[0010] The above object is achieved according to the invention by the subject matter of the appended claims.

[0010a] In accordance with an aspect of the present disclosure, there is provided a distribution device for an extruder. The extruder including a first connecting piece for connecting the distribution device to an outlet of an extruder, a distribution unit, and at least two conduits leading away from the distribution unit. Each conduit has a second connecting piece, for connection to a cooling nozzle, at its end remote from the distribution unit. Each conduit comprises a temperature-control device, and a measuring device, preferably a flow meter, or mutually spaced measuring devices, are provided, in order to determine the product flow in the conduits, the measuring devices preferably being selected from the group consisting of flow meters and pressure sensors.

[0011] In detail, the present invention relates to a distribution device for an extruder, comprising

- a first connecting piece for connecting the distribution device to an outlet of an extruder,
- a distribution unit,
- at least two conduits leading away from the distribution unit, each conduit having a second connecting piece, for connection to a cooling nozzle, at its end remote from the distribution unit;

wherein each conduit comprises a temperature-control device.

[0012] The distribution device according to the invention enables an efficient and precise regulation of the partial flows of a product stream extruded from an extruder.

[0013] The product stream exiting from the Extruder is divided into partial flows in a distribution unit, which are transferred through separate conduits into cooling nozzles. With the aid of a measuring device (preferably a flow meter) or mutually spaced measuring devices, for example pressure sensors

arranged in an initial portion and an end portion of each conduit, deviations of the flow rates of the partial flows from one another can be determined. For example, any pressure drop in a conduit can be determined with the aid of pressure sensors. The ratio of the partial flows flowing through the corresponding conduits can be determined from the ratio or the difference between the pressure drops thus determined. Similarly, in another embodiment, the flow rates of the partial flows in the conduits can be determined with the aid of flow meters. The ratio of the partial flows flowing through the corresponding conduits can be determined from the ratio of the flow rates thus determined.

Claims

1. A distribution device for an extruder, comprising

- a first connecting piece for connecting the distribution device to an outlet of an extruder,

- a distribution unit,

- at least two conduits leading away from the distribution unit, wherein each conduit has a second connecting piece, for connection to a cooling nozzle, at its end remote from the distribution unit;

wherein each conduit comprises a temperature-control device, and

wherein a measuring device, preferably a flow meter, or mutually spaced measuring devices, are provided, in order to determine the product flow in the conduits, the measuring devices preferably being selected from the group consisting of flow meters and pressure sensors.

2. The distribution device according to claim 1, wherein two conduits leading away from the distribution unit are provided.

3. The distribution device according to claim 1 or 2, wherein each conduit is cylindrical, the temperature-control device surrounding the interior space of the conduit, serving as a product conduit, in a sheath-like manner.

4. The distribution device according to any of the preceding claims, wherein the second connecting piece comprises a curved pipe portion.

5. The distribution device according to any of the preceding claims, further comprising a heat exchanger which comprises channels through which product can be guided from a first side of the heat exchanger through an elongate portion to a second side of the heat exchanger.

6. An extrusion system comprising an extruder and the distribution device according to any of claims 1 to 5, which is connected via a first connecting piece to an outlet of the extruder.

7. The extrusion system according to claim 6, wherein in each case a cooling nozzle is connected to each conduit of the distribution device via a second connecting piece which is arranged on an end of the conduit remote from the distribution unit of the distribution device.

8. The extrusion system according to claim 6 or 7, further comprising a heat exchanger which has channels through which the product can be guided from a first side of the heat exchanger through an elongate portion to a second side of the heat exchanger.

9. The extrusion system according to claim 8, wherein the extruder is shortened, for example to a 5-barrel extruder.

10. A method of producing a proteinaceous food item in the extruder system according to any of claims 6 to 9, comprising the steps of:

a) processing a raw material mixture, wherein at least one raw material is a protein, preferably a plant protein, in the extruder,

b) leading the extrudate out of the extruder into the distribution device,

c) guiding partial flows of the extrudate through conduits of the distribution device into cooling nozzles, wherein the flow rates of the partial flows in the conduits are determined by means of a measuring device, preferably a flow meter, or mutually spaced measuring devices, and deviations of the flow rates of the partial flows from one another are determined herefrom,

d) optionally heating or cooling a conduit during step c) depending on the flow rates of the partial flows determined in step c), in order to modify the flow rates of the partial flows in the conduits.

11. The method according to claim 10, wherein the method comprises an additional step d) of thermal shock treatment of the extrudate, step d) being carried out after step a) and before entry of the extrudate into the cooling nozzles.

12. The method according to claim 11, wherein the thermal shock treatment is carried out in a heat exchanger at 150 to 200°C for 1 s to 10 s.

13. The method according to claim 11 or 12, wherein the temperature in the cooling nozzle is adjusted depending on the temperature in the heat exchanger.