Claims

1. System (1) for transmitting liquids, e.g. clean water and wastewater, between a stationary core (2) and a rotatable story (3) of a building (4) in which said rotatable story (3) is arranged substantially circumferentially around said stationary core (2) and is rotatable with respect to said stationary core (2) about a vertical reference axis (5) that is the longitudinal axis of a section of the core (2) at which the story (3) is arranged,

the system (1) comprising an annular buffer duct (6) extending circumferentially around the reference axis (5) of the stationary core (2) and having an annular lower duct portion (7) extending along the entire circumferential length of the buffer duct (6), and an upper duct portion (8) arranged from above in liquid communication with the lower duct portion (7) and slidingly engaging the lower duct portion (7) in at least one interface (9) extending along the entire circumferential length of the buffer duct (6),

one of the lower duct portion (7) and upper duct portion (8) being fixed to the stationary core (2) and the other one of the lower duct portion (7) and upper duct portion (8) being fixed to the rotatable story (3), so that upon rotation of the story (3) with respect to the core (2) about the reference axis (5), the upper and lower duct portions (8, 7) rotate relative to each other about the reference axis (5),

the buffer duct (6) internally defining at least one annular transmission chamber (10) into which the liquid enters from above through one or more inlet ports (11) formed by the upper duct portion (8), and from which the liquid exits through one or more outlet ports (12) formed by the lower duct portion (7),

the transmission chamber (10) being at atmospheric pressure, wherein the system further comprises transmitted liquid level (15) sensor means for detecting a transmitted liquid level (15) of the liquid in the annular transmission chamber (10), and

a control system (16) connected to the transmitted liquid level (15) sensor means and adapted to control one or more inlet valves of the inlet ports (11) in dependency on signals from the transmitted liquid level (15) sensor means.

2. System (1) according to claim 1, wherein the transmitted liquid level (15) sensor means comprise one or more of:

upper level sensors (17) responsive to the transmitted liquid level (15) exceeding a predetermined upper limit level (14),

lower level sensors (18) responsive to the transmitted liquid level (15) dropping below a predetermined lower limit level (19), and/or

liquid pressure sensors and/or optical sensors and/or electrical resistance sensors, adapted to detect values representative of the transmitted liquid level (15).

3. System (1) according to claim 1 or 2, wherein the control system (16) is configured in such a way that the transmitted liquid level (15) inside the transmission chamber (10) is maintained always below the interface/s (9).

4. System (1) according to any preceding claim, wherein the inlet port/s (11) and the outlet port/s (12) are arranged at a distance from the interface/s (9) and oriented in such a way that the transmitted liquid does not flow over or into the interface/s (9).

5. System (1) according to any preceding claim, comprising safety overflow apertures (20) positioned in the lower duct portion (7) above an upper limit level (14) and below the interface/s (9) for automatically draining excess transmitted liquid.

6. System (1) according to any preceding claim, wherein the outlet port/s (12) or additional safety draining apertures (21) in the bottom of the lower duct portion (7) have level- or pressure-controlled safety valves for automatically draining transmitted liquid when the transmitted liquid level (15) exceeds an upper limit level (14), which must be below the interface/s (9).

7. System (1) according to any preceding claim, wherein the control system (16) is configured in such a way that, in one or more of the buffer ducts (6) which transmit liquid to or from the rotatable story (3), the transmitted liquid level (15) inside the transmission chamber (10) is maintained always at or above a predetermined lower limit level (19).

8. System (1) according to any preceding claim, wherein the upper duct portion (8) forms an annular upper duct cover extending along the entire circumferential length of the buffer duct (6) and engaging the lower duct portion (7) continuously along two interfaces (9), both extending along the entire circumferential length of the buffer duct (6).

9. System (1) according to any preceding claim, wherein one of said one or more buffer ducts (6) constitutes a supply duct (25) from the stationary core (2) to the rotatable story (3) and the outlet port/s (12) of said supply duct (25) is/are connected to one or more clean water pressure accumulation tanks (51) with the interposition of one or more clean

water pumps (23) for pumping the clean water from the supply duct (25) into the clean water pressure accumulation tanks (51) and for increasing the water pressure in the clean water pressure accumulation tanks (51) to a desired value.

10. System (1) according to claim 9, wherein one or more of the clean water pressure accumulation tanks (51) comprise a hydraulic pressure accumulator for stabilizing the water pressure and compensating non constant water usage in the rotatable story (3).

11. System (1) according to any preceding claim, wherein the interface/s (9) comprise/s a dust proof interface seal which closes the interface/s (9) so as to make the buffer duct (6) of a substantially closed cross-section.

12. System (1) according to claim 11, wherein the dust proof interface seal comprises a liquid seal (28) having a trough (29) containing a sealing liquid, and a lip or wall or sheet (30) projecting from above into the trough (29) and being immersed in the sealing liquid, wherein the trough (29) forms the lower duct portion (7) face of the interface (9) and the lip or wall or sheet (30) forms the upper duct portion (8) face of the interface (9), or vice versa.

13. System (1) according to claim 12, comprising a drainage system which allows the sealing liquid to flow out of the liquid seal (28), and a replenishing system (38) for feeding sealing liquid into the liquid seal (28).

14. System (1) according to any preceding claim, wherein at least a portion of a bottom of the annular transmission chamber (10) slopes downwards from one or more locally highest points (32) to one or more locally lowest points (33) where the outlet ports (12) are arranged, thereby driving the flow of liquid towards the outlet ports (12) by means of gravity.

15. System (1) according to any preceding claim, wherein the lower portion (7) of the wastewater buffer duct (6) of a given rotatable story (3) and the upper portion (8) of the clean water buffer duct (6) of the rotatable story (3) positioned directly beneath said given rotatable story (3) are formed in a same stationary core (2) wall portion.

16. System (1) according to claim 15, wherein the wastewater buffer duct (6) and the clean water buffer duct (6) are positioned at different radial distances from the stationary core (2).

17. System (1) according to claims 14 and 15 or claims 14 and 16, wherein the clean water buffer duct (6) is positioned at a greater radial distance from the stationary core (2) than the radial distance of the wastewater buffer duct (6) from the stationary core (2), and wherein a clean water supply line to the clean water buffer duct (6) is arranged to extend through the core (2) at the circumferential position of and below a locally highest point (32) of the wastewater transmission chamber (10) bottom.

18. System (1) according to claim 12 or 13, wherein discharge of part of the sealing liquid from the liquid seal (28) into the transmission chamber (10) is accomplished by over-replenishment of sealing liquid into the liquid seal (28) trough (29) and overflow of excess sealing liquid above one or more internal overflow wall sections (37) of the trough (29) having a calibrated height which is lower than an external wall of the trough (29).

19. System (1) according to claim 6, comprising a control system to control the level- or pressure-controlled safety valves in dependency on signals from sensors, wherein the control system also allows manual control interventions.

20. System (1) according to claim 9, comprising a control system to control the clean water pump/s (23) in dependency on signals from sensors, wherein the control system also allows manual control interventions.