CLAIMS

1. A sound absorbing device comprising:

a plurality of sound absorbing units, wherein

a frequency of sound absorbed by at least one of the sound absorbing units overlaps, at least partially, with a frequency of sound with a volume increased by installation of another sound absorbing unit, wherein the plurality of sound absorbing units comprises a first sound absorbing unit and a second sound absorbing unit, and each of the first sound absorbing unit and the second sound absorbing unit has a single cavity and a single opening.

2. The sound absorbing device according to claim 1, wherein the respective sound absorbing units are structured as Helmholtz resonators.

3. The sound absorbing device according to claim 2, wherein members making up the Helmholtz resonators are made of a resin material, and an interval between a frequency of sound absorbed by one of the Helmholtz resonator and a frequency of sound absorbed by another Helmholtz resonator is 30 hertz to 70 hertz.

4. The sound absorbing device according to claim 2, wherein members making up the Helmholtz resonators include a member made of a metallic material, and an interval between a frequency of sound absorbed by one of the Helmholtz resonator and a frequency of sound absorbed by another Helmholtz resonator is 70 hertz to 200 hertz.

5. The sound absorbing device according to claim 4, further comprising:

a first member that forms a wall defining cavities of the respective Helmholtz resonators, the wall being provided with communicating portions communicating to external; and

a second member that forms another wall defining the cavities, wherein

the first member is made of a metallic material, and the communicating portions are formed by performing a burring process on the metallic material.

6. The sound absorbing device according to any one of claims 2 to 5, wherein at least one first Helmholtz resonator is positioned adjacent to a second Helmholtz resonator.

7. The sound absorbing device according to claim 5, wherein frequencies of sound absorbed by the respective Helmholtz resonators are differentiated by differentiating lengths of the communicating portions that communicate to external and are provided on a wall defining the cavities of the respective Helmholtz resonators.

8. The sound absorbing device according to any one of claims 2 to 7, wherein a frequency of sound absorbed by at least one of the Helmholtz resonators is within a range of equal to or higher than 100 hertz and equal to or lower than 1500 hertz.

9. The sound absorbing device according to any one of claims 2 to 4, further comprising:

a first member that forms a wall defining cavities of the respective Helmholtz resonators, the wall being provided with communicating portions communicating to external; and

a second member that forms another wall defining the cavities, wherein

the first member is provided with a plurality of holes each of which serves as one of the communicating portions,

the second member is provided with a plurality of opened spaces each of which serves as one of a plurality of cavities by being surrounded by another wall and by having an opening closed by the first member,

the Helmholtz resonators are formed by assembling the first member and the second member in such a manner that each of the holes faces corresponding one of the opened spaces,

at least one of the holes has a different diameter or length from that of another hole, and at least one of the opened spaces has a different volume from that of another opened space, and

pairing of each of the holes and corresponding one of the opened spaces facing each other is changeable.

10. The sound absorbing device according to claim 9, wherein at least one first Helmholtz resonator is positioned adjacent to a second Helmholtz resonator.

11. The sound absorbing device according to claim 9, wherein frequencies of sound absorbed by the respective Helmholtz resonators are differentiated by differentiating lengths of the communicating portions that communicate to external and are provided on a wall defining the cavities of the respective Helmholtz resonators.

12. The sound absorbing device according to any one of claims 9 to 11, wherein a frequency of sound absorbed by at least one of the Helmholtz resonators is within a range of equal to or higher than 100 hertz and equal to or lower than 1500 hertz.

13. The sound absorbing device according to claim 9, wherein the pairing of each of the holes and corresponding one of the opened spaces facing each other is changed by changing a relative position of the second member with respect to the first member.

14. The sound absorbing device according to claim 13, further comprising:
a sound detecting unit that is arranged on the first member and detects sound;
a cavity forming member moving unit that moves one of the first member or the second member relatively to the other; and
a cavity forming member movement control unit that changes the relative position of the second member with respect to the first member, by controlling the cavity forming member moving unit based on a detection result of the sound detecting unit.

15. The sound absorbing device according to claim 13 or 14, wherein the holes and the opened spaces are both circumferentially arranged.

16. The sound absorbing device according to claims 13 or 14, wherein the holes and the opened spaces are both linearly arranged.

17. The sound absorbing device according to any one of claims 9 to 16, wherein one of the first member and the second member is a magnet, and the other is a ferromagnetic body.

18. An electronic device comprising:
a sound absorbing module that absorbs sound generated in an operation, wherein
the sound absorbing device according to any one of claims 1 to 14 is used as the sound absorbing module.

19. An electrophotographic image forming apparatus structured as the electronic device according to claim 18.