CLAIMS

1. A refrigerant vapor compression system comprising:

a compression device having at least a first compression stage and a second compression stage arranged in series refrigerant flow relationship;

a first refrigerant heat rejection heat exchanger disposed downstream with respect to refrigerant flow of the second compression stage for passing the refrigerant in heat exchange relationship with a flow of a first secondary fluid;

a first refrigerant intercooler disposed intermediate the first compression stage and the second compression stage for passing the refrigerant passing from the first compression stage to the second compression stage in heat exchange relationship with the flow of the first secondary fluid, the first refrigerant intercooler disposed downstream of the first refrigerant heat rejection heat exchanger with respect to the flow of the first secondary fluid;

an economizer circuit including a vapor line in fluid communication with a suction inlet to the second compression stage;

a second refrigerant heat rejection heat exchanger disposed intermediate with respect to refrigerant flow of the second compression stage and the first refrigerant heat rejection heat exchanger; and

a second refrigerant intercooler disposed intermediate the first compression stage and the second compression stage and downstream with respect to refrigerant flow of the vapor line for passing the refrigerant from the first compression stage to the second compression stage in heat exchange relationship with a second secondary fluid.

2. The refrigerant vapor compression system of claim 1, wherein the first refrigerant heat rejecting heat exchanger comprises a round tube plat fin heat exchanger or a louver fin mini-channel flat tube heat exchanger.

3. The refrigerant vapor compression system of claim 1, wherein the first refrigerant intercooler comprises a round tube plat fin heat exchanger or a louver fin mini-channel flat tube heat exchanger.

4. The refrigerant vapor compression system of claim 1, wherein the second refrigerant heat rejection heat exchanger comprises a brazed plate heat exchanger, a tube-on-tube heat exchanger or a tube-in-tube heat exchanger.

5. The refrigerant vapor compression system of claim 1, wherein the second refrigerant intercooler comprises a tube-on-tube heat exchanger or a tube-in-tube heat exchanger.

6. The refrigerant vapor compression system of claim 1 wherein the first secondary fluid comprises air and the second secondary fluid comprises a brine.

7. The refrigerant vapor compression system of claim 1, further comprising a pump operatively associated with the second refrigerant heat rejection heat exchanger and with the second refrigerant intercooler for moving a flow of the second secondary fluid first through the second refrigerant heat rejection heat exchanger and thence through the second refrigerant intercooler.

8. The refrigerant vapor compression system of claim 1, wherein the economizer circuit includes a flash tank economizer disposed between the first heat rejection heat exchanger and a heat absorption heat exchanger.

9. The refrigerant vapor compression system as recited in claim 1, further comprising at least one fan operatively associated with the first refrigerant heat rejection heat exchanger and with the first refrigerant intercooler for moving a flow of air first through the first refrigerant heat rejection heat exchanger and thence through the first refrigerant intercooler.

10. A refrigerant vapor compression system comprising:

a compression device having at least a first compression stage and a second compression stage arranged in series refrigerant flow relationship;

a first refrigerant heat rejecting heat exchanger disposed downstream with respect to refrigerant flow of the second compression stage for passing the refrigerant in heat exchange relationship with a first secondary fluid;

a second refrigerant heat rejecting heat exchanger disposed upstream with respect to refrigerant flow of the first refrigerant heat rejecting heat exchanger for passing the refrigerant in heat exchange relationship with a second secondary fluid;

a first refrigerant intercooler disposed intermediate the first compression stage and the second compression stage for passing the refrigerant passing from the first compression stage to the second compression stage in heat exchange relationship with the first secondary fluid;

a second refrigerant intercooler disposed intermediate the first compression stage and the second compression stage and upstream with respect to refrigerant flow of the first refrigerant intercooler for passing the refrigerant passing from the first compression stage to the second compression stage in heat exchange relationship with the second secondary fluid

an economizer circuit including a vapor line in fluid communication with a suction inlet into to the second compression stage; and

wherein the first secondary fluid comprises air and the second secondary fluid comprises a brine.

11. The refrigerant vapor compression system of claim 10, wherein the first refrigerant heat rejecting heat exchanger comprises a round tube plate fin heat exchanger or a louver fin mini-channel flat tube heat exchanger.

12. The refrigerant vapor compression system of claim 10, wherein the first refrigerant intercooler comprises a round tube plate fin heat exchanger or a louver fin mini-channel flat tube heat exchanger.

13. The refrigerant vapor compression system of claim 10, wherein the second refrigerant heat rejection heat exchanger comprises a brazed plat heat exchanger, a tube-on-tube heat exchanger or a tube-in-tube heat exchanger.

14. The refrigerant vapor compression system of claim 10, wherein the second refrigerant intercooler comprises a brazed plat heat exchanger, a tube-on-tube heat exchanger or a tube-in-tube heat exchanger.

15. The refrigerant vapor compression system of claim 10, wherein the economizer circuit includes a flash tank economizer disposed between the first heat rejection heat exchanger and a heat absorption heat exchanger.

16. The refrigerant vapor compression system as recited in claim 10, further comprising at least one fan operatively associated with the first refrigerant heat rejection heat exchanger and with the first refrigerant intercooler for moving a flow of air first through the first refrigerant heat rejection heat exchanger and thence through the first refrigerant intercooler.

18. The refrigerant vapor compression system of claim 10, further comprising a pump operatively associated with the second refrigerant heat rejection heat exchanger and with the second refrigerant intercooler for moving a flow of the second secondary fluid first through the second refrigerant heat rejection heat exchanger and thence through the second refrigerant intercooler.

19. A refrigerant vapor compression system comprising:

a compression device having at least a first compression stage and a second compression stage arranged in series refrigerant flow relationship;

a first refrigerant heat rejecting heat exchanger disposed downstream with respect to refrigerant flow of the second compression stage for passing the refrigerant in heat exchange relationship with a first secondary fluid;

a second refrigerant heat rejecting heat exchanger disposed upstream with respect to refrigerant flow of the first refrigerant heat rejecting heat exchanger for passing the refrigerant in heat exchange relationship with a second secondary fluid, and wherein the second refrigerant heat rejecting heat exchanger is directly downstream of the second compression stage and directly upstream of the first refrigerant heat rejecting heat exchanger;

a first refrigerant intercooler disposed intermediate the first compression stage and the second compression stage for passing the refrigerant passing from the first compression stage to the second compression stage in heat exchange relationship with the first secondary fluid, wherein the first refrigerant intercooler is directly downstream of the first compression stage and directly upstream of the second compression stage; and

an economizer including a vapor line in fluid communication with a suction inlet into to the second compression stage, and wherein an outlet from the first refrigerant heat rejecting heat exchanger feeds directly into the economizer.

20. A refrigerant vapor compression system comprising:

a compression device having at least a first compression stage and a second compression stage arranged in series refrigerant flow relationship;

a first refrigerant heat rejecting heat exchanger disposed downstream with respect to refrigerant flow of the second compression stage for passing the refrigerant in heat exchange relationship with a first secondary fluid;

a second refrigerant heat rejecting heat exchanger disposed ~~downstream~~ upstream with respect to refrigerant flow of the first refrigerant heat rejecting heat exchanger for passing the refrigerant in heat exchange relationship with a second secondary fluid, and wherein the second refrigerant heat rejecting heat exchanger is directly downstream of the second compression stage and directly upstream of the first refrigerant heat rejecting heat exchanger;

a first refrigerant intercooler disposed intermediate the first compression stage and the second compression stage for passing the refrigerant passing from the first compression stage to the second compression stage in heat exchange relationship with the first secondary fluid;

a second refrigerant intercooler disposed ~~downstream~~ upstream with respect of refrigerant flow of first refrigerant intercooler for passing the refrigerant passing from the first compression stage to the second compression stage in heat exchange relationship with the second secondary fluid, and wherein the second refrigerant intercooler has a fluid pass and a refrigerant pass arranged in a heat transfer relationship, and wherein an outlet from the first compression stage is in direct flow communication with an inlet to the refrigerant pass, and wherein an outlet from the refrigerant pass is in direct flow communication with an inlet to the first refrigerant intercooler; and

an economizer including a vapor line in fluid communication with a suction inlet into to the second compression stage, and wherein an outlet from the first refrigerant heat rejecting heat exchanger feeds directly into the economizer.