CLAIMS

1. A tool (22) for removing a fan disc (4) alone from a module (1) having a longitudinal axis (X) of a turbomachine comprising a rotor (2) and a stator (3), the rotor (2) comprising the fan disc (4), a drum (5) and an annular sealing part (6) centered on the longitudinal axis (X) and secured to one another via a circular row of bolts (7) each comprising a screw (8) and a nut (9), each screw (8) passing through a retaining member (10) arranged inside the rotor (2), each retaining member (10) having at least two opposing lugs (11) arranged around a head (12) of the screw (8) and projecting with respect to the head (12), the stator (3) being centered on the longitudinal axis (X) and surrounding the drum (5), the stator (3) being longitudinally delimited by a compressor stator vanes assembly (r4) arranged opposite the fan disc (4), the compressor stator vanes assembly (r4) comprising an outer shell (14) having a flange (15), the tool (22) having a vertical axis (Z) comprising:

- a frame (23) comprising a ground support (24);
- an annular plate (25) centered on the vertical axis (Z) and secured to the frame (23), this annular plate (25) comprising first and second circular rows (26a, 26b) of pins (27) as well as two holes (28) arranged around the vertical axis (Z) at a regular pitch, each of the two holes (28) being arranged between the first and second rows (26a, 26b), each of the pins (27) being configured to bear the head (12) of a screw (8) so as not to damage the lugs (11) of the retaining members (10), each hole (28) being configured to receive an indexing finger (29) of the module (1) relative to the tool (22);
- at least three supports (30) distributed in a regular manner around the vertical axis (Z) and secured to the frame (23), each support (30) comprising a bearing surface (31), the bearing surfaces (31) being coplanar and being configured to support the flange (15) of the compressor stator vanes assembly (r4) of the module (1), the three supports (30) being vertically located below the annular plate (25);

- a first visual marker (32) arranged on the frame (23) and configured to angularly orient the module (1) relative to the tool (22).

2. The tool (22) according to claim 1, characterized in that the tool (22) comprises a second visual marker (40) arranged on the frame (23) and configured to determine a vertical position of the module (1) from which the module (1) is to be indexed relative to the tool (22).

3. The tool (22) according to one of the preceding claims, characterized in that each of the three supports (30) comprises a recess (39) configured to allow the passage of an annular row of vanes (20) fitted to the drum (5).

4. A method for removing a fan disc (4) alone from a module (1) having a longitudinal axis (X) of a turbomachine comprising a rotor (2) and a stator (3), the rotor (2) comprising the fan disc (4), a drum (5) and an annular sealing part (6) centered on the longitudinal axis (X) and secured to one another via a circular row of bolts (7) each comprising a screw (8) and a nut (9), each screw (8) passing through a retaining member (10) arranged inside the rotor (2), each retaining member (10) having at least two opposing lugs (11) arranged around a head (12) of the screw (8) and projecting with respect to the head (12), the stator (3) being centered on the longitudinal axis (X) and surrounding the drum (5), the stator (3) being longitudinally delimited by a compressor stator vanes assembly (r4) arranged opposite the fan disc (4), the compressor stator vanes assembly (r4) comprising an outer shell (14) having a flange (15), by means of the tool (22) according to one of claims 1 to 3, the method comprising chronologically the steps of:

a) removing two predetermined bolts (7) hereinafter referred to as reference bolts so as to have two free orifices (41) at the level of the rotor (2), the angular distance between the reference bolts being equal to the angular distance between the two holes (28) of the annular plate (25);

b) positioning the module (1) above the tool (22) in a vertical position so that the longitudinal axis (X) of the module (1) is substantially vertical and substantially coaxial with the vertical axis (Z) of the tool (22), the fan disc (4) then being vertically above the drum (5);

c) aligning one of the free orifices (41) with the first visual marker (32) so as to angularly orient the module (1) with respect to the tool (22);

d) indexing the module (1) with respect to the tool (22) by introducing two indexing fingers (29) from the outside of the module (1), each indexing finger (29) passing through a free orifice (41) of the rotor (2) and then through a hole (28) of the annular plate (25);

e) abutting the heads (12) of the screws (8) on the pins (27) of the annular plate (25), the drum (5) then surrounding the annular plate (25);

f) abutting the flange (15) of the compressor stator vanes assembly (r4) on the bearing surfaces (31) of the three supports (30);

g) removing all the nuts (9) from the bolts (7);

h) extracting in a controlled manner the fan disc (4) alone via at least one extractor (42);

i) removing the fan disc (4) alone.

5. The method according to claim 4, characterized in that the fan disc (4) is extracted during the step h) via three extractors (42) distributed in a regular manner around the vertical axis (Z), the extraction being controlled by progressively unscrewing three extraction nuts (55) previously screwed onto three screws (8) each located close to one of the three extractors (42) and by progressively inserting wedges (56) around the three screws (8) having the extraction nuts (55) between the fan disc (4) and the drum (5), the extraction nuts (55) and the wedges (56) being in a non-metallic material.

6. The method according to claim 5, characterized in that the step h) comprises the sub-steps of:

h1) arranging each extraction nut (55) at a distance (D) from an upper face (60) of a corresponding lobe (16) of the fan disc (4), the upper face (60) being arranged opposite the extraction nut (55);

h2) actuating the three extractors (42) so that each upper face (60) is in contact with the corresponding extraction nut (55);

h3) arranging one or more wedges (56) having a total height (H) around each screw (8) having an extraction nut (55) between the fan disc (4) and the drum (5), the total height (H) being equal to the distance (D).

7. The method according to one of claims 4 to 6, characterized in that the step d) is carried out when the flange (15) of the compressor stator vanes assembly (r4) is located vertically at the level of a second visual marker (40) arranged on the frame (23) of the tool (22).

8. The method according to any of claims 4 to 7, characterized in that the module (1) is held during the steps a) to f) via a first handling tooling (43) on which the module (1) is positioned and held, the first handling tooling (43) comprising at least one pair of opposing first trunnions (44, 45), each of the first trunnions (44, 45) being linked to a bracket (46) of a lifting system (47).

9. The method according to claim 8, characterized in that the first handling tooling (43) is configured to allow the positioning of the rotor (2) relative to the stator (3) to be adjusted longitudinally over a predetermined range or vice versa.

10. The method according to any one of claims 4 to 9, characterized in that the fan disc (4) is held during the steps g) to i) via a second handling tooling (51) on which the fan disc (4) is positioned and held, the second handling tooling (51) comprising at least one pair of opposing second trunnions (52), each of the second trunnions (52) being linked to a bracket (46) of a lifting system (47).