The composite valve device according to claim 1,

wherein the movable valve body is formed of a movable disc having a circular shape in plan view, which is rotatably arranged in close contact with the fixed-side valve body, and

wherein the plurality of variable communication paths are arranged spaced apart from each other in a circumferential direction of the movable disc.

[Claim 6] The composite valve device according to claim 1, wherein each of the variable communication paths has an end portion on a side corresponding to the flow ports and an end portion on a side corresponding to the branching/mixing flow ports of the fixed-side valve body, the end portions being formed in shapes corresponding to an opening shape of each of the flow ports and an opening shape of each of the branching/mixing flow ports, respectively.

[Claim 7] The composite valve device according to claim 6, wherein one of the end portions of each of the plurality of variable communication paths is constantly in communication with a corresponding one of the flow ports even when the movable valve body is moved.

[Claim 8] The composite valve device according to claim 1,

wherein each of the variable communication paths is, at a first position, in communication with the each flow port and one of the at least two branching/mixing flow ports of the fixed-side valve body,

at a second position, in communication with the each flow port and both of the at least two branching/mixing flow ports of the fixed-side valve body, and

at a third position, in communication with the each flow port and another one of the at least two branching/mixing flow ports.

[Claim 9] The composite valve device according to claim 8, wherein, at the first position, one of the at least two branching/mixing flow ports formed corresponding to each of the plurality of flow ports, with which one of two of the plurality of variable communication paths is in communication, is different from one of the at least two branching/mixing flow ports, with which another one of the two variable communication paths is in communication.

[Claim 10] The composite valve device according to claim 1, wherein the plurality of flow ports comprise three flow ports through which a higher temperature fluid being the same fluid at a relatively high temperature, a lower temperature fluid being the same fluid at a relatively low temperature, and a mixed fluid in which the higher

temperature fluid and the lower temperature fluid are mixed are allowed to flow, respectively.

[Claim 11] The composite valve device according to claim 1 or 10, wherein, among the plurality of flow ports and the branching/mixing flow ports of the fixed valve body, which are formed such that at least two branching/mixing flow ports correspond to each of the flow ports, a specific one of the flow ports and specific ones of the branching/mixing flow ports are connected in advance on the fixed valve body side.

[Claim 12] The composite valve device according to claim 11, wherein one of the specific branching/mixing flow ports is a main branching/mixing flow port, through which the higher temperature fluid is allowed to mainly flow, and one of the specific branching/mixing flow ports is a main branching/mixing flow port, through which the lower temperature fluid is allowed to mainly flow.

[Claim 13] The composite valve device according to claim 10, wherein the plurality of flow ports and the branching/mixing flow ports, which are formed such that at least two branching/mixing flow ports correspond to each of the flow ports, comprise:

a main higher-temperature-side branching/mixing flow port and a sub higher-temperature-side branching/mixing flow port, through which the higher temperature fluid is allowed to be branched and flow;

a main lower-temperature-side branching outflow port and a sub lower-temperature-side branching outflow port, through which the lower temperature fluid is allowed to be branched and flow; and

a higher-temperature-side branching/mixing flow port and a lower-temperature-side branching/mixing flow port, through which the mixed fluid is allowed to be branched and flow, and a supply-side branching/mixing flow port, which allows the mixed fluid to be branched to a supply side of the mixed fluid.

[Claim 14] The composite valve device according to claim 13, wherein the higher-temperature-side main branching/mixing flow port, the lower-temperature-side main branching/mixing flow port, and the supply-side branching/mixing flow port are connected in advance to each other on the fixed valve body side.

[Claim 15] A temperature control device, comprising:

temperature control target having a flow passage for temperature control, through which a fluid for temperature control including a lower temperature fluid and a higher temperature fluid, which are mixed at an adjusted mixture ratio, is allowed to flow;

first supply portion for supplying the lower temperature fluid adjusted to a predetermined lower-temperature-side first temperature;

second supply portion for supplying the higher temperature fluid adjusted to a predetermined higher-temperature-side second temperature; and

a composite valve device connected to the first supply portion and the second supply portion, the composite valve device being configured to allow the lower temperature fluid supplied from the first supply portion and the higher temperature fluid supplied from the second supply portion to flow through the flow passage for temperature control after adjusting the mixture ratio and to branch and return a mixed fluid of the lower temperature fluid and the

higher temperature fluid, which has flowed through the flow passage for temperature control, to the first supply means and the second supply means,

wherein the composite valve device of any one of claims 1 to 14 is used as the composite valve device.