CLAIMS

1. An apparatus for ~~the~~a rapid cooling of packaged beverages, wherein said apparatus (1) comprises:

a thermally insulated (21) immersion tank (11) said immersion tank (11) being appropriate for containing a liquid refrigerant (14), an evaporation coil (15) of a closed refrigeration circuit fluid refrigerant, said coil (15) being placed within said immersion tank (11),

gripping means (3) for at least one container (~~2~~20), said gripping means (3) being connected to a vertical axial rotation axis (4), wherein said vertical axial rotation axis (4) is driven by a first driving means (6),

characterized by further comprising:

a vertically movable cart (5) supporting said vertical axial rotation axis (4) that can be driven by a second driving means (10),

a control unit (30) operatively connected to at least said first driving means (6) and said second driving means (10), which commands the following sequential steps:

I) driving the rotation of said vertical axial rotation axis (4) at a speed ranging from 500 RPM to 2500 RPM for a period of time ranging from 0.1 seconds to 7 seconds,

II) slowing down the rotation of said vertical axial rotation axis (4) to a speed not exceeding 500 RPM, and simultaneously to a vertical reciprocating

movement of said vertically moving cart (5), for a period of time ranging from 0.1 seconds to 3 seconds,

III) establishing ~~the~~a number of repetitions of steps I) and II) up to ~~the~~a final stop of the rotation of said vertical axial rotation axis (4).

2. The apparatus for the rapid cooling of packaged beverages, according to claim 1, **characterized in that** said coil comprises:

a first helical section (15a) shaped as a concentric coil inside a second outside helical section (15b), said immersion tank being (11) of cylindrical shape.

3. The apparatus for the rapid cooling of packaged beverages, according to claim 2, **characterized in that** said cylindric immersion tank (11) includes an inlet port for the ~~containers~~at least one container (20) closable by means of a rotating disk (18) which includes a rotating opening (8), whereby said gripping means (3) may pass through said inlet port for the ~~containers~~at least one container (20) and said rotating opening (8) when said inlet port for the ~~containers~~at least one container (20) and said rotating opening (8) are vertically aligned.

4. The apparatus for the rapid cooling of packaged beverages, according to claim 3, **characterized in that** said rotating disk (18) moves jointly with a revolving access door (22) which includes a handle (23).

5. The apparatus for the rapid cooling of packaged beverages, according to claims 1 to 4, **characterized in that** said liquid refrigerant is ethanol at a temperature in the range from -28°C to -42,5°C.

6. The apparatus for the rapid cooling of packaged beverages, according to any of claims 1 to 6, **characterized in that** in step I), the rotation of said axial rotation axis (4) is driven at a speed of 1100 RPM during 0.5 seconds.

7. The apparatus for the rapid cooling of packaged beverages, according to any of claims 1 to 6, **characterized in that** in step II), slowing down of the rotation of said axial rotation axis (4) takes place at a speed of 120 RPM with said simultaneous vertical reciprocating movement of said vertically movable cart (5) with at least one reciprocating movement with a vertical run distance of 4 cm, during 0.5 seconds.

8. The apparatus for the rapid cooling of packaged beverages, according to any of claims 1 to 5, **characterized in that** the number of repetitions of steps I) and II) up to the final stop of rotation of said axial rotation axis (4) is established by the control unit (30) based on at least the following information of reference:

- initial temperature of the at least one container (~~2~~20);
- current temperature of the liquid refrigerant (14);
- amount of liquid refrigerant (14) in the immersion tank

(11);

• type of the at least one container (~~2~~20) introduced in the tank;

• type of liquid beverage contained in the at least one container.

9. The apparatus for the rapid cooling of packaged beverages, according to claim 8, **characterized in that** said information of reference further includes:

• heat capacity of the at least one container (~~2~~20);

• heat capacity of the liquid refrigerant (14);

• heat capacity of the liquid beverage contained in the at least one container.