CLAIMS

WHAT IS CLAIMED IS:

1. A motor for an electrical submersible pumping system comprising:

a housing having an axial bore;

a groove formed inside the housing and circumscribing the bore;

a curvilinear snap ring set in the groove, a portion of which projects radially inward into the bore;

a stack of laminations in the housing that define a stator and are axially compressed against the portion of the snap ring within the bore;

a gap at an angular position in the snap ring; and

a material adhered to the housing in the groove and projecting radially inward into the gap.

2. The motor of claim 1, wherein the material comprises a weld and is further adhered to the stack of laminations.

3. The motor of claim 1, wherein the groove, snap ring, gap, and material respectively comprise a first groove, a first snap ring, a first gap, and a first material, the motor further comprising a second groove formed inside the housing and circumscribing the bore, a second snap ring set in the second groove and having a portion that projects radially inward from the second groove and into the bore, and a second material adhered to the housing in the second groove and projecting radially inward into the second gap, and wherein the stack of laminations is compressed between the first and second snap rings.

4. The motor of claim 1, wherein the material extends partially across the groove in an axial direction.

5. The motor of claim 1, wherein the material extends fully across the groove in an axial direction.

6. The motor of claim 1, wherein a recess is provided on an end of the stack of laminations and along an outer periphery of the stack of laminations and configured to receive therein the portion of the snap ring that projects radially into the bore.

7. The motor of claim 1, wherein the material extends into the groove a full radial depth of the groove.

8. An electrical submersible pumping system comprising:

a motor section comprising:

a motor housing having an axial bore,

a groove formed inside the motor housing and circumscribing the bore,

a snap ring in the groove with a portion that extends into the bore and comprising an elongated member that is curved so that the ends of the snap ring are spaced apart to define a gap therebetween;

a stack of laminations in the housing that define a stator and are axially compressed against the portion of the snap ring within the bore;

a gap at an angular position in the snap ring;

a weld adhered within the groove to the housing and to an end of one of the laminations and positioned in the gap; and

a rotor coaxially disposed within the stack of laminations;

a pump section; and

a pump shaft connected between the rotor and the pump section.

9. The pumping system of claim 8, wherein the weld adheres to an upper side and an outer side of the groove and protrudes inward into the bore of the housing.

10. The pumping system of claim 8, wherein the weld extends across a radial depth in the groove.

11. The pumping system of claim 8, wherein the weld extends an axial depth of the groove.

12. The pumping system of claim 8, wherein the weld is in non-adhering contact with the snap ring.

13. The pumping system of claim 8, wherein an annular recess is provided on the end of one of the laminations and configured to receive therein the portion of the snap ring that projects radially into the bore.

14. The pumping system of claim 8, wherein the groove, snap ring, gap, and material bead respectively comprise a first groove, a first snap ring, a first gap, and a first weld, the system further comprising a second groove formed inside the motor housing and circumscribing the bore, a second snap ring set in the second groove and having a portion that projects radially inward from the second groove and into the bore, and a second weld adhered to the motor housing in the second groove and to a second end of one of the laminations and positioned in the gap; and wherein the stack of laminations is compressed between the first and second snap rings.

15. A method of forming a motor for an electrical submersible pumping system comprising:

providing an annular motor housing with an axial bore and a groove formed in an inner surface of the housing circumscribing the bore, a motor stator, and a snap ring comprising a curved elongated member having ends and a circumference less than 360° to define a gap between the ends;

setting the snap ring in the groove so that an inner diameter of the snap ring is in the bore;

inserting the stator into the housing and contacting an end of the stator against the inner diameter of the snap ring in the bore; and

adhering a bead of material in the groove and aligned with the gap.

16. The method of claim 15, wherein the bead of material comprises a weld that extends partially along a portion of the groove aligned with a path perpendicular to an axis of the housing.

17. The method of claim 15, wherein the bead of material comprises a weld that extends across the portion of the groove aligned with a path perpendicular to an axis of the housing.

18. The method of claim 15, wherein the bead of material comprises a weld that extends across the portion of the groove aligned with a path parallel to an axis of the housing.

19. The method of claim 15, wherein the stator comprises a stack of laminations and a winding through the stack of laminations, the method further comprising inserting an electrically responsive cylindrical rotor that is attached to an end of a shaft that couples to a pump.

CLAIMS

WHAT IS CLAIMED IS:

1. An electrical submersible pumping system comprising:

a pump section;

a motor section connected to the pump section by a shaft and that comprises,

a housing having an axial bore;

a groove formed inside the housing and circumscribing the bore;

a curvilinear snap ring set in the groove, a portion of which projects radially inward into the bore;

a stack of laminations in the housing that define a stator and are axially compressed against the portion of the snap ring within the bore;

a gap at an angular position in the snap ring;

material adhered to the housing in the groove and projecting radially inward into the gap; wherein the groove, snap ring, gap, and material respectively comprise a first groove, a first snap ring, a first gap, and a first material; and

the motor further comprising a second groove formed inside the housing and circumscribing the bore, a second snap ring set in the second groove and having a portion that projects radially inward from the second groove and into the bore, and a second material adhered to the housing in the second groove and projecting radially inward into the second gap, and wherein the stack of laminations is compressed between the first and second snap rings.

2. The pumping system of claim 1, wherein the first and the second material comprises a weld and is further adhered to the stack of laminations.

3. The pumping system of claim 1, wherein the first and second material extends partially across the first and second grooves, respectively, in an axial direction.

4. The pumping system of claim 1, wherein the first and second material extends fully across the first and second groves, respectively, in an axial direction.

5. The pumping system of claim 1, wherein a recess is provided on each end of the stack of laminations and alone an outer periphery of the stack of laminations and each of the recesses configured to receive therein the portion of one of the snap rings that projects radially into the bore.

6. The pumping system of claim 1, wherein the first and second material extends into the first and second grooves, respectively, a full radial depth of each of the first and second grooves.

7. An electrical submersible pumping system comprising;

a motor section comprising:

a motor housing having an axial bore,

a groove rimmed inside the motor housing and circumscribing the bore, a snap ring in the groove, with a portion that extends into the bore and comprising an elongated member that is curved so that the ends of the snap ring are spaced apart to define a gap therebetween;

a stack or laminations in the housing that define a stator and are axially compressed against the portion of the snap ring within the bore;

a gap at an angular position in the snap ring;

a weld adhered within the groove, to the housing and to an end oboe of the laminations and positioned in the gap; and

a rotor coaxially disposed within the stack of laminations;

a pump section; and

a pump shaft connected between the rotor and the pump section.

8. The pumping system of claim 7, wherein the weld adheres to an upper side and an outer side of the groove and protrudes inward into the bore of the housing.

9. The pumping system of claim 7, wherein the weld extends across it radial depth in the groove.

10. The pumping system of claim 7, wherein the weld extends an axial depth of the groove.

11. The pumping system of claim 7, wherein the weld is in non-adhering contact with the snap ring.

12. The pumping system of claim 7, wherein an annular recess is provided on the end of one of the laminations and configured to receive therein the portion of the snap ring that projects radially into the bore.

13. The pumping system of claim 7, wherein the groove, snap ring, gap, and material bead respectively comprise a first groove, a first snap ring, a first gap, and a first weld, the system further comprising a second groove formed inside the motor housing and circumscribing the bore, a second snap ring set in the second groove and having, to portion that projects radially inward front the second groove and into the bore, and a second weld adhered to the motor housing in the second groove and to a second end of one of the laminations and positioned in the gap; and wherein the stack of laminations is compressed between the first and second snap rings.

14. A method of forming a motor for an electrical submersible pumping system comprising:

providing an annular motor housing with an axial bore and a groove formed in an inner surface of the housing circumscribing the bore, a motor stator, and a snap ring comprising a curved elongated member having ends and a circumference less than 360° to define a gap between the ends;

setting the snap ring in the groove so that an inner diameter of the snap ring is in the bore;

inserting the stator into the housing and contacting an end of the stator against the inner diameter of the snap ring in the bore; and

adhering a bead of material in the groove and aligned with the gap.

15. The method of claim 14, wherein the bead of material comprises a weld that extends partially along a portion of the groove aligned with a path perpendicular to an axis of the housing.

16. The method of claim 14, wherein the bead of material comprises a weld that extends across the portion of the groove aligned with a path perpendicular to an axis of the housing.

17. The method of claim 14, wherein the bead of material comprises a weld that extends across the portion of the groove aligned with a path parallel to an axis of the housing.

18. The method of claim 14, wherein the stator comprises a stack of laminations and a winding through the stack of laminations, the method further comprising inserting an electrically responsive cylindrical rotor that is attached to an end of a shaft that couples to a pump.