CLAIMS

1. A rotary drum for use within a vacuum chamber in a vacuum freeze-dryer for the bulkware production of freeze-dried particles, wherein the drum is adapted for unloading the freeze-dried particles after the drying process is finished, and wherein

the drum is in open communication with the vacuum chamber and comprises a main section terminated by a front plate and a rear plate;

the rear plate is adapted for connection with a rotary supporting shaft for rotary support of the drum, and

the rear plate is permeable for sublimation vapor from freeze-drying the particles.

2. A rotary drum for use within a vacuum chamber in a vacuum freeze-dryer for the bulkware production of freeze-dried particles, wherein the drum is adapted for freeze-drying particles, and wherein

the drum is in open communication with the vacuum chamber and comprises a main section terminated by a front plate and a rear plate;

the rear plate is adapted for connection with a rotary supporting shaft for rotary support of the drum, and

the rear plate is permeable for sublimation vapor from freeze-drying the particles.

3. A rotary drum for use within a vacuum chamber in a vacuum freeze-dryer for the bulkware production of freeze-dried particles, wherein the drum is adapted to keep the particles in the drum during freeze-drying, and wherein

the drum is in open communication with the vacuum chamber and comprises a main section terminated by a front plate and a rear plate;

the rear plate is adapted for connection with a rotary supporting shaft for rotary support of the drum, and

the rear plate is permeable for sublimation vapor from freeze-drying the particles.

~~2~~4. The drum according to any one of claims 1 to 3, wherein the drum is adapted for use within the vacuum chamber of the freeze-dryer.

~~3~~5. The drum according to any one of claims 1 to 4~~or 2~~, wherein the front plate is permeable for sublimation vapor from freeze-drying the particles.

~~4~~6. The drum according to any one of the preceding claims, wherein the permeability of at least one of the rear plate and the front plate are adapted so as to avoid choke flow limitations during a freeze-drying process.

~~5~~7. The drum according to claim ~~3 or 4~~5 or 6, wherein the permeability of one of the rear plate and the front plate is adapted relative to the permeability and the flow path length of the other one of the rear plate the front plate, which is the length of a flow path of sublimation vapor from the other one of the rear plate and the front plate to a vacuum pump provided for maintaining the vacuum inside the vacuum chamber.

~~6~~8. The drum according to any one of the preceding claims, wherein the rear plate comprises at least one venting hole for venting the sublimation vapor from the rotary drum.

~~7~~9. The drum according to any one of the preceding claims, wherein the rear plate comprises a mesh which is permeable for the sublimation vapor.

~~8~~10. The drum according to any one of the preceding claims, wherein the rear plate is adapted for connecting with the supporting shaft via laterally extending supporting bars.

~~9~~11. A rear plate for a rotary drum according to any one of claims 1 to ~~8~~10 for use in a vacuum freeze-dryer for the bulkware production of freeze-dried particles, wherein the drum comprises a main section terminated on a rear end by the rear plate.

~~10~~12. A device comprising a rotary drum according to any one of claims 1 to ~~8~~10 and a rotary supporting shaft mounted to the drum.

~~11~~13. The device according to claim ~~10~~12, wherein the supporting shaft is a hollow rotary shaft.

~~12~~14. A freeze-dryer for the bulkware production of freeze-dried particles under vacuum, the freeze-dryer comprising

a rotary drum according to any one of claims 1 to ~~8~~10 for receiving the frozen particles; and

a stationary vacuum chamber housing the rotary drum,

wherein the rear plate is connected with a rotary supporting shaft for rotary support of the drum.

~~13~~15. The freeze-dryer according to claim ~~12~~14, wherein the vacuum chamber is adapted for closed operation.

~~14~~16. A process line for the production of freeze-dried particles under closed conditions, the process line comprising a freeze-dryer according to claim ~~12~~14 or ~~13~~15.

~~15~~17. A process for the bulkware production of freeze-dried particles under vacuum performed using a freeze-dryer according to claim ~~12~~14 or ~~13~~15 with a rotary drum according to an one of claims ~~3~~5 to ~~8~~10, wherein the step of freeze-drying the particles in a rotating drum of the freeze-dryer comprises controlling the flow of sublimation vapor out of the rotating drum via a permeable rear plate and via a permeable front plate by adapting the permeability of one of the rear plate and the front plate relative to the permeability and the flow path length of the other one of the rear plate and the front plate, which is the length of a flow path of sublimation vapor from the other one of the rear plate and the front plate to a vacuum pump provided for maintaining the vacuum inside the vacuum chamber, such that the particles are retained inside the drum.