CLAIMS

1. A system (10) for in-line treatment of thread (20) for use with a thread consuming device (15), comprising:

a treatment unit (100) comprising at least one discharge device (150) being configured to dispense one or more coating substances onto the at least one thread (20) when activated; and

a drive unit (32) being configured to move said at least one discharge device (150) between an idle position (42) and an operational position (41) being arranged along an axis of movement (A), wherein the drive unit (32) is configured to move said at least one discharge device (150) by means of a mechanism (40) providing different transmission ratios between the drive unit (32) and the discharge device (150) depending on the position of the discharge device (150) along the axis of movement (A), wherein the mechanism (40) comprises an actuator (34) at one end connected to the discharge device (150) and at a second end connected to a crank (37) being connected to the drive unit (32), thus forming a rod and crank mechanism (40) operatively connecting the discharge device (150) and the drive unit (32),

wherein the actuator (34) comprises a connecting rod having a curved portion (34a) and a straight portion (34b), and wherein the curved portion (34a) is configured to accommodate a rotational axis of the drive unit (32), and

wherein the transmission ratio is the correlation between rotational movement of the crank, or an electric motor of the drive unit (32), and the linear movement of the discharge device (150).

2. The system (10) according to claim 1, wherein the transmission ratio of the mechanism (40) is lower when the discharge device (150) is in the operational position (42) than when the discharge device (150) is between the idle position (42) and the operational position (41).

3. The system (10) according to claim 1 or 2, wherein the ~~transmission~~ crank (37) is configured to convert a rotary motion of the drive unit (32) to a linear motion of the discharge device (150).

4. The system (10) according to any one of the preceding claims, further comprising a control unit (190) being configured to control the operation of the drive unit (32).

5. The system (10) according to claim 4, wherein the treatment unit (100) further comprises a position sensor (38) configured to determine at least one position of the drive unit (32), and wherein the control unit (190) is configured to control the operation of the drive unit (32) based on the determined position(s).

~~6. The system (10) according to any one of the preceding claims, wherein the mechanism (40) comprises an actuator (34) at one end connected to the discharge device (150) and at a second end connected to a crank (37) being connected to the drive unit (32), thus forming a rod and crank mechanism (40) operatively connecting the discharge device (150) and the drive unit (32).~~

~~7. The system (10) according to claim 6, wherein the actuator (34) comprises a connecting rod having a curved portion (34a) and a straight portion (34b), and wherein the curved portion (34a) is configured to accommodate a rotational axis of the drive unit (32).~~

~~8~~6. The system (10) according to claim ~~6 or 7~~1, wherein the transmission ratio is proportional to a cosine function depending on the position of the crank (37) such that a maximum transmission ratio is achieved when the discharge device (150) is between the idle position (42) and the operational position (41).

~~9~~7. The system (10) according to claim ~~8~~6, wherein the idle position (42) and/or the operational position (41) is located near rad $\pi \pm \pi/2$ as measured from the

angular position of the crank (37) when the discharge device (150) is approximately in the middle between idle position (42) and the operational position (41).

~~10~~8. The system (10) according to any one of the preceding claims, wherein the drive unit (32) comprises a motor (36).

~~11~~9. The system (10) according to claim ~~10~~8, wherein the motor (36) is a step motor.

~~12~~10. The system (10) according to claim ~~10~~8, wherein the motor (36) is a DC-motor.

~~13~~11. The system (10) according to any proceeding claim, wherein the treatment unit (100) comprises at least two discharge devices (150) and a control unit (190), wherein each discharge device (150) is associated with a separate drive unit (32), and wherein the control unit (190) is configured to control selective activation of each one of the discharge devices (150) and the drive units (32).

~~14~~12. The system (10) according to ~~any one of the preceding claims~~claim 11, wherein each discharge device (150) comprises a plurality of nozzles (152a-f) arranged at different positions relative the longitudinal extension of the at least one thread (20), said at least one thread (20) being in motion in use, each nozzle (152a-f) being configured to dispense one or more coating substances onto the at least one thread (20) when activated.

~~15~~13. The system (10) according to claim ~~14~~12, wherein the nozzles (152a-f) are inkjet nozzles.

~~16~~14. The system (10) according to any one of the preceding claims, wherein the coating substance is a colouring substance.

~~17~~15. The system (10) according to any one of the preceding claims, further comprising a thread consuming device (15).

~~18~~16. The system (10) according to claim ~~18~~15, wherein the thread consuming device (15) is an embroidery machine, a sewing machine, a knitting machine, a weaving machine, a tufting machine, a thread winding machine, or any combination thereof.

~~19~~17. A method for in-line treatment of at least one thread (20), comprising:

providing a treatment unit (100) comprising at least one discharge device (150) being configured to dispense one or more coating substances onto the at least one thread when activated;

providing a drive unit (32),

wherein the drive unit (32) is configured to:

to move said at least one discharge device (150) between an idle position (42) and an operational position (41) being arranged along an axis of movement (A), wherein the drive unit (32) is configured to move said at least one discharge device (150) by means of a mechanism (40) providing different transmission ratios between the drive unit (32) and the discharge device (150) depending on the position of the discharge device (150) along the axis of movement (A)~~.~~,

wherein the mechanism (40) comprises an actuator (34) at one end connected to the discharge device (150) and at a second end connected to a crank (37) being connected to the drive unit (32), thus forming a rod and crank mechanism (40) operatively connecting the discharge device (150) and the drive unit (32),

wherein the actuator (34) comprises a connecting rod having a curved portion (34a) and a straight portion (34b), and wherein the curved portion (34a) is configured to accommodate a rotational axis of the drive unit (32), and

wherein the transmission ratio is the correlation between rotational movement of the crank, or an electric motor of the drive unit (32), and the linear movement of the discharge device (150).