CLAIMS

What is claimed is:

1. A compressor (20) comprising:

a case (22) having:

an inlet;

a motor compartment (50);

a plurality of cylinders (30-32);

a suction passage (82) between the motor compartment and the cylinders;

a crankcase compartment (52); and

an outlet;

a crankshaft (38);

for each of said cylinders:

a piston (34) mounted for reciprocal movement at least partially within the cylinder;

a connecting rod (36) coupling the piston to the crankshaft; and

a pin (44) coupling the connecting rod to the piston; and

an electric motor (24) within the motor compartment and comprising:

a stator (42); and

a rotor (40) mounted to the crankshaft, the case having a wall (56) between the motor compartment (50) and the crankcase compartment (52);

wherein:

the wall bears means (120, 132; 420; 460) for coalescing oil entrained in a flow exiting a gap (90) between the rotor and the stator to prevent the oil from entering the cylinders via the suction passage.

2. The compressor of claim 1 further comprising:

a bearing (60) mounted within the wall and supporting the crankshaft; and

a check valve (98) in the wall below the bearing.

3. The compressor of claim 1 wherein:

the case comprises a single main casting (54), the single main casting including:

the wall (56);

a motor case (57) surrounding at least half a length of the stator and the rotor; and

a crankcase (55), of which the wall (56) forms a portion.

4. The compressor of claim 1 wherein:

the means comprises a surface having a first portion (130) deflecting the refrigerant radially outward and a second portion (124) deflecting the refrigerant longitudinally backward.

5. The compressor of claim 1 wherein:

the means comprises a lip.

6. The compressor of claim 5 wherein:

the lip is a generally annular lip and has a gap (138; 466) at a lower end.

7. A refrigeration system (220; 350) comprising:

the compressor (20) of claim 1;

a refrigerant recirculating flowpath (252) through the compressor;

a first heat exchanger (256) along the flowpath downstream of the compressor;

an expansion device (262; 262') along the flowpath downstream of the first heat exchanger; and

a second heat exchanger (264; 264') along the flowpath downstream of the expansion device.

8. The refrigeration system of claim 7 wherein:

a refrigerant charge comprises at least 50% carbon dioxide by weight.

9. The refrigeration system of claim 7 wherein:

there is no additional oil separator.

10. The refrigeration system of claim 7 wherein:

the crankshaft axis of rotation is within 20° of horizontal.

11. The system of claim 7 being a refrigerated transport system further comprising:

a container (324), the second heat exchanger being positioned to cool an interior (326) of the container.

12. The system of claim 7 being a fixed refrigeration system further comprising:

multiple refrigerated spaces (356); and

a plurality of said second heat exchangers (264'), each being positioned to cool an associated said refrigerated space.

13. A method for operating the compressor of claim 1 wherein:

the motor is powered to drive the crankshaft and provide the reciprocal movement of the pistons;

the movement of the pistons creates suction in a suction passage;

the suction draws the refrigerant and the oil entrained in the refrigerant into the compressor through the inlet;

at least a portion of the refrigerant and entrained oil passes longitudinally toward the wall through a space between the rotor and the stator; and

the means cause a deflection of the flow.

14. The method of claim 13 wherein:

the deflection of the flow causes separation and the coalescing of the oil.

15. A method for reengineering a configuration of a compressor or remanufacturing the compressor, the method comprising:

adding a lip to form the means for coalescing oil to produce the compressor of claim 1 or the configuration of said compressor.

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a case (22) having:

an inlet;

a motor compartment (50);

a plurality of cylinders (30-32);

a suction passage (82) between the motor compartment and the cylinders;

a crankcase compartment (52); and

an outlet;

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for each of said cylinders:

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a connecting rod (36) coupling the piston to the crankshaft; and

a pin (44) coupling the connecting rod to the piston; and

an electric motor (24) within the motor compartment and comprising:

a stator (42); and

a rotor (40) mounted to the crankshaft, the case having a wall (56) between the motor compartment (50) and the crankcase compartment (52);

wherein:

the wall bears means (120, 132; 420; 460) for coalescing oil entrained in a flow exiting a gap (90) between the rotor and the stator to prevent the oil from entering the cylinders via the suction passage.

2. The compressor of claim 1 further comprising:

a bearing (60) mounted within the wall and supporting the crankshaft; and

a check valve (98) in the wall below the bearing to permit flow from the motor compartment into the crankcase compartment.

3. The compressor of claim 1 wherein:

the case comprises a single main casting (54), the single main casting including:

the wall (56);

a motor case (57) surrounding at least half a length of the stator and the rotor; and a crankcase (55), of which the wall (56) forms a portion.

4. The compressor of claim 1 wherein:

the means comprises a surface having a first portion (130) deflecting the refrigerant radially outward and a second portion (124) deflecting the refrigerant longitudinally backward.

5. The compressor of claim 1 wherein:

the means comprises a lip.

6. The compressor of claim 5 wherein:

the lip is a generally annular lip and has a gap (138; 466) at a lower end.

7. A refrigeration system (220; 350) comprising:

the compressor (20) of claim 1;

a refrigerant recirculating flowpath (252) through the compressor;

a first heat exchanger (256) along the flowpath downstream of the compressor;

an expansion device (262; 262') along the flowpath downstream of the first heat exchanger; and

a second heat exchanger (264; 264') along the flowpath downstream of the expansion device.

8. The refrigeration system of claim 7 wherein:

a refrigerant charge comprises at least 50% carbon dioxide by weight.

9. The refrigeration system of claim 7 wherein:

there is no additional oil separator.

10. The refrigeration system of claim 7 wherein:

the crankshaft axis of rotation is within 20° of horizontal.

11. The system of claim 7 being a refrigerated transport system further comprising:

a container (324), the second heat exchanger being positioned to cool an interior (326) of the container.

12. The system of claim 7 being a fixed refrigeration system further comprising:

multiple refrigerated spaces (356); and

a plurality of said second heat exchangers (264'), each being positioned to cool an associated said refrigerated space.

13. A method for operating the compressor of claim 1 wherein:

the motor is powered to drive the crankshaft and provide the reciprocal movement of the pistons;

the movement of the pistons creates suction in a suction passage;

the suction draws the refrigerant and the oil entrained in the refrigerant into the compressor through the inlet;

at least a portion of the refrigerant and entrained oil passes longitudinally toward the wall through a space between the rotor and the stator; and

the means cause a deflection of the flow.

14. The method of claim 13 wherein:

the deflection of the flow causes separation and the coalescing of the oil.

15. A method for reengineering a configuration of a compressor or remanufacturing the compressor, the method comprising:

adding a lip to form the means for coalescing oil to produce the compressor of claim 1 or the configuration of said compressor.

16. The method of claim 15 wherein:

the adding of the lip comprises adding a plate (422) having a web (424) extending radially outward from a central aperture (426) to a curved peripheral portion (428).

17. The method of claim 15 wherein:

the adding of the lip comprises adding a channel in a casting mold to cast the lip.

18. The compressor of claim 1 wherein:

the means comprises a generally annular channel (134).

19. The compressor of claim 18 wherein:

the channel has a base (136) along the wall.

20. The system of claim 10 further comprising:

a bearing (60) mounted within the wall and supporting the crankshaft; and

a check valve (98) in the wall below the bearing to permit flow from the motor compartment into the crankcase compartment.