CLAIMS

1. An apparatus for generating a magnetic field comprising:

a device configured to generate the magnetic field with a corresponding magnetic flux emanating from a first region of the device and returning to a second region of the device; and

a magnetically permeable element comprising a connection member and a pair of arms connected to the connection member, the pair of arms being arranged spaced apart from each other and projecting from the connection member,

wherein, in a first mode of operation, the magnetically permeable element is adapted to be arranged to interact with the magnetic field to configure the apparatus in a closed flux configuration to provide a path directing the magnetic flux from the first region of the device towards the second region of the device, ~~and~~

wherein, in a second mode of operation, the magnetically permeable element is removable away from the magnetic field to configure the apparatus in an open flux configuration,

wherein, in the closed flux configuration, the magnetically permeable element is configured to be arranged with the connection member proximal to the first region of the device, and the pair of arms extending in a direction from the first region to the second region of the device,

wherein an aperture is defined in the connection member, and

wherein, in the closed flux configuration, the magnetically permeable element is configured to be arranged with the aperture aligned coaxially with the device.

2. The apparatus as claimed in claim 1, wherein the device comprises a permanent magnet configured to generate the magnetic field.

3. The apparatus as claimed in claim 1, wherein the device comprises an electromagnet configured to generate the magnetic field.

4. The apparatus as claimed in claim 3,

wherein the electromagnet comprises an electrical conductor, and

wherein the electrical conductor is configured to generate the magnetic field in response to an electrical current applied to and passing through the electrical conductor.

5. The apparatus as claimed in claim 4, wherein the electrical conductor comprises a coil comprising at least one loop.

6. The apparatus as claimed in claim 5, wherein the electromagnet further comprises a magnetic core, wherein the coil is arranged around the magnetic core.

7. The apparatus as claimed in claim 6, wherein a region of the magnetic core defining the first region of the device comprises a tapering portion.

8. The apparatus as claimed in any one of claims 1 to 7, further comprising a support structure to support the device, the support structure comprising a magnetic material.

~~9. The apparatus as claimed in any one of claims 1 to 8, wherein the magnetically permeable element comprises:~~

~~a connection member; and~~

~~a pair of arms connected to the connection member, the pair of arms being arranged spaced apart from each other and projecting from the connection member,~~

~~wherein, in the closed flux configuration, the magnetically permeable element is configured to be arranged with the connection member proximal to the first region of the device, and the pair of arms extending in a direction from the first region to the second region of the device.~~

9~~10~~. The apparatus as claimed in claim 1~~9~~, wherein the pair of arms project perpendicularly from the connection member.

~~11. The apparatus as claimed in claim 9 or 10,~~

~~wherein an aperture is defined in the connection member, and~~

~~wherein, in the closed flux configuration, the magnetically permeable element is configured to be arranged with the aperture aligned coaxially with the device.~~

10~~12~~. The apparatus as claimed in claim 1~~1~~,

wherein a thickness of a first section of the connection member is less than a thickness of a second section of the connection member, and

wherein the aperture is defined in the first section.

11~~13~~. An imaging device comprising the apparatus for generating a magnetic field as claimed in any one of the preceding claim~~s 11 or 12~~.

12~~14~~. The imaging device as claimed in claim 11~~13~~, wherein ~~the apparatus is configured~~ in the closed flux configuration, ~~wherein~~ the magnetically permeable element is arranged to interact with the magnetic field to be generated by the device of the apparatus to provide a path directing the magnetic flux corresponding to the magnetic field from the first region of the device towards the second region of the device.

13~~15~~. A method for imaging a sample comprising:

generating a magnetic field using the device of the apparatus as claimed in any one of claim~~s~~ 1~~1~~ ~~or 12~~to 10;

configuring the apparatus in the closed flux configuration, wherein the magnetically permeable element is arranged to interact with the generated magnetic field to provide a path directing the magnetic flux corresponding to the generated magnetic field from the first region of the device towards the second region of the device;

positioning the sample between the device and the aperture of the magnetically permeable element; and

imaging the sample through the aperture.

14~~16~~. The method as claimed in claim 13~~15~~,

wherein the device comprises an electromagnet,

wherein generating a magnetic field comprises generating the magnetic field using the electromagnet, and

the method further comprises varying an intensity of an electrical current applied to the electromagnet.