WHAT IS CLAIMED IS:

1. A substrate processing apparatus, comprising:

a transfer region configured to communicate with a process chamber in which substrates are processed;

a first shelf region installed above the transfer region, and having a first shelf configured to store a plurality of transfer vessels configured to accommodate the substrates;

a second shelf region installed below a stage part on which the transfer vessels to be transferred to and from an external device are loaded, and having a second shelf that is a stacked shelf having a plurality of stages of shelf boards and that is configured to stack and store the transfer vessels; and

a transfer vessel transfer robot installed inside a housing that accommodates the transfer region, the first shelf region and the second shelf region, and configured to transfer the transfer vessels to and from the stage part, the first shelf, the second shelf, and the transfer region,

wherein the transfer vessel transfer robot includes:

a main body base part installed on a bottom surface of the housing;

a first table part configured to be moved up and down with respect to the main body base part;

a first driving part disposed at an upper position of the main body base part and configured to serve as a driving source for moving the first table part up and down;

a second table part mounted on the first table part and configured to be moved up and down with respect to the first table part;

a second driving part configured to serve as a driving source for moving the second table part up and down; and

a vessel support part mounted on the second table part and configured to support the transfer vessels to be transferred.

2. The apparatus of Claim 1, wherein the first driving part is connected to a drive transmission mechanism configured to move the first table part up and down at an upper side of the main body base part through a connection mechanism.

3. The apparatus of Claim 2, wherein the first driving part and the second driving part are respectively configured as the driving sources separate from each other and are respectively configured to be independently controlled.

4. The apparatus of Claim 3, wherein the second driving part is disposed at either an upper position or a lower position of the first table part.

5. The apparatus of Claim 4, wherein a driving torque of the first driving part is larger than a driving torque of the second driving part.

6. The apparatus of Claim 5, further comprising an air flow generating part configured to generate a down-flow from an upper side toward a bottom side in a region inside the housing where the transfer vessel transfer robot is disposed.

7. The apparatus of Claim 3, wherein a driving torque of the first driving part is larger than a driving torque of the second driving part.

8. The apparatus of Claim 2, wherein the second driving part is disposed at either an upper position or a lower position of the first table part.

9. The apparatus of Claim 8, wherein a driving torque of the first driving part is larger than a driving torque of the second driving part.

10. The apparatus of Claim 2, wherein a driving torque of the first driving part is larger than a driving torque of the second driving part.

11. The apparatus of Claim 1, wherein the first driving part and the second driving part are respectively configured as the driving sources separate from each other and are respectively configured to be independently controlled.

12. The apparatus of Claim 11, wherein the second driving part is disposed at either an upper position or a lower position of the first table part.

13. The apparatus of Claim 12, wherein a driving torque of the first driving part is larger than a driving torque of the second driving part.

14. The apparatus of Claim 11, wherein a driving torque of the first driving part is larger than a driving torque of the second driving part.

15. The apparatus of Claim 1, wherein the second driving part is disposed at either an upper position or a lower position of the first table part.

16. The apparatus of Claim 15, wherein a driving torque of the first driving part is larger than a driving torque of the second driving part.

17. The apparatus of Claim 1, wherein a driving torque of the first driving part is larger than a driving torque of the second driving part.

18. The apparatus of Claim 1, further comprising an air flow generating part configured to generate a down-flow from an upper side toward a bottom side in a region inside the housing where the transfer vessel transfer robot is disposed.

19. A method of manufacturing a semiconductor device, comprising:

transferring, by using a transfer vessel transfer robot, a plurality of transfer vessels configured to accommodate substrates from a stage part, on which the transfer vessels to be

transferred to and from an external device are loaded, to a first shelf configured to store the plurality of transfer vessels in a first shelf region installed above a transfer region and a second shelf that is a stacked shelf having a plurality of stages of shelf boards and that is configured to stack and store the transfer vessels in a second shelf region installed below the stage part, and storing the transfer vessels thus transferred in the first shelf and the second shelf;

transferring, by using the transfer vessel transfer robot, the transfer vessels stored in the first shelf from the first shelf to the transfer region configured to communicate with a process chamber in which the substrates are processed;

transferring, by using the transfer vessel transfer robot, the transfer vessels stored in the second shelf from the second shelf to the transfer region;

taking the substrates out from the transfer vessels transferred to the transfer region and delivering the substrates thus taken out to the process chamber; and

processing the substrates in the process chamber,

wherein the transfer vessel transfer robot includes:

a main body base part installed on a bottom surface of a housing;

a first table part configured to be moved up and down with respect to the main body base part;

a first driving part disposed at an upper position of the main body base part and configured to serve as a driving source for moving the first table part up and down;

a second table part mounted on the first table part and configured to be moved up and down with respect to the first table part;

a second driving part configured to serve as a driving source for moving the second table part up and down; and

a vessel support part mounted on the second table part and configured to support the transfer vessels to be transferred.

20. A computer-readable recording medium storing a program that causes a substrate processing apparatus to perform a process by a computer, the process comprising:

transferring, by using a transfer vessel transfer robot, a plurality of transfer vessels configured to accommodate substrates from a stage part, on which the transfer vessels to be transferred to and from an external device are loaded, to a first shelf configured to store the plurality of transfer vessels in a first shelf region installed above a transfer region and a second shelf that is a stacked shelf having a plurality of stages of shelf boards and that is configured to stack and store the transfer vessels in a second shelf region installed below the stage part, and storing the transfer vessels thus transferred in the first shelf and the second shelf;

transferring, by using the transfer vessel transfer robot, the transfer vessels stored in the first shelf from the first shelf to the transfer region configured to communicate with a process chamber in which the substrates are processed;

transferring, by using the transfer vessel transfer robot, the transfer vessels stored in the second shelf from the second shelf to the transfer region;

taking the substrates out from the transfer vessels transferred to the transfer region and delivering the substrates thus taken out to the process chamber; and

processing the substrates in the process chamber,

wherein the transfer vessel transfer robot includes:

a main body base part installed on a bottom surface of a housing;

a first table part configured to be moved up and down with respect to the main body base part;

a first driving part disposed at an upper position of the main body base part and configured to serve as a driving source for moving the first table part up and down;

a second table part mounted on the first table part and configured to be moved up and down with respect to the first table part;

a second driving part configured to serve as a driving source for moving the second table part up and down; and

a vessel support part mounted on the second table part and configured to support the transfer vessels to be transferred.

21. The apparatus of Claim 1, wherein the stacked shelf has three stages of shelf boards.

22. The apparatus of Claim 1, wherein a cover is installed to cover a connection part between the main body base part and the first table part.

23. The apparatus of Claim 22, further comprising a local exhaust mechanism configured to make an internal space of the main body base part to be at a negative pressure.