Claims

1. Synchronous generator (1), in particular multipole synchronous ring generator (1) of a gearless wind turbine (101) for generating electric current, comprising
   - a rotor (4) and
   - a stator (6) having teeth (8) and slots (10) arranged therebetween for receiving a stator winding, wherein

   the stator (6) is divided in a circumferential direction into stator segments (31-34), each having a plurality of teeth (8) and slots (10), and at least two stator segments (31-34) being offset or interleaved with respect to one another in a circumferential direction, wherein each stator segment (31-34) receives part of the stator winding as winding segment (51-54), and winding segments (51, 53; 52, 54) of non-adjacent stator segments (31, 33; 32, 34) are interconnected with one another.

2. Synchronous generator (1) according to Claim 1,
   characterized in that
   at least one tooth (8) forms a stator pole, and two stator poles form a pole pair, and the number of pole pairs of each stator segment (31-34) is a multiple of two, in particular a multiple of six.

3. Synchronous generator (1) according to Claim 1 or 2,
   characterized in that
   four stator segments (31-34) are provided, and the stator segments (31-34) are grouped into two segment groups (31, 33; 32, 34), wherein the number of pole pairs of each segment group (31, 33; 32, 34) is a multiple of four, or the stator segments (31-34) of a segment group (31, 33; 32, 34) have different numbers of pole pairs.

4. Synchronous generator (1) according to one of the preceding claims,
   characterized in that
   - slots (10) and teeth (8) of in each case one stator segment (31-34) are arranged equidistantly, and
   - the at least two stator segments (31-34) are offset or interleaved with respect to one another in the circumferential direction in such a way that adjacent teeth (8) of the adjacent stator segments (31-34) or adjacent slots (10) of the adjacent stator segments (31-34) have a different spacing from

one another than adjacent teeth (8) or slots (10) of the same stator segment (31-34).

5. Synchronous generator (1) according to one of the preceding claims, characterized in that

- a first and a second slot (10) of a first stator segment (31) or
- a first and a second tooth (8) of the first stator segment (31) have an average spacing from one another of n*a, where
- a is an average spacing of two adjacent slots (10) or teeth (8) of the first stator segment (31), and
- n is the number of slot spacing between the first and second slots (10) or teeth spacing between the first and second teeth (8), wherein n is less than the number of slots/teeth between the first and second slots/teeth by a value of 1, and wherein
- the first slot (10), with respect to a further slot (10) which is on a second stator segment (32) or
- the first tooth (8), with respect to a further tooth (8) which is on the second stator segment (32), has an average spacing of n*a+v or n*a-v, where v describes the offset or the interleaving between the first and second stator segments (31, 32) and is both greater than 0 and less than a.

6. Synchronous generator (1) according to Claim 5, characterized in that the offset or the interleaving (v) has a value in the range of from 0.2*a to 0.3*a, in particular of 0.25a.

7. Synchronous generator (1) according to one of the preceding claims, characterized in that the winding segments (51-54) are connected alternately to a first and a second rectifier (61-64), wherein the two rectifiers preferably feed a common DC link, in particular each segment group (31, 33; 32, 34) is connected in each case to a rectifier in the form of a B12 bridge.

8. Synchronous generator (1) according to Claim 1 or Claim 7, characterized in that winding segments (51, 53; 52, 54) of non-adjacent stator segments (31, 33; 32, 34) are connected to one another electrically in series.

9. Synchronous generator (1) according to one of the preceding claims, characterized in that
the stator winding or the winding segments have, phase by phase, winding phases (850),
- a winding phase (850) is laid in a first stator segment (31) through a first slot (851) and passed back through a second slot (852),
- the laying through these first and second slots (851, 852) is repeated, in particular such that at least one, in particular three, loops are laid through these two slots (851, 852) and therefore around the teeth (8) in between, with the result that an electromagnetically effective turns number of four is provided, and
- the laying of this winding phase (850) is then continued in this sense in a third and a fourth slot (853, 854) and possibly in correspondingly further slots (855, 856) until the winding phase (850) is passed to a first slot of a further stator segment (833) or is connected there to a winding phase of the further stator segment, or is connected to an output.

10. Synchronous generator (1) according to Claim 9, characterized in that
five slots (8) and six teeth (10) are located between the first and second slots (851, 852) or in the at least one loop.

11. Synchronous generator (1) according to Claim 9, characterized in that
a winding phase (850) is wound continuously through a stator segment (31-34) and/or through all stator segments (31, 33; 32, 34) of a segment group (31, 33; 32, 34).

12. Synchronous generator (1) according to one of the preceding claims, characterized in that
the stator (6) and/or the stator winding is/are point-symmetrical, in particular with respect to an axis of rotation (2) of the synchronous generator (1).

13. Synchronous generator (1) according to one of the preceding claims, characterized in that
all of the slots (10) in the stator (6) are identical, and the offset or interleaving (v) of the stator segments (31-34) is achieved by correspondingly matched teeth (8^+, 8^-),

in particular by teeth (8^+, 8^-), which are increased or reduced in size in the circumferential direction, in the contact region of adjacent stator segments (31-34).

14. Set of laminations comprising a plurality of stator laminations for assembly to form a stator laminate stack of a synchronous generator (1) according to one of the preceding claims, wherein each stator lamination has a plurality of slot regions and a plurality of tooth regions for producing slots (10) and teeth (8), and the set of laminations comprises

- at least one normal lamination with tooth regions and slot regions for producing identical slots (10) and teeth (8), respectively,
- at least one expanded lamination with an expanded region (38)
- for producing a tooth (8^+) or tooth region which is widened in the circumferential direction, or
- for producing a slot or slot region which is widened in the circumferential direction, and
- at least one compressed lamination with a compressed region (36)
- for producing a tooth (8^-) or tooth region which is narrowed in the circumferential direction or
- for producing a slot or slot region which is narrowed in the circumferential direction.

15. Set of laminations according to Claim 14,
characterized in that

- each expanded lamination has its expanded region (38) eccentrically in the circumferential direction, in particular approximately in a first or last third, and/or
- the expanded region (38) is mirror-symmetrical in the circumferential direction,

and/or

- each compressed lamination has its compressed region (36) eccentrically in the circumferential direction, in particular approximately in a first or last third, and/or
- the compressed region (36) is mirror-symmetrical in the circumferential direction.

16. Method for producing a stator laminate stack, comprising the following steps:

- producing a first lamination layer consisting of normal laminations, expanded laminations and compressed laminations of a set of laminations according to Claim 14, wherein
- the expanded laminations are arranged in regions in which stator segments adjoin one another with a positive offset, and
- the compressed laminations are arranged in regions in which stator segments adjoin one another with a negative offset,
- producing a second lamination layer, wherein
- expanded laminations and compressed laminations
- are inverted with respect to the expanded laminations and compressed laminations, respectively, of the first layer in such a way that their upper side points downwards and their lower side points upwards, and
- they are each laid one on top of the other with their expanded region or compressed region, as a result of which partial overlapping of the respective laminations results by virtue of the fact that the expanded regions or compressed regions are arranged eccentrically.

17. Wind turbine (101) comprising a synchronous generator (1) according to one of Claims 1 to 13.