CLAIMS:

1. An electrical power control apparatus, including:

a magnetic core having a plurality of phase limbs for respective phases of electric power, each of the phase limbs being interconnected to the other phase limbs at respective ends of the limb,

wherein the magnetic core further includes coupling limbs that interconnect the phase limbs, wherein each phase limb is connected to adjacent ones of the other phase limbs at a location of the phase limb between the ends of the phase limb;

primary windings around the respective phase limbs to receive input electrical energy in the form of input signals for the respective electrical phases and generate corresponding magnetic fluxes in the phase limbs;

secondary windings around the respective phase limbs to generate output electrical energy in the form of output signals for respective electrical phases from magnetic fluxes in the phase limbs; and

control windings around respective portions of the magnetic core to receive control signals for respective electrical phases to modify the magnetic fluxes in the respective phase limbs in order to modify the output signals generated from the secondary windings so that the output signals have one or more electrical attributes that satisfy respective predetermined criteria,

wherein each of the control windings constitutes a portion of the corresponding secondary winding.

2. The electrical power control apparatus of claim 1, wherein each of the phase limbs is interconnected to the other phase limbs only at respective ends of the phase limb.

3. The electrical power control apparatus of any one of claims 1 to 2, wherein the limbs of the magnetic core have a square or rectangular cross-section.

4. The electrical power control apparatus of any one of claims 1 to 2, wherein the limbs of the magnetic core have a circular cross-section.

5. The electrical power control apparatus of any one of claims 1 to 4, including one or more rectifier windings around respective portions of the magnetic core to generate electric power for the control windings.

6. The electrical power control apparatus of claim 5, wherein each of the rectifier windings constitutes a portion of the corresponding primary winding.

7. The electrical power control apparatus of claim 5 or 6, including one or more rectifier components coupled to the rectifier windings, wherein each rectifier component receives an AC input from the corresponding rectifier winding, rectifies the received signal and charges at least one corresponding capacitor, wherein the at least one corresponding capacitor provides the electric power for at least one of the control windings.

8. The electrical power control apparatus of claim 7, wherein each rectifier component is configured to correct the power factor of the corresponding electrical phase.

9. The electrical power control apparatus of claim 7 or 8, including one or more inverter components, each inverter component being coupled to the at least one corresponding capacitor and at least one of the corresponding control windings, and configured to generate the control signal for at least one of the control windings.

10. The electrical power control apparatus of claim 9, including a control component to control operation of the one or more inverter components.

11. The electrical power control apparatus of any one of claims 1 to 6, including control components to generate, for each of the phases of electric power, the corresponding control signal that is applied to the corresponding control winding to dynamically control the magnetic flux through the corresponding phase limb and consequently the corresponding output signal at the corresponding secondary winding.

12. The electrical power control apparatus of any one of claims 1 to 11, wherein the one or more electrical attributes are selected from AC voltage and harmonic content or harmonic distortion.

13. A multiphase electric power transformer, including:

a magnetic core having a plurality of phase limbs for respective phases of electric power, each of the phase limbs being interconnected to the other phase limbs at respective ends of the limb;

primary windings around the respective phase limbs to receive input electrical energy in the form of input signals for respective electrical phases and generate corresponding magnetic fluxes in the magnetic core;

secondary windings around the respective phase limbs to generate output electrical energy in the form of output signals for respective electrical phases from magnetic fluxes in the magnetic core.

14. The multiphase electric power transformer of claim 13, wherein the limbs of the magnetic core have a square or rectangular cross-section.

15. The multiphase electric power transformer of claim 13, wherein the limbs of the magnetic core have a circular cross-section.