CLAIMS

1. A twisting head device (20; 220, 240) for twisting or stranding electrical or optical cables(16; 216), comprising a twisting rotor (22), a twisting rotor drive device (21; 221, 241) for driving the twisting rotor (22), a first gripper device (30) which is arranged rotatably on the twisting rotor (22), at least one further gripper device (45) which is arranged rotatably on the twisting rotor (22), wherein the twisting rotor (22) is arranged rotatably on the twisting head device (20; 220, 240) and has an axis of rotation (23), wherein at least the first gripper device (30) can be driven by means of a gripper drive device (55; 255, 273) and a drive shaft (24; 224), and the drive shaft (24; 224) extends at least partly through the twisting rotor (22), characterized in that the twisting rotor (22) has a dumb-bell shaft (36) which establishes an operative connection between the drive shaft (24; 224) and at least a first gripper shaft (31; 231, 263), wherein the operative connection can be established with the aid of at least a first transmission device (48) which is arranged between the drive shaft (24; 224) and the dumb-bell shaft (36).

2. The twisting head device (20; 220, 240) according to Claim 1, characterized in that at least the first gripper device (30) is arranged on the first gripper shaft (31; 231, 263) and has a first gripper rotational axis (32), wherein the first gripper shaft (31; 231, 263) preferably extends at least partly into the twisting rotor (22) and the first gripper rotational axis (32) is preferably at a distance from the axis of rotation (23) of the twisting rotor (22).

3. The twisting head device (20; 220, 240) according to Claim 1 or 2, characterized in that the twisting rotor (22) has a hollow rotor shaft (35; 235, 269), wherein the drive shaft (24; 224) is at least partly arranged inside the hollow rotor shaft (35; 235, 269) and the drive shaft (24; 224) in particular extends rotatably through the twisting rotor (22), wherein at least one drive bearing device (25) which supports the drive shaft (24; 224) rotatably is at least partly arranged inside the twisting rotor (22).

4. The twisting head device (20; 220, 240) according to any one of Claims 1 to 3, characterized in that at least the further gripper device (45) can be driven by means of the gripper drive device (55; 255, 273) and the drive shaft (24; 224), wherein the further gripper device (45) in particular is arranged on a further gripper shaft (46; 246, 264) which preferably extends at least partly into the twisting rotor (22), and has a further gripper rotational axis (47), wherein the further gripper rotational axis (47) is preferably at a distance from the axis of rotation (23) of the twisting rotor (22).

5. The twisting head device (20; 220, 240) according to any one of Claims 1 to 4, characterized in that at least one gripper bearing device (50) is arranged inside the twisting rotor (22), and supports at least the first gripper device (30) rotatably, and preferably supports the further gripper device (45) rotatably.

6. The twisting head device (20; 220, 240) according to ~~any one of Claims 1 to 5~~claim 4, characterized

in that the dumb-bell shaft (36) establishes an operative connection between the drive shaft (24; 224) and the further gripper shaft (46; 246, 264), and the dumb-bell shaft (36) and at least the first gripper shaft (31; 231, 263)can be established preferably with the aid of a further transmission device (49) which is arranged between the dumb-bell shaft (36) and at least the first gripper shaft (31; 231, 263), and in particular between the dumb-bell shaft (36) and the further gripper shaft (46; 246, 264).

7. The twisting head device (20; 220, 240) according to Claim 6, characterized in that a connecting bearing device (37) is arranged inside the twisting rotor (22) and supports the dumb-bell shaft (36) rotatably.

8. The twisting head device (20; 220, 240) according to any one of Claims 1 to 7, characterized in that the gripper drive device (55; 255, 273) and the twisting rotor drive device (21; 221, 241) are arranged at least partly on a common fastening device (54), and/or the gripper drive device (55; 255, 273) and the twisting rotor drive device (21; 221, 241) are connected to a control device (60; 260).

9. The twisting head device (20; 220, 240) according to any one of Claims 1 to 8, characterized in that at least the first gripper device (30) has at least one gripper (43) for gripping a cable end of the cable (16; 216), and the at least one gripper (43) preferably has an axially guided locking sleeve (44) for at least partly enclosing the at least one gripper (43).

10. A method for twisting or stranding electrical or optical cables (16; 216) with a twisting head device (20; 220, 240) according to any of Claims 1 to 9, comprising the following steps:

- clamping a first cable end of a first cable (16) into a first gripper device (30);

- clamping at least a first cable end of a further cable (16; 216) into a further gripper device (45);

- driving a twisting rotor (22) with a first number of rotations about an axis of rotation (23) of the twisting rotor (22) with the aid of a twisting rotor drive device (21; 221, 241);

- driving at least the first gripper device (30) about a first gripper rotational axis (32) with a further number of rotations with the aid of a gripper drive device (55; 255, 273);

- driving at least the further gripper device (45) about a further gripper rotational axis (47) with the further number of rotations with the aid of the gripper drive device (55; 255, 273), wherein the first number of rotations and the further number of rotations is specified by a control device (60; 260).

11. The method according to Claim 10, characterized in that the further number of rotations has a value that is 50 % to 98 %, advantageously 60 % to 70 % of the first number of rotations.

12. The method according to Claim 10 or 11, characterized in that the twisting rotor (22) and at least the first gripper device (30) are driven in the same direction of rotation, or the twisting rotor (22) and at least the first gripper device (30) are driven in opposite directions of rotation.

13. A twisting appliance (15; 215) for twisting or stranding electrical or optical cables (16; 216), comprising

a first twisting head device (20; 220, 240) according to any of Claims 1 to 9, with a first twisting rotor (22), wherein the first twisting rotor (22) is arranged rotatably on the first twisting head device (20; 220, 240),

a clamping device (28), wherein the first twisting head device (20; 220, 240) and the clamping device (28) are arranged at a distance from each other,

a stranding shuttle (65; 265) which is movable in a direction between the first twisting head device (20; 220, 240) and the clamping device (28) at least from a first position into a further position,

a control device (60; 260) for controlling at least the first twisting head device (20; 220, 240), characterized in that

the twisting appliance (15; 215) has at least one first sensor device (66) for detecting the position of the stranding shuttle (65; 265) and determining a stranding position or an idle position of a stranding shuttle (65; 265), wherein in particular the first sensor device (66) is connected to the

control device (60; 260) in order to exchange sensor data.

14. The twisting appliance (15; 215) according to Claim 13, characterized in that the twisting appliance (15; 215) has a first positioning device (70; 270), on which the stranding shuttle (65; 265) and/or a support device (85; 285) are arranged and with which the stranding shuttle (65; 265) can be brought into a stranding position and/or into an idle position, in particular linearly, and in particular the support device (85; 285) can be brought into a bracing position and/or into an idle position, and in particular is swivellable.

15. The twisting appliance (15; 215) according to Claim 13 or 14, characterized in that the twisting appliance (15; 215) has a further support device (95) for bracing at least one cable (16; 216), wherein the further support device (95) is movable, and is preferably arranged on a further positioning device (80) and can be brought into a bracing position and into an idle position, and in particular is swivellable.

16. The twisting appliance (15; 215) according to any of Claims 13 to 15, characterized in that the twisting appliance (15; 215) has a stranding shuttle drive (72) for shifting the stranding shuttle (65; 265) from a stranding position into an idle position and/or the twisting appliance (15; 215) has a support device drive (87) for shifting, particularly swivelling the support device (85; 285) from a bracing position into an idle position, wherein in particular at least one of the two drives (72, 87) is connected to the control device (60; 260), and in particular has a further support device

drive (97) for shifting, particularly swivelling the further support device (95), which is connected to the control device (60; 260).

17. The twisting appliance (15; 215) according to any of Claims 13 to 16, characterized in that the twisting appliance (15; 215) has at least one second sensor device (82), which is designed to detect the position of the support device (85; 285), wherein the second sensor device (82) in particular is connected to the control device (60; 260) for exchanging sensor data, and in particular has at least one third sensor device (96), which is designed to detect the position of the further support device (95), wherein the third Sensor device (96) in particular is connected to the control device (60; 260) for exchanging sensor data.

18. The twisting appliance (15; 215) according to any of Claims 13 to 17, characterized in that the positioning device (70; 270) of the stranding shuttle (65; 265) and/or the positioning device (70; 270) of the support device (85; 285) are arranged movably on a first guide device (18), wherein the stranding shuttle (65; 265) and/or the support device (85; 285) are movable in a direction between the clamping device (28) and the first twisting head device (20; 220, 240), and the stranding shuttle (65; 265) is preferably arranged on the support device (85; 285), and in particular the further positioning device (80) of the further support device (95) is arranged movably on the first guide device (18), wherein the further support device (95) is movable in a direction between the clamping device (28) and the first twisting head device (20; 220, 240).

19. The twisting appliance (15; 215) according to any of Claims 13 to 18, characterized in that the clamping device (28) is embodied as a further twisting head device, in particular as a twisting head device (20; 220, 240) according to one of Claims 1 to 9 and is connected to the control device (60; 260) for controlling at least the further twisting head device.

20. The twisting appliance (15; 215) according to any of Claims 13 to 19, characterized in that the twisting appliance (15; 215) has a computing device (61; 261) and a memory device (62; 262) which are connected to the control device (60; 260), wherein in particular at least sensor data of the first sensor device (66) of the stranding shuttle (65; 265) can be processed, and/or at least sensor data of the second sensor device (82) of the support device (85; 285) can be processed and can preferably be stored in the memory device (62; 262), and in particular at least sensor data of the third sensor device (96) of the further support device (95) can be processed and preferably stored in the memory device (62; 262) with the aid of the computing device (61; 261).

21. The twisting appliance (15; 215) according to any of Claims 13 to 20, characterized in that the twisting appliance (15; 215) has a further guide device (100) for linear movement of the clamping device (28) or for linear movement of at least the first twisting head device (20; 220, 240) in a direction between the first twisting head device (20; 220, 240) and the clamping device (28), wherein in particular the first twisting head device (20; 220, 240) and the clamping device (28) are arranged

to be linearly movable in this direction on the further guide device (100), and the twisting appliance (15; 215) preferably has at least one further sensor device (110), which detects a position of the first twisting head device (20; 220, 240) and/or of the clamping device (28) on the further guide device (100) and transmits sensor data to the control device (60; 260).

22. A method for stranding or twisting at least two electrical and/or optical cables (16; 216) with a twisting appliance (20; 220, 240) according to one of Claims 13 to 21, which has at least one first twisting head device (20; 220, 240) with a twisting rotor (22) according to one of Claims 1 to 9, wherein the method comprises the following steps:

- clamping a first cable (16; 216) in the twisting appliance (15; 215);

- clamping at least one further cable (16; 216) in the twisting appliance (15; 215), wherein in particular the two cables (16; 216) are clamped parallel to each other;

- detecting at least one location and determining a stranding position or an idle position of a stranding shuttle (65; 265) with a first sensor device (66);

- performing a stranding process or a twisting process on the at least two cables, wherein a stranding process is performed when the stranding shuttle (65; 265) is in the stranding position and a twisting process is performed when the stranding shuttle (65; 265) is in the idle position.

23. The method according to Claim 22, characterized in that at least the stranding shuttle (65; 265) is moved into a stranding position before the performance of the stranding process, or the stranding shuttle (65; 265) into an idle position before the performance of the twisting process.

24. The method according to Claim 22 or 23, characterized in that a location of a support device (85; 285) is detected with a second sensor device (82), and in particular the support device (85; 285) is moved, particularly swivelled, from an idle position into a bracing position, or preferably is moved from a first bracing position into a further bracing position during the stranding process or the twisting process.

25. The method according to one of Claims 22 to 24, characterized in that the stranding shuttle (65; 265) is moved in a direction away from the clamping device (28) towards the first twisting head device (20; 220) during the stranding process, and at least one position of the stranding shuttle (65; 265) along this direction is determined by at least one further sensor device (68), and the sensor data is communicated to the control device (60; 260) and processed further by the control device (60; 260).

26. The method according to Claim 24 or 25, characterized in that the support device (85; 285) is moved in a direction away from the clamping device (28) towards the first twisting head device (20; 220) during the stranding process or during the twisting process, and at least one position of the support device (85; 285) along this direction is determined by at least one further sensor device

(68), and the sensor data is communicated to the control device (60; 260) and processed further by the control device (60; 260).

27. The method according to one of Claims 22 to 26, characterized in that the stranding shuttle (65; 265) is moved into an idle position after the stranding process, and/or the support device (85; 285) is moved into an idle position after the stranding process or the twisting process, wherein this is preferably triggered by the termination of the standing process or of the twisting process.

28. The method according to one of Claims 22 to 27, wherein the twisting appliance (15; 215) has a second twisting head device, which has a second twisting rotor which has at least one first gripper device and one further gripper device, characterized in that the twisting rotor (22) of the first twisting head device (20; 220) is caused to rotate and the first gripper device and the further gripper device of the second twisting head device (240) are caused to rotate during the stranding process, wherein the stranding shuttle (65; 265) is moved in a direction between the first twisting head device (20; 220) and the second twisting head device (240).

29. The method according to Claim 28, wherein the first twisting head device (20; 220) has a first gripper device (30) and a further gripper device (45) characterized in that after the stranding process two further cables (16; 216) are clamped in the twisting appliance (15; 215) and then the first gripper device (30) and the further gripper device (45) of the first twisting head device (20; 220) are caused to rotate and the twisting rotor of the

second twisting head device (240) is caused to rotate, wherein the stranding shuttle (65; 265) is moved in a direction between the first twisting head device (20; 220) and the second twisting head device.

30. A computer-implemented method for automatic determination and generation of data sets and/or movement commands for controlling at least one twisting head device (20; 220, 240) according to one of Claims 1 to 9, or a twisting appliance (15; 215) according to one of Claims 13 to 21 which performs a method to twisting or stranding at least two cables (16; 216), in particular the method for twisting or stranding according to one of Claims 22 to 29, wherein a position of a stranding shuttle (65; 265) is detected with a first sensor device (66) and preferably a position of a support device (85; 285) is detected with a second sensor device (82), and at least one data set and/or one movement command is generated and stored, in particular multiple data sets and/or movement commands are generated and stored, which indicates at least the position of the stranding shuttle (65; 265) and/or the movement from an idle position into a stranding position and preferably indicates the position of the support device (85; 285) and/or the movement from an idle position into a bracing position.

31. The computer-implemented method according to Claim 30, characterized in that at least one stored data set and/or at least one stored movement command is communicated to the control device (60; 260).