CLAIMS

1. A surge suppression system of a power distribution system of a power grid which provides power to low-voltage power consumers, comprising:

at least one three phase system transformer of said power distribution system having a primary side which receives three phase power from a power source through first, second and third power distribution lines, which each transmit a respective phase of said three phase power, and a secondary side, which supplies three phase power downstream through fourth, fifth and sixth power distribution lines which each transmit a respective one of said phases of said three phase power, said primary and secondary sides including respective primary and secondary side coils to transform said three phase power from a first voltage on said primary side to a second voltage on said secondary side different from said first voltage, said system transformer stepping said first voltage up to or stepping said first voltage down from one of a medium voltage or a high voltage; and

at least a first surge suppressor unit which is connected in parallel to said first, second and third power distribution lines on and in immediate physical proximity to said primary side of said system transformer, said surge suppressor unit comprising first, second and third transformer banks which correct voltage imbalances in respective phases carried by said first, second and third power distribution lines resulting from one or more surges due to an electro-magnetic pulse ("EMP") or geomagnetic disturbance ("GMD") whose voltage and/or current exceed normal operating levels by at least ten times, said first, second and third transformer banks including respective first, second and third primary coils which connect to and receive the respective phase of three phase power carried by said first, second and third power distribution lines at said first voltage, said first, second and third transformer banks also including respective first, second and third secondary coils which connect in series together and have a resistor connected in series therewith to harmlessly drain energy from a surge due to an EMP or GMD whose voltage and/or current exceed normal operating levels by at least ten times, wherein said transformer banks transform said three phase power at said first voltage to three phase power at a third voltage wherein a voltage imbalance in any one of said three phases on said secondary coils is counterbalanced by the remaining phases on said secondary coils which

counterbalances voltage imbalances on said primary side of said system transformer of said power distribution system.

2. The surge suppression system according to claim 1, which includes a second said surge suppressor unit which is connected in parallel to said fourth, fifth and sixth power distribution lines on and in immediate physical proximity to said secondary side of said system transformer, said second surge suppressor unit including said first, second and third transformer banks which correct voltage imbalances in respective phases carried by said fourth, fifth and sixth power distribution lines, said first, second and third transformer banks including said respective first, second and third primary coils which connect to and receive the respective phase of three phase power carried by said fourth, fifth and sixth power distribution lines at said second voltage, said first, second and third transformer banks also including said respective first, second and third secondary coils which connect in series together and have a resistor connected in series therewith, wherein said transformer banks transform said three phase power at said second voltage to three phase power at a fourth voltage wherein a voltage imbalance in any one of said three phases on said secondary coils is counterbalanced by the remaining phases on said secondary coils which counterbalances voltage imbalances on said secondary side of said system transformer of said power distribution system.

3. The surge suppression system according to claim 2, wherein said first and second surge suppression units are sized to the voltage class and kVA associated with said respective first and second voltages.

4. The surge suppression system according to claim 2, wherein said first, second and third primary coils of said first and second surge suppressor units also are connected to and in immediate physical proximity to ground, and said first, second and third secondary coils of said first and second surge suppressor units are ungrounded.

5. The surge suppression system according to claim 1, wherein said first, second and third primary coils of said first surge suppressor unit also are connected to ground.

6. The surge suppression system according to claim 5, wherein said first, second and third secondary coils of said first surge suppressor unit are ungrounded.

7. The surge suppression system according to claim 1, wherein said second voltage is a medium voltage.

8. The surge suppression system according to claim 1, wherein said first voltage is a high voltage.

9. A surge suppression system of a power distribution system of a power grid which receives three phase power from a power source, transmits said three phase power at high and medium voltages and converts and supplies said three phase power at a low voltage, comprising:

a plurality of three phase system transformers of said power distribution system which either step said power up to or step said power down from one of said medium voltage or said high voltage, each of said system transformers having a primary side which receives three phase power from a power source through first, second and third power distribution lines, which each transmit a respective phase of said three phase power, and a secondary side, which supplies three phase power downstream through fourth, fifth and sixth power distribution lines which each transmit a respective one of said phases of said three phase power, said primary and secondary sides including respective primary and secondary side coils to transform said three phase power from a primary side voltage on said primary side to a secondary side voltage on said secondary side different from said primary side voltage, said power distribution system further including at least one step down transformer stepping said secondary side voltage supplied by an upstream one of said system transformers down to said low voltage for use by low voltage power consumers; and

a plurality of surge suppressor units wherein at least a first said surge suppressor unit is connected in parallel to said first, second and third power distribution lines on and in immediate physical proximity to said primary side of each said system transformer, and at least a second said surge suppressor unit is connected in parallel to said fourth, fifth and sixth power distribution lines on and in immediate physical proximity to said secondary side of each said system transformer, each said surge suppressor unit comprising first, second and third transformer banks which correct voltage imbalances in respective phases carried by said power distribution system resulting from one or more surges due to an electro-magnetic pulse ("EMP") or

geomagnetic disturbance ("GMD") whose voltage and/or current exceed normal operating levels by at least ten times through said first, second and third power distribution lines or said fourth, fifth and sixth power distribution lines, said first, second and third transformer banks including respective first, second and third primary coils which connect to and receive the respective phase of three phase power received from said power distribution system, said first, second and third transformer banks also including respective first, second and third secondary coils which connect in series together and have a resistor connected in series therewith to harmlessly drain energy from a surge due to an EMP or GMD whose voltage and/or current exceed normal operating levels by at least ten times, wherein said transformer banks transform said three phase power from said primary side voltage or said secondary side voltage of said system transformers to three phase power at a third voltage wherein a voltage imbalance in any one of said three phases on said secondary coils is counterbalanced by the remaining phases on said secondary coils which counterbalances voltage imbalances on each of said primary and secondary sides of said system transformers of said power distribution system.

10. The surge suppression system according to claim 9, wherein said first and second surge suppression units are sized to the voltage class and kVA associated with said respective primary side and secondary side voltages of said respective system transformer to which said first and second surge suppression units are connected.

11. The surge suppression system according to claim 9, wherein said first, second and third primary coils of each of said surge suppressor units also are connected to ground, and said first, second and third secondary coils of said surge suppressor units are ungrounded.

12. The surge suppression system according to claim 9, wherein said system transformers step said three phase power either up from or down to one of said medium or high voltages which is greater than said low voltage.

13. The surge suppression system according to claim 9, wherein said primary side voltage on a first one of said system transformers is received from a respective power generator which generates said three phase power for said power grid.

14. The surge suppression system according to claim 9, wherein said voltage imbalances are created by an EMP comprising at least one of E1, E2, and E3 pulse components, and said surge suppressor units counterbalance any of said E1, E2, and E3 pulse components of said electromagnetic pulse.

15. A surge suppression system of a power distribution system of a power grid which provides power to low-voltage power consumers, comprising:

at least one three phase system transformer of said power distribution system having a primary side which receives three phase power from a power source through first, second and third power distribution lines, which each transmit a respective phase of said three phase power, and a secondary side, which supplies three phase power downstream through fourth, fifth and sixth power distribution lines which each transmit a respective one of said phases of said three phase power, said primary and secondary sides including respective primary and secondary side coils to transform said three phase power from a first voltage on said primary side to a second voltage on said secondary side different from said first voltage, said system transformer stepping said first voltage up to or stepping said first voltage down from one of a medium voltage or a high voltage; and

at least first and second surge suppressor units which are respectively connected in parallel to and in immediate physical proximity to said first and secondary sides of said system transformer, said first surge suppressor unit being connected to said first, second and third power distribution lines on said primary side of said system transformer, and said second surge suppressor unit being connected to and in immediate physical proximity to said fourth, fifth and sixth power distribution lines on said secondary side of said system transformer; and

each said surge suppressor unit comprising first, second and third transformer banks which correct voltage imbalances resulting from one or more surges due to an electro-magnetic pulse ("EMP") or geomagnetic disturbance ("GMD") whose voltage and/or current exceed normal operating levels by at least ten times in respective phases carried by said first, second and third power distribution lines or said fourth, fifth and sixth power distribution lines to protect said system transformer from voltage balances on either side thereof, said first, second and third transformer banks including respective first, second and third primary coils which connect to and receive the

respective phase of three phase power carried by said power distribution system, said first, second and third transformer banks also including respective first, second and third secondary coils which connect in series together and have a resistor connected in series therewith to harmlessly drain energy from a surge due to an EMP or GMD whose voltage and/or current exceed normal operating levels by at least ten times, wherein said transformer banks transform said three phase power received from said power distribution system to three phase power at a third voltage wherein a voltage imbalance in any one of said three phases on said secondary coils is counterbalanced by the remaining phases on said secondary coils which counterbalances voltage imbalances on both of said primary and secondary sides of said system transformer of said power distribution system.

16. The surge suppression system according to claim 15, wherein said first, second and third primary coils of each of said first and second surge suppressor units also are connected to ground, and said first, second and third secondary coils of said first and second surge suppressor units are ungrounded.

17. The surge suppression system according to claim 16, wherein said system transformer steps said three phase power either up from or down to one of said medium or high voltages.

18. The surge suppression system according to claim 16, wherein said primary side voltage on said system transformer is received from a respective power generator which generates said three phase power for said power grid.

19. The surge suppression system according to claim 16, wherein said voltage imbalances are created by electromagnetic pulses comprising at least one of or all of E1, E2, and E3 pulse components, and said surge suppressor units counterbalance any of said E1, E2, and E3 pulse components of said electromagnetic pulse.