We Claim:

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 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 secondary fluid;

a 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 secondary fluid, the refrigerant intercooler disposed downstream of the refrigerant heat rejection heat exchanger with respect to the flow of the secondary fluid.

2. The refrigerant vapor compression system as recited in claim 1 wherein the refrigerant heat rejection heat exchanger operates at least in part at a refrigerant pressure and refrigerant temperature in excess of a critical point of the refrigerant.

3. The refrigerant vapor compression system as recited in claim 2 wherein the refrigerant comprises carbon dioxide.

4. The refrigerant vapor compression system as recited in claim 1 further comprising an intercooler bypass circuit for selectively establishing refrigerant flow communication from the first compression stage to the second compression stage without passing through the intercooler.

5. The refrigerant vapor compression system as recited in claim 4 further comprising at least one fan operatively associated with the refrigerant heat rejection heat exchanger and with the intercooler for moving the flow of air first through the refrigerant heat rejection heat exchanger and thence through the refrigerant intercooler.

6. 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 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; 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 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.

7. The refrigerant vapor compression system as recited in claim 6 wherein the refrigerant heat rejection heat exchanger operates at least in part at a refrigerant pressure and refrigerant temperature in excess of a critical point of the refrigerant.

8. The refrigerant vapor compression system as recited in claim 7 wherein the refrigerant comprises carbon dioxide.

9. The refrigerant vapor compression system as recited in claim 6 wherein the first secondary fluid comprises air and the secondary fluid comprises at least one of water and glycol.

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

11. The refrigerant vapor compression system as recited in claim 9 further comprising a pump operatively associated with the second refrigerant heat rejection heat exchanger and with the second refrigerant intercooler for moving the flow of the second secondary fluid first through the second refrigerant heat rejection heat exchanger and thence through the second refrigerant intercooler.

12. The refrigerant vapor compression system as recited in claim 6 further comprising an intercooler bypass circuit for selectively establishing refrigerant flow communication from the first compression stage to the second compression stage without passing through the intercooler.

13. 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 refrigerant to secondary liquid heat exchanger including a first refrigerant flow passage, a second refrigerant flow passage and a secondary liquid flow passage in heat exchange relationship with each of the first refrigerant flow passage and the second refrigerant flow passage, the first refrigerant flow passage disposed downstream with respect to refrigerant flow of the second compression stage and the second refrigerant flow passage disposed intermediate the first compression stage and the second compression stage.

14. The refrigerant vapor compression system as recited in claim 13 wherein the refrigerant to secondary fluid heat exchanger comprises a double tube-on-tube heat exchanger having a first refrigerant tube defining the first refrigerant flow passage, a second refrigerant tube defining the second refrigerant flow passage, and a cooling liquid tube defining the secondary liquid flow passage.

15. The refrigerant vapor compression system as recited in claim 14 wherein the first and second refrigerant tubes are disposed on opposite sides of the cooling liquid tube.

16. The refrigerant vapor compression system as recited in claim 13 wherein the flow of refrigerant flow through each of the first refrigerant flow passage and the second refrigerant flow passage passes in a counterflow arrangement with the flow of secondary liquid through the secondary liquid flow passage.

17. The refrigerant vapor compression system as recited in claim 13 wherein the flow of refrigerant flow through each of the first refrigerant flow passage and the second refrigerant flow passage passes in a parallel flow arrangement with the flow of secondary liquid through the secondary liquid flow passage.

18. The refrigerant vapor compression system as recited in claim 12 wherein the secondary liquid comprises at least one of water and glycol.

19. A refrigerated container for use in transporting perishable goods including a refrigeration system incorporating the refrigeration vapor compression system as recited in claim 1.

20. A refrigerated container for use in transporting perishable goods including a refrigeration system incorporating the refrigeration vapor compression system as recited in claim 6.

We Claim:

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 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 secondary fluid;

a 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 secondary fluid, the refrigerant intercooler disposed downstream of the refrigerant heat rejection heat exchanger with respect to the flow of the secondary fluid.

2. The refrigerant vapor compression system as recited in claim 1 wherein the refrigerant heat rejection heat exchanger operates at least in part at a refrigerant pressure and refrigerant temperature in excess of a critical point of the refrigerant.

3. The refrigerant vapor compression system as recited in claim 2 wherein the refrigerant comprises carbon dioxide.

4. The refrigerant vapor compression system as recited in claim 1 further comprising an intercooler bypass circuit for selectively establishing refrigerant flow communication from the first compression stage to the second compression stage without passing through the intercooler.

5. The refrigerant vapor compression system as recited in claim 4 further comprising at least one fan operatively associated with the refrigerant heat rejection heat exchanger and with the intercooler for moving the flow of air first through the refrigerant heat rejection heat exchanger and thence through the refrigerant intercooler.

6. 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 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 downstream 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; wherein

the first secondary fluid comprises air and the secondary fluid comprises at least one of water and glycol; and

further comprising a pump operatively associated with the second refrigerant heat rejection heat exchanger and with the second refrigerant intercooler for moving the flow of the second secondary fluid first through the second refrigerant heat rejection heat exchanger and thence through the second refrigerant intercooler.

7. The refrigerant vapor compression system as recited in claim 6 wherein the refrigerant heat rejection heat exchanger operates at least in part at a refrigerant pressure and refrigerant temperature in excess of a critical point of the refrigerant.

8. The refrigerant vapor compression system as recited in claim 7 wherein the refrigerant comprises carbon dioxide.

9. The refrigerant vapor compression system as recited in claim 6 further comprising at least one fan operatively associated with the first refrigerant heat rejection heat exchanger and with the first refrigerant intercooler for moving the flow of air first through the first refrigerant heat rejection heat exchanger and thence

through the first refrigerant intercooler.

10. The refrigerant vapor compression system as recited in claim 6 further comprising an intercooler bypass circuit for selectively establishing refrigerant flow communication from the first compression stage to the second compression stage without passing through the intercooler.

11. 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 refrigerant to secondary liquid heat exchanger including a first refrigerant flow passage, a second refrigerant flow passage and a secondary liquid flow passage in heat exchange relationship with each of the first refrigerant flow passage and the second refrigerant flow passage, the first refrigerant flow passage disposed downstream with respect to refrigerant flow of the second compression stage and the second refrigerant flow passage disposed intermediate the first compression stage and the second compression stage; wherein

the refrigerant to secondary fluid heat exchanger comprises a double tube-on-tube heat exchanger having a first refrigerant tube defining the first refrigerant flow passage, a second refrigerant tube defining the second refrigerant flow passage, and a cooling liquid tube defining the secondary liquid flow passage.

12. The refrigerant vapor compression system as recited in claim 11 wherein the first and second refrigerant tubes are disposed on opposite sides of the cooling liquid tube.

13. The refrigerant vapor compression system as recited in claim 11 wherein the flow of refrigerant flow through each of the first refrigerant flow passage and the second refrigerant flow passage passes in a counterflow arrangement with the flow of secondary liquid through the secondary liquid flow passage.

14. The refrigerant vapor compression system as recited in claim 11 wherein the flow of refrigerant flow through each of the first refrigerant flow passage and the second refrigerant flow passage passes in a parallel flow arrangement with the flow of secondary liquid through the secondary liquid flow

passage.

15. The refrigerant vapor compression system as recited in claim 10 wherein the secondary liquid comprises at least one of water and glycol.

16. A refrigerated container for use in transporting perishable goods including a refrigeration system incorporating the refrigeration vapor compression system as recited in claim 1.

17. A refrigerated container for use in transporting perishable goods including a refrigeration system incorporating the refrigeration vapor compression system as recited in claim 6.