Claims

1. A ~~C~~cooling nozzle for use in the production of foods, in which an inner tube (1) and, arranged at a distance around it, an inner jacket tube (2) between them confine a product channel (3), wherein ~~the~~ an inner volume of the inner tube (1) forms an inner coolant channel (4) and wherein an outer jacket tube (5) that is arranged at a distance around the inner jacket tube (2) forms an outer coolant channel (6) that encompasses the product channel (3), characterized in that ~~the~~ a cross-section of the product channel (3) is divided by a carrier (7) that extends in parallel to a ~~the~~ longitudinal axis (24) of the inner tube (1) over an ~~the~~ entire length of the product channel (3) and ~~the~~ wall surfaces of which carrier (7) are seamless and continuously abut on the inner tube (1) and on the inner jacket tube (2).

2. The ~~C~~cooling nozzle according to claim 1, characterized in that the carrier (7) has a cross-section that is constant along the entire length of the product channel (3).

3. The ~~C~~cooling nozzle according to one of the preceding claims, characterized in that the carrier (7) is releasably connected to the inner jacket tube (2).

4. The ~~C~~cooling nozzle according to one of the preceding claims, characterized in that the carrier (7) is connected to the inner jacket tube (2) by screws (10) that engage in threaded bore holes (8) arranged within the carrier (7) and that abut on the inner jacket tube (2), and in that in the outer jacket tube (5) mounting bore holes are arranged that cover the threaded bore holes (8) and that are reversibly closable by closures (12).

5. The ~~C~~cooling nozzle according to one of the preceding claims, characterized in that the outer cooling channel (6) has a first inlet (14) and a first outlet (15) to which a first cooling device is connected, and in that the inner cooling channel (4) has a second inlet (16) and a second outlet (17) to which a second cooling device is connected, wherein the first cooling device and the second cooling device independently from one another are configured to generate a coolant flow that is sufficient for cooling ~~the~~ a mass at a cooling rate of from 5 to 130 °C/min.

6. The ~~C~~cooling nozzle according to one of the preceding claims, characterized in that the carrier (7) on its opposite ends has bore holes (18) that form a second inlet (16)

and a second outlet (17) for the inner coolant channel (4), wherein the bore holes (18) are guided through the inner jacket tube (2) and the inner tube (1) and wherein connection lines that are sealingly guided through bore holes within the outer jacket tube (5) are connected to the bore holes (18).

7. The ~~C~~cooling nozzle according to one of the preceding claims, characterized in that it is directly connected to ~~the~~ an outlet of an extruder.

8. The ~~C~~cooling nozzle according to one of claims 1 to 6, characterized in that it is connected to ~~the~~ an outlet of an extruder by a connecting piece that forms an at least sectionally annular product guiding channel between an inner wall and ~~a~~ an outer wall spaced therefrom, and in that the inner wall and/or the outer wall is heated to a temperature that is higher than ~~the~~ an outlet temperature of ~~the~~ a mass from the extruder.

9. The ~~C~~cooling nozzle according to one of claims 1 to 7, characterized in that at one end it is releasably connectable to a connecting piece having a core piece (27) within a jacket section (28), which between them within a radial section form a product guiding channel (29) and which are connected by a catch (31), wherein ~~the~~ a cross-section of the product guiding channel (29) is arranged matching ~~the~~ a cross-section of the product channel (3).

10. The ~~C~~cooling nozzle according to claim 9, characterized in that the core piece (27) is formed with the catch (31) and the jacket section (28) thereon as a single piece.

11. The ~~C~~cooling nozzle according to one of the preceding claims, characterized in that it is oriented in a way that the carrier (7) is arranged above the longitudinal axis (24) of the inner tube (1) and/or of the inner jacket tube (2), and in that ~~the~~ an outlet of the product channel (3) is arranged above a conveyor belt.

12. The ~~C~~cooling nozzle according to one of the preceding claims, characterized by at least one web (45) that extends over ~~the~~ a length of the inner tube (1) and in parallel to its longitudinal axis (24) and that protrudes over the inner tube (1), wherein the inner tube (1) is fixedly connected to the inner jacket tube (2) and/or the outer jacket tube (5) exclusively by means of the carrier (7).

13. The ~~C~~cooling nozzle according to claim 12, wherein the at least one web (45) comprises ~~characterized by~~ at least two webs (45) that are arranged around ~~the~~ a circumference of the inner tube (1), each in equal distance to one another and to the carrier (7).

14. The ~~C~~cooling nozzle according to one of claims 12 to 13, characterized in that the web (45) extends up to a distance of at maximum 2 mm from the inner jacket tube (2).

15. The ~~C~~cooling nozzle according to one of the preceding claims, characterized by being combined with at least one further inner tube (1) that is exchangeable against the one inner tube (1), wherein the further inner tube (1) has a different outer diameter and a carrier (7), wherein the carriers (7) extend up to the same radius from ~~the~~ a longitudinal central axis of the inner tube (1).

16. A ~~C~~cleaning device for use with a cooling nozzle according to one of the preceding claims, having a connector plate (33) for mounting to the cooling nozzle, having a bearing plate (35) which is connected to the connector plate (33) by means of a holder (34) and at which a spindle (38) is run on bearings stationary and rotatably and a spindle nut (37) that engages the spindle (38) and that is connected to a pushing element (36) that is slidable lengthwise along the spindle (38) and that has a cross-section approximately equal to or smaller than the cross-section of the product channel (3) and that has a longitudinal recess (42) having that has a cross-section approximately equal to or larger than ~~the~~ a cross-section of the carrier (7).

17. A ~~P~~process for the production of foods by extruding a protein containing mass and subsequently cooling the extruded mass by means of a cooling nozzle, characterized in that the extruded mass is moved through the product channel (3) of a cooling nozzle according to one of claims 1 to 15, coolant is moved through the inner coolant channel (4) and through the outer coolant channel (6), and after exiting the product channel (3) the mass is laid onto a conveyor belt in order to form a single-layered and continuous layer.

18. The ~~P~~process according to claim 17, characterized in that after exiting the product channel (3) the mass is not divided lengthwise to its direction of movement.

19. The ~~P~~process according to one of claims 17 to 18, characterized in that prior to cooling, the mass is guided through a connecting piece arranged between ~~the~~ an outlet of the extruder and ~~the~~ an inlet of the product channel (3), which connecting piece forms an at least sectionally annular product guiding channel between an inner wall and an outer wall spaced-apart therefrom, and in that the inner wall and/or the outer wall is heated to a temperature that is higher than ~~the~~ an outlet temperature of the mass from the extruder.

20. The ~~P~~process according to one of claims 17 to 19, characterized in that the cooling nozzle is lengthened or shortened by at least one axial section in order to change ~~the~~ a structure of the product and/or when extruding a different mass or respectively after a change of product.

21. The ~~P~~process according to one of claims 17 to 20, characterized in that after finishing or interrupting the process, the mass is moved out of the product channel (3) by moving a pushing element (36) that is connected to a spindle nut (37) into the product channel (3) by means of a spindle (38), wherein the spindle (38) is run on bearings rotatably and stationary at a bearing plate (35) that by means of a holder (34) is connected to a connector plate (33) that is connected to the cooling nozzle.

22. The ~~P~~process according to one of claims 17 to 21, characterized in that the process is interrupted and the inner tube (1) including its carrier (7) is removed from the inner jacket tube (2) and a further inner tube (1) is inserted into the inner jacket tube (2) and is attached therein by means of its carrier (7), wherein the further inner tube (1) has a different outer diameter and a carrier (7), wherein the carriers (7) extend into the same radius from ~~the~~ a longitudinal central axis of the inner tube (1).