CLAIMS

1. Gripper (1) for an ophthalmic lens, in particular a contact lens such as a soft contact lens, the gripper comprising:

a gripper head (14) having a bearing surface (140), the bearing surface (140) having at least one through-opening (141) to which suction or overpressure can be applied, the bearing surface (140) further having a separate detection through-opening (142) other than the at least one through-opening (141), through which detection through-opening (142) a separate detection vacuum can be applied independent from the suction or overpressure that can be applied to the at least one through-opening (141);

a suction channel (170) arranged in an interior of the gripper, the suction channel (170) leading to the at least one through-opening (141) in the bearing surface (140) for applying suction from the interior of the gripper to the at least one through-opening (141) in order to suck the lens against the bearing surface (140);

an overpressure channel (130) arranged in the interior of the gripper, the overpressure channel (130) leading to the at least one through-opening (141), for applying overpressure from the interior of the gripper to the at least one through-opening (141) in the bearing surface (140) in order to release the lens from the bearing surface (140); and

a detection vacuum tube (16) arranged in the interior of the gripper, the detection vacuum tube (16) leading to the separate detection through-opening (142) in the bearing surface (140), the detection vacuum tube (16) having a distal end which is arranged in the detection through-opening (142) in a fluid-tight manner in order to allow the detection vacuum to be applied through the detection vacuum tube (16) to the detection through-opening (142) independent from the application of the suction or overpressure applied to the at least one through-opening (141) in the bearing surface (140),

wherein the detection through-opening (142) is arranged in the center of the bearing surface (140) of the gripper.

2. Gripper according to claim 1, wherein the gripper has a central longitudinal gripper axis (18), and wherein both the detection vacuum tube (16) in the interior of the gripper and the detection through-opening (142) in the bearing surface (140) are arranged coaxial with the central longitudinal gripper axis (18).

3. Gripper according to claim 2, wherein the gripper further comprises, viewed from a proximal end of the gripper towards a distal end of the gripper
a mounting portion (10; 100, 101) for mounting the gripper to a mounting support;
a manifold (11) attached to the mounting portion and comprising

a first inlet (111) for the supply of the suction, and a first supply channel (1111) extending between the first inlet (111) and a distal end of the first supply channel for supplying the suction in a fluid-tight manner to the distal end of the first supply channel (1111),

a second inlet (110) for the supply of overpressure, and a second supply channel (1101) extending between the second inlet (110) and a distal end of the second supply channel for supplying the overpressure in a fluid-tight manner to the distal end of the second supply channel (1101),

a third inlet (112) for the supply of the detection vacuum, and a third supply channel (1121) extending between the third inlet (112) and a distal end of the third supply channel for supplying the detection vacuum to the distal end of the third supply channel (1121), and

a connecting portion (113) at a distal end of the manifold (11), the connecting portion (113) having a connecting portion outer thread (1130),
a connection insert (12) comprising

a first connection channel connecting in a fluid-tight manner the distal end of the first supply channel (1111) to a proximal end of the suction channel arranged in the interior of the gripper,

a second connection channel connecting in a fluid-tight manner the distal end of the second supply channel (1101) to a proximal end of the overpressure channel arranged in the interior of the gripper, and

a third connection channel connecting in a fluid tight manner the distal end of

the third supply channel (1121) to a proximal end of the detection vacuum tube (16) arranged in the interior of the gripper;

a suction tube (17) coaxially arranged with the central longitudinal gripper axis (18) and surrounding the detection vacuum tube (16) thus forming the suction channel (170) between the detection vacuum tube (16) and the suction tube (17), the distal end of the suction tube (17) being arranged axially spaced apart from an inner end of the detection through-opening (141) in the bearing surface (140) by a predetermined distance (173);

a hollow gripper shaft (13) coaxially arranged with the central longitudinal gripper axis (18) and surrounding the suction tube (17), thus forming the overpressure channel (130) between the suction tube (17) and the hollow gripper shaft (13), the hollow gripper shaft (13) at a proximal end thereof having an abutment flange (131) protruding radially outwardly from the hollow gripper shaft (13), and at a distal end thereof having a mounting portion (132) with a mounting portion outer thread (133);

a hollow gripper head (14) at a distal end thereof having the bearing surface (140) with the at least one through-opening (141) and the detection through-opening (142), and at a proximal end thereof having an open end, with a gripper head inner thread (143) being provided on an inner wall at the proximal end of the hollow gripper head (14), the gripper head inner thread (142) being screwed onto the mounting portion outer thread (133) at the distal end of the gripper shaft (13) thus mounting the gripper head (14) to the gripper shaft (13);

a union nut (15) comprising a distal nut portion (150) having an inner diameter larger than the outer diameter of the gripper head (14) and larger than the outer diameter of the hollow gripper shaft (13) but smaller than an outer diameter of the abutment flange (131) that protrudes radially outwardly from the hollow gripper shaft (13), the union nut (15) further having a proximal nut portion (151) having an inner diameter larger than the outer diameter of the abutment flange (131) that protrudes radially outwardly from the hollow gripper shaft (13), the proximal nut portion (151) having a union nut inner thread (153), the union nut inner thread

(153) being screwed onto the connection portion outer thread (1130) of the connection portion (113) of the manifold (11), thus connecting the hollow gripper shaft (13) with the gripper head (14) mounted thereto to the manifold (11).

4. Gripper according to claim 3, wherein to each of the first inlet (111), the second inlet (110) and the third inlet (112) of the manifold 11 a separate valve (1110; 1100; 1120) is connected.

5. Gripper according to claim 1, wherein the bearing surface (140) is a smooth surface which does not comprise any channels or grooves.

6. Gripper according to claim 1, wherein the at least one through-opening (141) in the bearing surface (140) comprises a plurality of openings which are arranged in the bearing surface along a circle (1410; 1410A; 1410B).

7. Gripper according to claim 6, wherein the circle (1410; 1410A, 1410B) has a diameter in the range of 5 mm to 10 mm, and in particular has a diameter of 5 mm, 6 mm, 7 mm, 8 mm, 9 mm, or 10 mm.

8. Process for transporting an ophthalmic lens, in particular a contact lens such as a soft contact lens from a start location to a destination location, the process comprising the steps of:

providing a gripper (1) according to any one of the preceding claims;

positioning the gripper head (14) with its bearing surface (140) adjacent to the lens to be transported from the start location to the destination location;

applying suction through the suction channel (170) arranged in the interior of the gripper to the at least one through-opening (141) in the bearing surface to suck the lens and make it adhere to the bearing surface (140);

moving the gripper (1) with the lens adhered to the bearing surface (140) to the destination location;

applying overpressure through the overpressure channel (130) arranged in the

interior of the gripper to the at least one through-opening (141) in the bearing surface (140) to release the lens from the bearing surface (140) at the destination location; and

applying a separate detection vacuum, independent from the suction or overpressure that can be applied to the at least one through-opening, to the detection through-opening (142) in the bearing surface (140) through the detection vacuum tube (16) the distal of which is arranged in a fluid-tight manner in the detection through-opening (142) so as to detect whether or not the lens is adhered to the bearing surface (140).

9. Process according to claim 8, wherein the step of applying suction through the at least one through-opening (141) in the bearing surface (140) to suck the lens to make it adhere to the bearing surface comprises applying suction through the suction channel (170) to the at least one through-opening (141) and at the same time allowing a leakage flow to flow towards the at least one through-opening (141) in the bearing surface (140), the leakage flow being chosen such that it essentially does not affect the suction applied.

10. Process according to claim 8, wherein the step of applying a separate detection vacuum to the detection through-opening (142) in the bearing surface (140) is performed after a predetermined time interval of application of suction through the at least one through-opening (141) in the bearing surface (140).

11. Process according to claim 8, wherein the step of applying a separate detection vacuum to the detection through-opening (142) in the bearing surface (140) is performed after a predetermined time interval of application of overpressure through the at least one through-opening (141) in the bearing surface (140).