Claims

1. An inductor coil, comprising:

a first component (12);

a second component (14); and

a length of conductor (18);

wherein, the first component is located adjacent to the second component;

wherein, a core (16) is formed from the first component and the second component;

wherein the core is located along a first portion of a central axis and a second portion of the central axis;

wherein, along a third portion of the central axis the first component is spaced from the second component to form a gap (20, 30) in the core, wherein the third portion of the central axis is between the first portion of the central axis and the second portion of the central axis;

wherein, a first part of the length of conductor is located around the first portion of the central axis, located around the second portion of the central axis, and located around the third portion of the central axis to form a plurality of turns of conductor around the core and the gap in the core;

wherein, at least one section of the first part of the length of conductor is compressed in the direction of the central axis;

wherein a spacer (30) is located in the gap in the core to form a gap (22) around the core, wherein an outer surface of a portion of the spacer is located a distance from the central axis that is greater than a distance from the central axis of an outer surface of the first component and an outer surface of the second component that form the core; and

wherein the spacer comprises a central hole (32) configured to be located around the central axis.

2. Inductor coil according to claim 1, wherein the at least one section of the first part of the length of conductor that is compressed has a dimension of the conductor in the

direction of the central axis that is less than a dimension of the conductor in a direction perpendicular to the central axis.

3. Inductor coil according to any of claims 1-2, wherein at least one section of the first part of the length of conductor between a base portion of the first component and a base portion of the second component is compressed between and by the base portion of the first component and the base portion of the second component.

4. Inductor coil according to any of claims 1-3, wherein the first part of the length of conductor is at least partially compressed prior to being located around the first portion of the central axis, located around the second portion of the central axis, and located around the third portion of the central axis.

5. Inductor coil according to any of claims 1-4, wherein adjacent turns of the plurality of turns of conductor are bonded to each other.

6. Inductor coil according to any of claims 1-5, wherein each turn of conductor of the plurality of turns of conductor has an inner part of the conductor spaced at least one distance from the central axis in a direction perpendicular to the central axis, wherein the inner part of the conductor of two or more turns of the conductor located around the first portion of the central axis and/or located around the second portion of the central axis are spaced from the central axis by at least one first distance, and wherein the inner part of the conductor of one or more turns of the conductor located around the third portion of the central axis is spaced from the central axis by at least one second distance greater than the at least one first distance.

7. Inductor coil according to claim 1, wherein a dimension of the portion of the spacer adjacent to the outer surface of the first component and the outer surface of the second component in the direction of the central axis is greater than a dimension of the gap (24) in the core in the direction of the central axis.

8. Inductor coil according to claim 6, wherein the outer surface of the portion of the spacer is configured to contact the one or more turns of conductor located around the third portion of the central axis.

9. Inductor coil according to any of claims 1-8, wherein the spacer comprises a non-conductive material.

10. Inductor coil according to any of claims 1-9, wherein the first component comprises a ferrite material.

11. Inductor material according to any of claims 1-10, wherein the second component comprises a ferrite material.

12. Inductor coil according to any of claims 1-11, wherein the conductor comprises a multi-strand wire.

13. Inductor coil according to any of claims 1-12, wherein the conductor comprises a Litz wire.

14. An inductor coil, comprising:

a first component (12);

a second component (14); and

a length of conductor (18);

wherein, the first component is located adjacent to the second component;

wherein, a core (16) is formed from the second component;

wherein the core is located along a first portion of a central axis;

wherein, along a second portion of the central axis the first component is spaced from the second component to form a gap (40, 50) in the core, wherein the second portion of the central axis is between the first portion of the central axis and the first component;

wherein, a first part of the length of conductor is located around the first portion of the central axis, and located around the second portion of the central axis to form a plurality of turns of conductor around the core and the gap in the core;

wherein, at least one section of the first part of the length of conductor is compressed in the direction of the central axis;

wherein a spacer (50) is located in the gap in the core to form a gap (42) around the core, wherein an outer surface of a portion of the spacer is located a distance from

the central axis that is greater than a distance from the central axis of an outer surface of the second component that forms the core; and

wherein the spacer comprises a central hole configured to be located around the central axis.

15. An inductor coil, comprising:

a first component (12);

a second component (14); and

a length of conductor (18);

wherein, the first component is located adjacent to the second component;

wherein, a core (16) is formed from the first component and the second component;

wherein the core is located along a first portion of a central axis and a second portion of the central axis;

wherein, along a third portion of the central axis the first component is spaced from the second component to form a gap (20, 30) in the core, wherein the third portion of the central axis is between the first portion of the central axis and the second portion of the central axis;

wherein, a first part of the length of conductor is located around the first portion of the central axis, located around the second portion of the central axis, and located around the third portion of the central axis to form a plurality of turns of conductor around the core and the gap in the core;

wherein each turn of conductor of the plurality of turns of conductor has an inner part of the conductor spaced at least one distance from the central axis in a direction perpendicular to the central axis, wherein the inner part of the conductor of two or more turns of the conductor located around the first portion of the central axis and/or located around the second portion of the central axis are spaced from the central axis by at least one first distance, and wherein the inner part of the conductor of one or more turns of the conductor located around the third portion of the central axis is spaced from the central axis by at least one second distance greater than the at least one first distance;

wherein a spacer (30) is located in the gap in the core to form a gap (22) around the core, wherein an outer surface of a portion of the spacer is located a distance from the central axis that is greater than a distance from the central axis of an outer surface of the first component and an outer surface of the second component that form the core; and

wherein the spacer comprises a central hole (32) configured to be located around the central axis.

16. Inductor coil according to claim 15, wherein a dimension of the portion of the spacer adjacent to the outer surface of the first component and the outer surface of the second component in the direction of the central axis is greater than a dimension of the gap (24) in the core in the direction of the central axis.

17. Inductor coil according to any of claims 15-16, wherein the outer surface of the portion of the spacer is configured to contact the one or more turns of conductor located around the third portion of the central axis.

18. Inductor coil according to any of claims 15-17, wherein the spacer comprises a non-conductive material.

19. Inductor coil according to claim 15, wherein at least one section of the first part of the length of conductor is compressed in the direction of the central axis.

20. Inductor coil according to claim 19, wherein the at least one section of the first part of the length of conductor that is compressed has a dimension of the conductor in the direction of the central axis that is less than a dimension of the conductor in a direction perpendicular to the central axis.

21. Inductor coil according to any of claims 19-20, wherein at least one section of the first part of the length of conductor between a base portion of the first component and a base portion of the second component is compressed between and by the base portion of the first component and the base portion of the second component.

22. Inductor coil according to any of claims 15-21, wherein the first part of the length of conductor is at least partially compressed prior to being located around the first portion of the central axis, located around the second portion of the central axis, and located around the third portion of the central axis.

23. Inductor coil according to any of claims 15-22, wherein adjacent turns of the plurality of turns of conductor are bonded to each other.

24. An inductor coil, comprising:

a first component (12);

a second component (14); and

a length of conductor (18);

wherein, the first component is located adjacent to the second component;

wherein, a core (16) is formed from the second component;

wherein the core is located along a first portion of a central axis;

wherein, along a second portion of the central axis the first component is spaced from the second component to form a gap (40, 50) in the core, wherein the second portion of the central axis is between the first portion of the central axis and the first component;

wherein, a first part of the length of conductor is located around the first portion of the central axis, and located around the second portion of the central axis to form a plurality of turns of conductor around the core and the gap in the core;

wherein each turn of conductor of the plurality of turns of conductor has an inner part of the conductor spaced at least one distance from the central axis in a direction perpendicular to the central axis, wherein the inner part of the conductor of two or more turns of the conductor located around the first portion of the central axis are spaced from the central axis by at least one first distance, and wherein the inner part of the conductor of one or more turns of the conductor located around the second portion of the central axis is spaced from the central axis by at least one second distance greater than the at least one first distance;

wherein a spacer (50) is located in the gap in the core to form a gap (42) around the core, wherein an outer surface of a portion of the spacer is located a distance from the central axis that is greater than a distance from the central axis of an outer surface of the second component that forms the core; and

wherein the spacer comprises a central hole configured to be located around the central axis.

25. A method of forming an inductor coil, comprising:

locating a first component (12) adjacent to a second component (14), wherein, a core (16) is formed from the first component and the second component, wherein the core is

located along a first portion of a central axis and a second portion of the central axis, and wherein along a third portion of the central axis the first component is spaced from the second component to form a gap (20, 30) in the core, wherein the third portion of the central axis is between the first portion of the central axis and the second portion of the central axis;

locating a first part of a length of conductor (18) around the first portion of the central axis, around the second portion of the central axis, and around the third portion of the central axis to form a plurality of turns of conductor around the core and the gap in the core;

compressing in the direction of the central axis at least one section of the first part of the length of conductor;

wherein the method comprises locating a spacer (30) in the gap in the core to form a gap (22) around the core, wherein an outer surface of a portion of the spacer is located a distance from the central axis that is greater than a distance from the central axis of an outer surface of the first component and an outer surface of the second component that form the core; and

wherein the spacer comprises a central hole (32) configured to be located around the central axis.

26. Method according to claim 25, wherein the method comprises locating the length of conductor such that each turn of conductor of the plurality of turns of conductor has an inner part of the conductor spaced at least one distance from the central axis in a direction perpendicular to the central axis, wherein the inner part of the conductor of two or more turns of the conductor located around the first portion of the central axis and/or located around the second portion of the central axis are spaced from the central axis by at least one first distance, and wherein the inner part of the conductor of one or more turns of the conductor located around the third portion of the central axis is spaced from the central axis by at least one second distance greater than the at least one first distance.

27. A method of forming an inductor coil, comprising:

locating a first component (12) adjacent to a second component (14), wherein a core is formed from the second component, wherein the core is located along a first portion of a central axis, wherein along a second portion of the central axis the first component is spaced from the second component to form a gap (40, 50) in the core, and wherein the second portion of the central axis is between the first portion of the central axis and the first component;

locating a first part of a length of conductor (18) around the first portion of the central axis, and around the second portion of the central axis to form a plurality of turns of conductor around the core and the gap in the core;

compressing in the direction of the central axis at least one section of the first part of the length of conductor;

wherein the method comprises locating a spacer (50) in the gap in the core to form a gap (42) around the core, wherein an outer surface of a portion of the spacer is located a distance from the central axis that is greater than a distance from the central axis of an outer surface of the second component that forms the core; and

wherein the spacer comprises a central hole configured to be located around the central axis.

28. A method of forming an inductor coil, comprising:

locating a first component (12) adjacent to the second component (14), wherein a core (16) is formed from the first component and the second component, wherein the core is located along a first portion of a central axis and a second portion of the central axis, wherein along a third portion of the central axis the first component is spaced from the second component to form a gap (20, 30) in the core, and wherein the third portion of the central axis is between the first portion of the central axis and the second portion of the central axis;

locating a first part of the length of conductor (18) around the first portion of the central axis, around the second portion of the central axis, and around the third portion of the central axis to form a plurality of turns of conductor around the core and the gap in the core;

locating the first part of the length of conductor such that each turn of conductor of the plurality of turns of conductor has an inner part of the conductor spaced at least one distance from the central axis in a direction perpendicular to the central axis, wherein the inner part of the conductor of two or more turns of the conductor located around the first portion of the central axis and/or located around the second portion of the central axis are spaced from the central axis by at least one first distance, and wherein the inner part of the conductor of one or more turns of the conductor located around the third portion of the central axis is spaced from the central axis by at least one second distance greater than the at least one first distance;

wherein the method comprises locating a spacer (30) in the gap in the core to form a gap (22) around the core, wherein an outer surface of a portion of the spacer is located

a distance from the central axis that is greater than a distance from the central axis of an outer surface of the first component and an outer surface of the second component that form the core; and

wherein the spacer comprises a central hole (32) configured to be located around the central axis.

29. Method according to claim 28, wherein the method comprises compressing at least one section of the first part of the length of conductor in the direction of the central axis.

30. A method of forming an inductor coil, comprising:

locating a first component (12) adjacent to a second component (14), wherein a core (16) is formed from the second component, wherein the core is located along a first portion of a central axis, wherein along a second portion of the central axis the first component is spaced from the second component to form a gap (40, 50) in the core, and wherein the second portion of the central axis is between the first portion of the central axis and the first component;

locating a first part of a length of conductor (18) around the first portion of the central axis, and around the second portion of the central axis to form a plurality of turns of conductor around the core and the gap in the core;

locating the first part of the length of conductor such that each turn of conductor of the plurality of turns of conductor has an inner part of the conductor spaced at least one distance from the central axis in a direction perpendicular to the central axis, wherein the inner part of the conductor of two or more turns of the conductor located around the first portion of the central axis are spaced from the central axis by at least one first distance, and wherein the inner part of the conductor of one or more turns of the conductor located around the second portion of the central axis is spaced from the central axis by at least one second distance greater than the at least one first distance;

wherein the method comprises locating a spacer (50) in the gap in the core to form a gap (42) around the core, wherein an outer surface of a portion of the spacer is located a distance from the central axis that is greater than a distance from the central axis of an outer surface of the second component that forms the core; and

wherein the spacer comprises a central hole configured to be located around the central axis.