DESCRIPTION

STATOR AND ELECTRIC MOTOR HAVING SAME

TECHNICAL FIELD

[0001] The present disclosure relates to a stator and an electric motor including the stator.

BACKGROUND ART

[0002] An electric motor including a stator in which a pair of insulators is attached above and below a stator core is known (see PTL 1, for example). Hereinafter, the stator will be described with reference to Figs. 13, 14A, and 14B.

[0003] Fig. 13 is an exploded perspective view illustrating a configuration of a conventional stator. Figs. 14A and 14B are sectional views illustrating states before and after attaching an insulator in the conventional stator. Here, Fig. 14A illustrates a state before the insulator is attached, and Fig. 14B illustrates a state after the insulator is attached.

[0004] As illustrated in Fig. 13, in conventional stator 100, a pair of insulators (insulator 101a, Insulator 101b) is attached in such a manner as to sandwich stator core 102 from above and below the stator core. The insulator includes a plurality of cylindrical walls extending in a direction orthogonal to a base having a flat portion and covering a wall surface of each slot. As illustrated in Figs. 14A and 14B, the conventional insulator is attached to stator core 102 such that a wall of upper insulator 101a and a wall of lower insulator 101b overlap each other inside slot 103. Electric insulation between a winding wire and the stator core is provided by winding the winding wire around the slot via the insulator. An electric motor including such a stator has a feature that the number of assembling steps can be reduced because the number of components is small.

Citation List

Patent Literature

[0005] PTL 1: Unexamined Japanese Patent Publication No. 2012-200116

SUMMARY

[0006] The configuration of the conventional insulator has a structural problem derived from, in particular, attachment of the insulator, and there is room for improvement from

the viewpoint of improving electrical efficiency and assembly workability of the electric motor.

[0007] Specifically, in the configuration of the conventional stator, when the upper and lower walls of the insulator are overlapped inside the slot, a clearance for preventing contact between the upper and lower walls is provided. In this case, the slots are narrowed by the thickness of the upper and lower walls and the width of the clearance (dimension Y in Fig. 14B), and the slot space factor of the winding wire decreases. When the winding wire is wound, the distance between the winding wire and the stator core is increased by the thickness of the upper and lower walls and the width of the clearance, and thus the circumferential length of the winding wire becomes long, and the electric resistance of the winding wire increases, which may reduce the electric efficiency of the electric motor.

[0008] In addition, in the configuration of the conventional stator, when a wall of the insulator is inserted into the slot, tensile and compressive stresses are applied in a radial direction from the inner circumferential portion as a starting point, and deformation such as bending of the outer circumferential portion in the circumferential direction may occur. In this case, due to the deformation of the outer circumferential portion of the insulator at the time of attachment, the positional relationship between the wall and the slot is shifted, and it takes extra time and effort to fit them, which may become a bottleneck in reducing the number of work steps.

[0009] One of the examples of the present disclosure is to provide a stator that improves electric efficiency of an electric motor and improves workability in an insulator attachment step, and an electric motor including the stator.

[0010] A stator according to an example of the present disclosure includes a stator core having a substantially cylindrical shape, the stator core including a plurality of slots, a pair of insulators that sandwiches the stator core from both sides in an axial direction in the substantially cylindrical shape, and a winding wire wound in an annular shape around the stator core via the insulators, wherein the insulators include a base including a flat portion orthogonal to the axial direction, the base being in contact with an end of the substantially cylindrical shape of the stator core in the axial direction, a plurality of walls extending in the axial direction from the base along an inner wall of the slot, and a slot cell having a substantially cylindrical shape attached to an inner circumference of the wall.

[0010A] In one aspect, the present disclosure refers to a stator comprising, a stator core having a substantially cylindrical shape, the stator core including a slot, a pair of

insulators that sandwiches the stator core from both sides in an axial direction in the substantially cylindrical shape, and a winding wire wound in an annular shape around the stator core via the pair of insulators, wherein each of the pair of insulators includes, a base including a flat portion orthogonal to the axial direction, the base being in contact with an end of the substantially cylindrical shape of the stator core in the axial direction, a wall extending in the axial direction from the base along an inner wall of the slot, and a slot cell having a substantially cylindrical shape attached to an inner circumference of the wall.

[0010B] In another aspect, the present disclosure refers to an electric motor comprising, a stator core including a plurality of first teeth, a first slot formed between the plurality of first teeth, a plurality of second teeth extending from an inner side in a radial direction of each of the plurality of first teeth toward an outer side in the radial direction, and a second slot formed between the plurality of second teeth, a pair of first insulators sandwiching the plurality of first teeth from both sides in an axial direction of the stator core, a pair of second insulators provided separately from the pair of first insulators and sandwiching the plurality of second teeth from the both sides in the axial direction, an A-phase winding wire applied to the first slot, a B-phase winding wire applied to the second slot, and a rotor rotatably provided facing a side surface of the stator core, wherein each of the pair of first insulators includes, a first base including a flat portion orthogonal to a rotation axis of the rotor, and a first wall extending in the axial direction from the first base along a wall surface of the first slot, and each of the pair of second insulators includes, a second base including a flat portion orthogonal to the rotation axis, and a second wall extending in the axial direction from the second base along a wall surface of the second slot.

[0011] The present disclosure can provide, by approaching to the insulator, a stator that improves electric efficiency of an electric motor and improves workability in an insulator