CLAIMS

1. A branch-off unit that is provided to a liquid-side connection pipe (20) and a gas-side connection pipe (25) via which a heat source unit (11) of a refrigeration apparatus (10) is connected to utilization-side units (12a to 12f), comprising:

a liquid-side header (50) provided to the liquid-side connection pipe (20), the liquid-side header (50) including a single liquid-side collecting port (52) for connection with a pipe (21) extending to the heat source unit (11) and liquid-side branch-off ports (54a to 54f) for connection with pipes (22a to 22f) extending to the utilization-side units (12a to 12f), the single liquid-side collecting port (52) communicating with all of the liquid-side branch-off ports (54a to 54f);

a gas-side header (60) provided to the gas-side connection pipe (25), the gas-side header (60) including a single gas-side collecting port (62) for connection with a pipe (26) extending to the heat source unit (11) and gas-side branch-off ports (64a to 64f) for connection with pipes (27a to 27f) extending to the utilization-side units (12a to 12f), the single gas-side collecting port (62) communicating with all of the gas-side branch-off ports (64a to 64f); and

a casing (40) in which the liquid-side header (50) and the gas-side header (60) are stored, wherein the branch-off unit and the utilization-side units (12a to 12f) are installed indoors.

2. The branch-off unit according to claim 1, wherein the liquid-side collecting port (52) and the gas-side collecting port (62) are exposed to an outside of the casing (40) through a first side face (41) of the casing (40).

3. The branch-off unit according to claim 2, wherein all of the liquid-side branch-off ports (54a to 54f) and all of the gas-side branch-off ports (64a to 64f) are exposed to the outside of the casing (40) through a second side face (42) of the casing (40).

4. The branch-off unit according to claim 3, wherein, of the liquid-side branch-off ports (54a to 54f) and the gas-side branch-off ports (64a to 64f), a liquid-side branch-off port and a gas-side branch-off port that are paired and connected to a certain one of the utilization-side units (12a to 12f) are aligned in a top-bottom direction.

5. The branch-off unit according to any one of claims 1 to 4, wherein

the liquid-side header (50) includes a liquid-side collecting pipe (51) having a first end being closed and a second end functioning as the liquid-side collecting port (52) and liquid-side branch-off pipes (53a to 53f) protruding laterally from the liquid-side collecting pipe (51) and having tip ends functioning as the liquid-side branch-off ports (54a to 54f), the liquid-side branch-off pipes (53a to 53f) being arranged at a certain interval along an axial direction of the liquid-side collecting pipe (51), and

the gas-side header (60) includes a gas-side collecting pipe (61) having a first end being closed and a second end functioning as the gas-side collecting port (62) and gas-side branch-off pipes (63a to 63f) protruding laterally from the gas-side collecting pipe (61) and having tip ends functioning as the gas-side branch-off ports (64a to 64f), the gas-side branch-off pipes (63a to 63f) being arranged at a certain interval along an axial direction of the gas-side collecting pipe (61).

6. The branch-off unit according to claim 5, wherein

the liquid-side branch-off pipes (53a to 53f) of the liquid-side header (50) include liquid-side branch-off pipes having different diameters and larger-diameter ones (53a, 53b) of the liquid-side branch-off pipes are disposed closer to the liquid-side collecting port (52), and

the gas-side branch-off pipes (63a to 63f) of the gas-side header (60) include gas-side branch-off pipes having different diameters and larger-diameter ones (63a, 63b) of the gas-side branch-off pipes are disposed closer to the gas-side collecting port (62).

7. The branch-off unit according to any one of claims 1 to 6, wherein

the liquid-side header (50) includes a single mechanical pipe joint (56) for mechanically connecting the pipe (21) to the liquid-side collecting port (52) and a plurality of flared pipe joints (57) for connecting the pipes (22a to 22f) to the liquid-side branch-off ports (54a to 54f), and

the gas-side header (60) includes a single mechanical pipe joint (66) for mechanically connecting the pipe (26) to the gas-side collecting port (62) and a plurality of flared pipe joints (67) for connecting the pipes (27a to 27f) to the gas-side branch-off ports (64a to 64f).

8. The branch-off unit according to any one of claims 1 to 7, wherein the casing (40) includes a coupling portion (44) that is designed to be coupled to a support member (96) fixed to a building (90) to hang the casing (40) at the support member (96).

9. A refrigeration apparatus comprising:

a branch-off unit (13) according to any one of claims 1 to 8;

a heat source unit (11) installed outdoors and connected to the branch-off unit (13); and

utilization-side units (12a to 12f) installed indoors and connected to the branch-off unit (13).

10. A method for installing a refrigeration apparatus (10) to a building (90), the refrigeration apparatus (10) including a heat source unit (11), utilization-side units (12a to 12f), and a branch-off unit (13) that is provided to a liquid-side connection pipe (20) and a gas-side connection pipe (25) via which the heat source unit (11) is connected to the utilization-side units (12a to 12f), the branch-off unit (13) including a liquid-side header (50) provided to the liquid-side connection pipe (20), the liquid-side header (50) including a single liquid-side collecting port (52) for connection with a pipe (21) extending to the heat source unit (11) and liquid-side branch-off ports (54a to 54f) for connection with pipes (22a to 22f) extending to the utilization-side units (12a to 12f), the single liquid-side collecting port (52) communicating with all of the liquid-side branch-off ports (54a to 54f), a gas-side header (60) provided to the gas-side connection pipe (25), the gas-side header (60) including a single gas-side collecting port (62) for connection with a pipe (26) extending to the heat source unit (11) and gas-side branch-off ports (64a to 64f) for connection with pipes (27a to 27f) extending to the utilization-side units (12a to 12f), the single gas-side collecting port (62) communicating with all of the gas-side branch-off ports (64a to 64f), and a casing (40) in which the liquid-side header (50) and the gas-side header (60) are stored, the method comprising:

an installation step of installing the heat source unit (11) outside the building (90) and installing the utilization-side units (12a to 12f) and the branch-off unit (13) inside the building (90);

a first connecting step of connecting the heat source unit (11) and the branch-off unit (13) to each other via a liquid-side trunk pipe (21) and a gas-side trunk pipe (26), the liquid-side trunk pipe (21) being made of a plurality of pipe members (31) connected to each other via a mechanical pipe joint (33), the gas-side trunk pipe (26) being made of a plurality of pipe members (32) connected to each other via a mechanical pipe joint (34); and

a second connecting step of connecting the utilization-side units (12a to 12f) and the branch-off unit (13) to each other via liquid-side branch pipes (22a to 22f) and gas-side branch pipes (27a to 27f), each of the liquid-side branch pipes (22a to 22f) and the gas-side

branch pipes (27a to 27f) being made of seamless pipes.

11. The method according to claim 10, further comprising a branch pipe manufacturing step of manufacturing the liquid-side branch pipes (22a to 22f) and the gas-side branch pipes (27a to 27f) by cutting a copper pipe carried to the building (90) in a form of a coiled package, each of the liquid-side branch pipes (22a to 22f) and the gas-side branch pipes (27a to 27f) being made of seamless pipes, wherein

in the second connecting step, the utilization-side units (12a to 12f) and the branch-off unit (13) are connected to each other via the liquid-side branch pipes (22a to 22f) and the gas-side branch pipes (27a to 27f) manufactured in the branch pipe manufacturing step.

12. The method according to claim 10 or 11, wherein

the branch-off unit (13) is configured such that the liquid-side branch-off ports (54a to 54f) and the gas-side branch-off ports (64a to 64f) are respectively provided with flared pipe joints (57, 67), and

in the second connecting step, the liquid-side branch pipes (22a to 22f) are connected to the liquid-side branch-off ports (54a to 54f) via the flared pipe joints (57), respectively, and the gas-side branch pipes (27a to 27f) are connected to the gas-side branch-off ports (64a to 64f) via the flared pipe joints (67), respectively.

13. The method according to any one of claims 10 to 12, wherein the pipe members (31, 32), which constitute the liquid-side trunk pipe (21) and the gas-side trunk pipe (26) used in the first connecting step, are made by braze-bonding of a plurality of parts, and the pipe members (31, 32) thus made are carried into the building (90).