

(12) **DEMANDE DE BREVET CANADIEN**
CANADIAN PATENT APPLICATION

(13) **A1**

(22) Date de dépôt/Filing Date: 2023/10/16

(41) Mise à la disp. pub./Open to Public Insp.: 2024/04/18

(30) **Priorité/Priority:** 2022/10/18 (DE10 2022 127 363.6)

(51) Cl.Int./Int.Cl. *B29C 55/28* (2006.01),
B29C 35/16 (2006.01), *B29D 7/01* (2006.01)

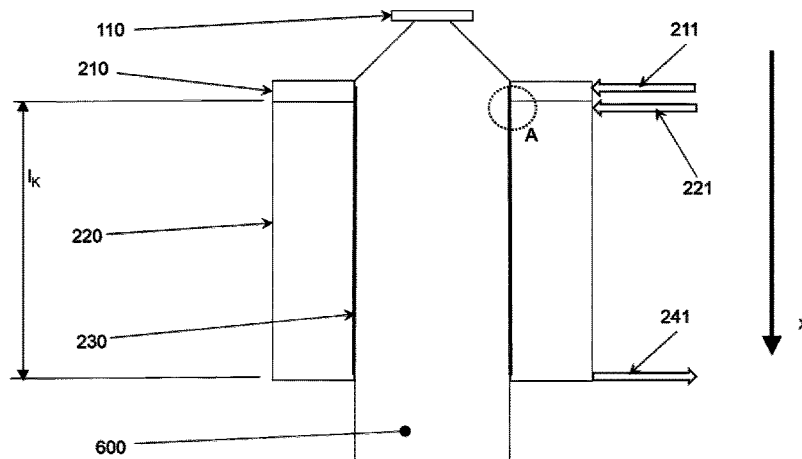
(71) Demandeur/Applicant:
REIFENHAUSER GMBH & CO. MASCHINENFABRIK,
DE

(72) **Inventeurs/Inventors:**
LETTOWSKY, CHRISTOPH, DE;
FISCHER, PETER, DE;
SCHMITT, STEPHAN, DE;
HERCHENBACH, MAXIMILLIAN, DE

(74) Agent: SMART & BIGGAR LP

(54) Titre : LIGNE DE FILM ET METHODE DE FABRICATION D'UNE TOILE DE FILM

(54) Title: FILM LINE AND METHOD FOR PRODUCING A FILM WEB



(57) *Abrégé/Abstract:*

The invention relates to a method for producing a blown film web, a blown film line and a film produced by same. The inventive method enables regulating a degree of crystallization of a film tube by detecting an actual temperature of the film tube at a specific area of a processing station and adapting a production parameter ahead of the specific area.

Abstract

5 The invention relates to a method for producing a blown film web, a blown film line and a film produced by same. The inventive method enables regulating a degree of crystallization of a film tube by detecting an actual temperature of the film tube at a specific area of a processing station and adapting a production parameter ahead of the specific area.

10

FILM LINE AND METHOD FOR PRODUCING A FILM WEB

5 The invention relates to a method for producing a blown film web, a blown film line and a film produced by same.

10 Blown film lines are extensively known in the prior art. They are used to produce large format films in the form of tubes made from melted thermoplastics. Plastics are supplied to the lines in granulated form which is then plasticized into a viscous mass under high pressure in extruders. This mass is formed into an annular shape in a die head and is discharged from the die head through an annular nozzle. The mass is already in the form of a film tube as it exits the annular nozzle. The film tube is drawn up or down along a tube forming zone in which compressed air is introduced into the interior of the film tube. This leads to a transverse stretching of the film tube. The melt is cooled by an active cooling medium for the ascending or descending film tube at a tolerable distance from the annular nozzle. The path taken by the film tube passes through a calibration cage followed by a flat lay which flattens the film. The flat lay unit pre-squeezes the double-layer film web. Squeezing then follows, with a virtually air-free double-layer film web ultimately being formed from the film tube. It is as of this point at the latest, or even as of the pre-squeezing stage itself, a double-layer film web.

25 Blown film lines may have different orientations: In the past, production usually took place vertically from top to bottom; i.e. in the effective direction of gravity, nowadays, however, production is usually from the bottom upward, thus against the effective direction of gravity. The first blown film lines in the top-to-bottom direction of production thereby took advantage of gravitational force. However, due to circumstances such as thinner melts being developed and efforts undertaken to increase throughput, difficulties arose with the stability of the film tube immediately after exiting the nozzle. The film is still molten at that point and, depending on the film material and throughput, not able to support the weight of the film tube continuing to come down in the effective direction of gravity, which can lead to the film bubble ripping. If the film bubble rips, the line needs to be restarted, meaning a significant expenditure of time and money. With the bottom-upward production direction; i.e. against the effective direction of gravity, the film tube is pulled off on the far side from the nozzle, i.e. at the top, by a

pair of rollers which takes up the weight of the film bubble at a point at which the film bubble has further cooled and can therefore bear this force.

Customary film materials for blown films are crystalline or semi-crystalline materials, for example certain polyethylene or polypropylene compounds or even certain polyamides and ethylene vinyl alcohols or ethylene vinyl acetates, among others. In multilayer films, the different layers consist of different materials having different properties such as printability, UV blocking properties or diffusion barrier properties, for example. Blown films have a broad field of application and are used for example as packaging film, including in medical technology or for food packaging, agrofoils, bags, laminating films, etc.

To support the cooling of the film bubble, thermoregulated external air is usually passed against the film bubble. The supporting air, i.e. the air introduced into the film bubble to inflate the film bubble, can also be thermoregulated and guided in a flow, whereby new cold air is continuously blown into the film bubble so as to also cool the film bubble from the inside.

Should the produced film be as transparent as possible, it needs to be cooled down very quickly after the nozzle in order to severely inhibit or even prevent the crystallization of the melt as much as possible. Further positive effects of rapid cooling include, for example, high gloss, high puncture and tear resistance as well as good thermoforming properties.

Heat transfer from plastic to air is much worse than that from plastic to water. Using water as a cooling medium to extract heat from the film tube is therefore obvious and also known. This is most easily achieved when the production direction is in the direction of gravity; i.e. downward, since the water itself can then follow gravity and there is no risk of water flowing onto the nozzle, which needs to remain hot.

It can be problematic if the film tube has already been cooled down to such an extent that the film web can only be minimally deformed or not even at all after the flat lay. Forces acting on the film web during further process steps can then lead to visual defects in the film or other losses in quality. It is therefore critical to find a suitable compromise between cooling the film down quickly enough to

inhibit as much crystallization as possible and at the same time prevent supercooling of the film.

5 The present invention is based on the task of providing an improvement or an alternative to the prior art

Summary of the invention

10 According to a first aspect, the task posed is solved by a method for regulating a degree of crystallization of a film tube during its production via a blown film line, wherein the blown film line has a processing station for the film tube, wherein the blown film line exhibits a downward direction of production, comprising the following steps:

- 15 a) defining a target temperature range of the film tube at least at one specific area of the processing station,
- b) detecting an actual temperature of the film tube at the specific area of the processing station,
- 20 c) in the case of the actual temperature deviating from the target temperature range, changing a production parameter ahead of the specific area of the processing station in the production direction which exerts a direct or indirect influence on the actual temperature of the film tube at the specific area of the processing station in order to drive the actual temperature into the target temperature range.

25

The target temperature range of the film tube depends on different parameters such as the material and the system used. Advance testing, for example, can determine the ideal film tube temperature range for the material and system used at the given parameters. Alternatively, the target temperature range could be
30 determined algorithmically. Utilizing a database which stores target temperature ranges for the material and the system used or for the system components used is also conceivable.

Different devices are conceivable for detecting the film tube's actual temperature.
35 A pyrometer such as an infrared measuring instrument or an infrared camera, for example, is generally used to detect temperatures of objects. It is possible to

detect the actual temperature of the film tube once, to detect it at discrete intervals or to detect it continuously. Detecting at discrete intervals or continuously can be advantageous in that doing so allows in-process control. Furthermore, any potential fluctuations of the actual temperature can be responded to as necessary.

Detecting the actual film tube temperature is generally possible at multiple areas of the processing station. In order to detect the influence of changed production parameters on the actual temperature, however, it should be detected at a sufficient distance from the component exerting an influence on the film tube's actual temperature at the specific area of the processing station.

Driving the actual temperature into the target temperature range by changing a production parameter ahead of the specific area of the processing station in the production direction which exerts a direct or indirect influence on the actual temperature of the film tube at the specific area of the processing station allows an adapting of the actual temperature so that it approaches or enters into the target temperature range.

A precision adjustment can thereby be made, whereby the film is cooled down quickly enough so as to inhibit as much crystallization as possible on the one hand and, on the other, prevent a supercooling of the film. Moreover, the entire film line can thereby be operated particularly efficiently in terms of energy for the simple reason of being able to avoid an energetically disadvantageous cooling of the film web and then subsequent heating of same.

The invention in detail

In one advantageous embodiment, the processing station exhibits water cooling having a central passage for the film tube running through the water cooling during operation of the blown film line.

Heat transfer from plastic to air is much worse than that from plastic to water. Using water as a cooling medium can therefore extract heat from the film tube more quickly, thereby enabling a rapid decrease in the film tube's temperature, whereby the crystallization of the melt is again inhibited or even prevented to the

greatest extent possible. Further positive effects of rapid cooling are, for example, high gloss, high puncture and tear resistance as well as good thermo-forming properties of the film. The central passage enables even cooling over the surface of the film tube.

5

In an additional or alternative embodiment, the specific area on the processing station is situated directly after a film tube cooling section, wherein the production parameter to be changed is the water temperature of the water cooling. The specific area is advantageously directly after the water cooling.

10

Detecting the actual temperature directly after the film tube cooling section, preferably directly after the water cooling, allows for detecting the full extent of the production parameter change on the actual temperature.

15

Changing the water temperature is simple for one skilled in the art to implement. The water can be selectively cooled or heated. This can either ensue electrically using heat exchangers or with fossil fuels. The water temperature is advantageously varied by at most 50 K, preferentially at most 25 K, in particular preferentially by at most 10 K, and particularly preferentially by at most 5 K.

20

In a further or alternative embodiment, the specific area on the processing station is situated directly after a film tube cooling section, wherein the production parameter to be changed is the volume of water of the water cooling. The specific area is advantageously directly after the water cooling.

25

Detecting the actual temperature directly after the film tube cooling section, preferably directly after the water cooling, allows for detecting the full extent of the production parameter change on the actual temperature.

30

Changing the volume of water is simple for one skilled in the art to implement. Increasing the volume of water results in there being more cooling medium, whereby increased heat exchange can occur between the film tube and the cooling medium. More rapid cooling of the film tube can thus take place.

35

Conversely, reducing the volume of water results in a decreased heat exchange and thus a slower cooling. The water volume is advantageously varied by at most

50 L/min, preferentially by at most 25 L/min, in particular preferentially by at most 10 L/min, and particularly preferentially by at most 5 L/min.

5 In an additional or alternative embodiment, the specific area on the processing station is situated directly after a film tube cooling section, wherein the production parameter to be changed is the speed of the film tube. The specific area is advantageously directly after the water cooling.

10 Detecting the actual temperature directly after the film tube cooling section, preferably directly after the water cooling, allows for detecting the full extent of the production parameter change on the actual temperature.

15 Changing the film tube speed is simple for one skilled in the art to implement. It is conceivable to adjust the film tube speed by changing the rotational speed of the take-off rollers. It must hereby be noted that the rotational speed cannot be increased arbitrarily since the quality of the film may otherwise be impaired up to and including the film even ripping. A further possibility for adjusting the film tube speed is changing the extrusion speed, for example by adapting the amount of extrudate. The film tube speed is advantageously varied by at most 50 m/s, 20 preferentially by at most 25 m/s, in particular preferentially by at most 10 m/s, and particularly preferentially by at most 5 m/s.

25 In a further or alternative embodiment, the specific area on the processing station is situated directly after a film tube cooling section, wherein the production parameter to be changed is an interior temperature of the film tube. The specific area is advantageously directly after the water cooling.

30 Detecting the actual temperature directly after the film tube cooling section, preferably directly after the water cooling, allows for detecting the full extent of the production parameter change on the actual temperature.

35 Changing the film tube's interior temperature is simple for one skilled in the art to implement. It is thus conceivable to thermoregulate the supporting air; i.e. the air introduced into the film bubble to inflate the film bubble, and guide it in a flow, whereby new cold air is continuously blown into the film bubble in order to also cool and/or heat the film bubble from the inside. The inside of the film can

furthermore be thermoregulated by a cooling and/or heating element such as a cooling and/or heating cylinder, for example, with the interior temperature of the film tube thereby being adapted. The film tube's interior temperature is advantageously varied by at most 50 K, preferentially by at most 25 K, in particular
 5 preferentially by at most 10 K, and particularly preferentially by at most 5 K.

In an additional or alternative embodiment, the specific area on the processing station is situated directly after a film tube cooling section, wherein the production parameter to be changed is the distance to be covered within the
 10 water cooling based on the film tube's direction of travel. The specific area is advantageously directly after the water cooling.

Detecting the actual temperature directly after the film tube cooling section, preferably directly after the water cooling, allows for detecting the full extent of
 15 the production parameter change on the actual temperature.

Changing the distance to be covered within the water cooling based on the film tube's direction of travel can for example be achieved by varying the height of the area in which the cooling water is discharged based on the direction of flow
 20 of the film. The distance to be covered within the water cooling based on the film tube's direction of travel is advantageously varied by at most 100 cm, preferentially by at most 50 cm, in particular preferentially by at most 20 cm, and particularly preferentially by at most 10 cm.

Pursuant to the above-specified embodiments, "directly" is to be understood here as the distance of the specific area from the cooling section being less than 50 cm, preferentially less than 20 cm, in particular preferentially less than 10 cm, and particularly preferentially less than 5 cm.

In a further or alternative embodiment, the specific area on the processing station is situated ahead of a film tube cooling section, wherein the production parameter to be changed is a film tube entry temperature into the cooling section. The specific area is advantageously directly ahead of the water
 30 cooling.

35

- Detecting the actual temperature ahead of the film tube cooling section, preferably ahead of the water cooling, allows for detecting the full extent of the production parameter change on the actual temperature before the film tube enters into the cooling section. This thereby enables detecting the contribution the adapted film tube entry temperature makes to the actual temperature of the film tube absent other components of the system such as the cooling section, for example, or other production parameter changes making a further contribution to the film tube's actual temperature.
- Changing the film tube entry temperature into the cooling section can for example be regulated by adapting the temperature control of the plastic material or the plasticized plastic in the extruder screw. It must hereby be noted that the plasticized plastic thereby needs to be at a sufficiently high enough temperature to produce a blown film. The film tube entry temperature into the cooling section is advantageously varied by at most 50 K, preferentially by at most 25 K, in particular preferentially by at most 10 K, and particularly preferentially by at most 5 K.

- In an additional or alternative embodiment, the specific area on the processing station is situated on a cooling section of the film tube, wherein the production parameter to be changed is the water contact distance above the water cooling. The specific area is advantageously situated on the water cooling.

- Detecting the actual temperature directly on a film tube cooling section, preferably on the water cooling, allows for detecting the full extent of the production parameter change on the actual temperature. This thereby enables detecting the contribution the adapted water contact distance makes to the actual temperature of the film tube, wherein the contribution to the actual temperature of the film tube made by other system components or other production parameter changes is reduced.
- Changing the water contact distance above the water cooling is simple for one skilled in the art to implement. Conceivable would be adjusting the supply or discharge of water above the water cooling. A change in the water contact distance can be achieved by water being removed again from the film web at an earlier or later point in relation to the film web's direction of travel. Removing the water from the film tube earlier can reduce the cooling efficiency. In contrast,

cooling efficiency is increased when the water is removed from the film tube at a later point. This modification can be realized by means of a height-adjustable base plate of the water contact section, for example.

- 5 The heat transfer from plastic to water is significantly better than from plastic to air. Thus, even small changes to the water contact distance can achieve major effects in terms of controlling the temperature of the film tube. The water contact distance above the water cooling is advantageously varied by at most 10 cm, preferentially by at most 5 cm, in particular preferentially by at most 2 cm, and
10 particularly preferentially by at most 1 cm.

- In a further or alternative embodiment, the specific area on the processing station is situated ahead of a flat lay unit of the film tube, wherein the production parameter to be changed is a film tube entry temperature into the
15 flat lay unit.

- Various production parameters are conceivable for adjusting the film tube entry temperature. The production parameters of the previous embodiments are to be noted here.

- 20 Detecting the actual temperature ahead of a flat lay unit of the film tube thereby enables detecting the cumulative effect of modified production parameters on the film tube before it is laid flat for further processing and ultimately wound onto the winder. The film tube entry temperature in the flat lay unit is advantageously
25 varied by at most 50 K, preferentially by at most 25 K, in particular preferentially by at most 10 K, and particularly preferentially by at most 5 K.

- In an additional or alternative embodiment, the specific area on the processing station is situated ahead of the film tube take-off, wherein the production
30 parameter to be changed is a film tube entry temperature into the take-off.

- Various production parameters are conceivable for adjusting the film tube entry temperature. The production parameters of the previous embodiments are to be noted here.

35

Detecting the actual temperature ahead of the film tube's take-off thereby enables detecting the cumulative effect of modified production parameters on the film tube before it goes through further process steps such as reversing. The film tube entry temperature in the take-off is advantageously varied by at most 50 K, 5 preferentially by at most 25 K, in particular preferentially by at most 10 K, and particularly preferentially by at most 5 K.

In an additional or alternative embodiment, the specific area on the processing station is situated after the film tube take-off, whereby the production parameter 10 to be changed is a film tube exit temperature from the take-off.

Various production parameters are conceivable for adjusting the film tube exit temperature. The production parameters of the previous embodiments are to be noted here.

15 Detecting the actual temperature after the film tube's take-off thereby enables detecting the cumulative effect of modified production parameters on the film tube before it goes through further process steps such as reversing. The film tube exit temperature from the take-off is advantageously varied by at most 50 K, 20 preferentially by at most 25 K, in particular preferentially by at most 10 K, and particularly preferentially by at most 5 K.

A plastic molding system constitutes a further aspect of the invention, particularly a blown film line or flat-film line or other system designed to produce a film web 25 using a processing station, wherein the plastic molding system comprises a means for detecting an actual temperature of the film tube at a specific area of the processing station for regulating a degree of crystallization of a film tube during its production and a control unit for changing a production parameter which exerts a direct or indirect influence on the actual temperature of the film 30 tube at the specific area of the processing station ahead of the specific area of the processing station in the production direction.

Detecting the actual temperature of the film tube at a specific area of the processing station together with a control unit for changing a production 35 parameter which exerts a direct or indirect influence on the actual temperature of the film tube at the specific area of the processing station ahead of the specific

area of the processing station in the production direction allows changing individual or multiple production parameters and thereby selectively influencing the degree of crystallization of a film tube. For example, the lowest possible degree of film tube crystallization can be achieved while simultaneously
 5 maintaining the film's deformability.

In an additional or alternative embodiment, the plastic molding system is a blown film line.

10 In an additional or alternative embodiment, the blown film line extrudes a film tube from top to bottom.

A top-to-bottom extruding of the film tube is particularly suitable in combination with water cooling since the water is conveyed along the machine direction solely
 15 by the force of gravity.

In an additional or alternative embodiment, the plastic molding system is suited to implementing the inventive method.

20 The following clarifications are made with respect to terminology:

It is expressly pointed out that in the context of the present patent application, indefinite articles and indefinite numerical details such as "one...", "two...", etc. should generally be understood as a minimum indication; i.e. as "at least one...",
 25 "at least two...", etc., unless the context or the specific text of a certain passage indicates that only "exactly one...", "exactly two...", is intended at that point. Furthermore, all numerical details as well as details on method parameters and/or device parameters are to be understood in the technical sense; i.e. are to be understood as having the usual tolerances. Neither does explicitly specifying the
 30 "at least" or similar limitation allow drawing the inference that simply stating "one;" i.e. without specifying "at least" or similar, means "exactly one."

The previously described embodiments can be employed individually or also in any combination with one another in configuring the inventive apparatus and
 35 utilizing the inventive method.

The following clarifications are made with respect to terminology:

“Crystallization” is to be understood as the molecular chains in the plastic polymer becoming partially ordered when the melt solidifies. Starting from
 5 crystallization nuclei, the molecular chains fold together and form so-called lamellae separated by amorphous areas. The lamellas form superstructures such as spherulites, for example. Crystallite formation is subject to the cooling conditions, the additives and fillers in the polymer as well as the flow conditions during solidification. Subsequent stretching also changes the arrangement of the
 10 molecules and thus the properties of the material.

Understood by “processing station for the film tube” is the region of the line up to the winder.

15 Understood by “production parameter” is any parameter in the system which is able to be adjusted and which exerts an influence on the temperature of the film tube.

The “machine direction” is the designated path of the film starting from the
 20 extrusion at the nozzle through to the winder. The machine direction therefore varies inasmuch as it runs around multiple rollers and possibly also turning bars.

The “film web” is a tubular film web, whereby the tube is separated on one or both sides after having been laid flat or is left in tubular form.

25 The invention will be described in greater detail below on the basis of exemplary embodiments referencing the figures. Shown therein

Fig. 1 a schematic sketch of a detail of an inventive blown film line from the
 30 nozzle to behind the calibration zone

Fig. 2 a schematic sketch of the enlarged detail A from Fig. 1

Fig. 1 shows a detail of a blown film line according to the invention from the
 35 nozzle 110 to behind the calibration zone 200 as a schematic sketch. The film tube extruded from the nozzle 110 is inflated into the film bubble 600 and passes

through the calibration zone 200 by first entering the base chamber 210. The base chamber 210 has a base chamber cooling fluid inlet 211 through which the cooling fluid, e.g. water able to be provided with an additive, is applied through the base chamber 210 to the exterior of the film bubble 600. The film bubble 600 then runs into the calibration insert 220. The calibration insert 220 exhibits a vertical expansion l_k . The cooling fluid introduced through the base chamber cooling fluid inlet 211 and the calibration insert cooling fluid inlet 221 forms a cooling fluid film 230 on the exterior of the film bubble 600 situated between the exterior of the film bubble 600 and the inner wall of the calibration unit and cools the film bubble 600 very efficiently, whereby the film bubble 600 is precisely calibrated at the same time, wherein visible contact marks on the surface of the film are significantly minimized or even eliminated, both in terms of their frequency as well as their magnitude.

Fig. 2 shows the enlarged detail A from Fig. 1 as a schematic sketch. The annular surface 222 transitions with a second radius r_R into the inside slope R of the edge forming an angle α with the annular surface. For its part, the inside slope R transitions at a first angle α into the inlet slope E on the inner surface of the calibration insert 220. The first radius (r_E) is thereby in the range of 0.5 mm to 5mm, preferentially in the range of 1 mm to 3 mm, and particularly preferentially in the range of 1 mm to 2 mm. The second radius (r_R) is in the range of 1 mm to 10 mm, preferentially in the range of 3mm to 7 mm, and particularly preferentially in the range of 4mm to 6mm. The edge itself rises by a height (h_R) above the annular surface, wherein the height (h_R) is in a range of 1 mm to 30 mm, preferentially 5 mm to 20 mm, and particularly preferentially 8 to 15 mm. The inlet slope E forms an angle (β) to the vertical which is between 0.5° and 20° , preferentially between 1° and 10° , and particularly preferentially between 1.5° and 5° . The vertical expansion of the inlet slope E has a vertical extension l_E of 5 mm to 20 mm, preferentially 10 mm to 15 mm, and particularly preferentially 11.5 mm to 12.5 mm.

The embodiments shown here only represent examples of the present invention and should therefore not be construed as limiting. Alternative embodiments entertained by those skilled in the art are equally included within the protective scope of the present invention.

List of reference numerals used

	110	annular nozzle, nozzle
	210	base chamber
5	211	base chamber cooling fluid inlet
	220	calibration insert
	221	calibration insert cooling fluid inlet
	222	annular surface
	230	cooling fluid film
10	241	cooling fluid outlet
	600	film bubble
	h_R	edge height
	E	inlet slope
	l_E	inlet slope vertical extension
15	l_K	calibration insert vertical extension
	R	inside slope
	r_E	first radius, radius at the transition from the inside slope to the inlet slope
	r_R	second radius, radius at the transition from the annular surface to the inside slope
20	A	detail
	X	general production direction
	a	angle between the inside slope and annular surface
	b	angle between the inlet slope and the vertical or the central axis of the calibration insert
25		

Claims

1. A method for regulating a degree of crystallization of a film tube during its production via a blown film line,
 5 wherein the blown film line has a processing station for the film tube, wherein the blown film line exhibits a downward direction of production, comprising the following steps:
 10
 - a) defining a target temperature range of the film tube at least at one specific area of the processing station,
 - b) detecting an actual temperature of the film tube at the specific area of the processing station,
 - 15 c) in the case of the actual temperature deviating from the target temperature range, changing a production parameter ahead of the specific area of the processing station in the production direction which exerts a direct or indirect influence on the actual temperature of the film tube at the specific area of the processing station in order to drive the actual temperature into the target temperature range.
 20
2. The method according to claim 1, **characterized in that** the processing station exhibits water cooling having a central passage for the film tube running through the water cooling during operation of the blown film line.
 25
3. The method according to one of the preceding claims, **characterized in that** the specific area on the processing station is situated directly after a cooling section of the film tube, preferably directly after the water cooling, and that the production parameter to be changed is the water temperature of the water cooling.
 30
4. The method according to one of the preceding claims, **characterized in that** the specific area on the processing station is situated directly after a cooling section of the film tube, preferably directly after the water cooling,
 35

and that the production parameter to be changed is the volume of water of the water cooling.

5. The method according to one of the preceding claims, ***characterized in that*** the specific area on the processing station is situated directly after a cooling section of the film tube, preferably directly after the water cooling, and that the production parameter to be changed is the speed of the film tube.
6. The method according to one of the preceding claims, ***characterized in that*** the specific area on the processing station is situated directly after a cooling section of the film tube, preferably directly after the water cooling, and that the production parameter to be changed is an interior temperature of the film tube.
7. The method according to one of the preceding claims, ***characterized in that*** the specific area on the processing station is situated directly after a cooling section of the film tube, preferably directly after the water cooling, and that the production parameter to be changed is the distance to be covered within the water cooling based on the film tube's direction of travel.
8. The method according to one of the preceding claims, ***characterized in that*** the specific area on the processing station is situated ahead of a cooling section of the film tube, preferably ahead of the water cooling, and that the production parameter to be changed is a film tube entry temperature into the cooling section.
9. The method according to one of the preceding claims, ***characterized in that*** the specific area on the processing station is situated on a cooling section of the film tube, preferably on the water cooling, and that the production parameter to be changed is the water contact distance above the water cooling.

10. The method according to one of the preceding claims, ***characterized in that*** the specific area on the processing station is situated ahead of a flat lay unit of the film tube, and that the production parameter to be changed is a film tube entry temperature into the flat lay unit.
- 5
11. The method according to one of the preceding claims, ***characterized in that*** the specific area on the processing station is situated ahead of the film tube take-off, and that the production parameter to be changed is a film tube entry temperature into the take-off.
- 10
12. The method according to one of the preceding claims, ***characterized in that*** the specific area on the processing station is situated after the film tube take-off, and that the production parameter to be changed is a film tube exit temperature from the take-off.
- 15
13. A plastic molding system, particularly a blown film line or flat-film line or other system designed to produce a film web using a processing station, wherein the plastic molding system comprises a means for detecting an actual temperature of the film tube at a specific area of the processing station for regulating a degree of crystallization of a film tube during its production and a control unit for changing a production parameter which exerts a direct or indirect influence on the actual temperature of the film tube at the specific area of the processing station ahead of the specific area of the processing station in the production direction.
- 20
- 25
14. The plastic molding system according claim 13, ***characterized in that*** the plastic molding system is a blown film line.
15. The plastic molding system according claim 14, ***characterized in that*** the blown film line extrudes a film tube from top to bottom.
- 30
16. The plastic molding system according to one of preceding claims 13 to 15, ***characterized in that*** it is suited to implementing the method according to one of claims 1 to 12.

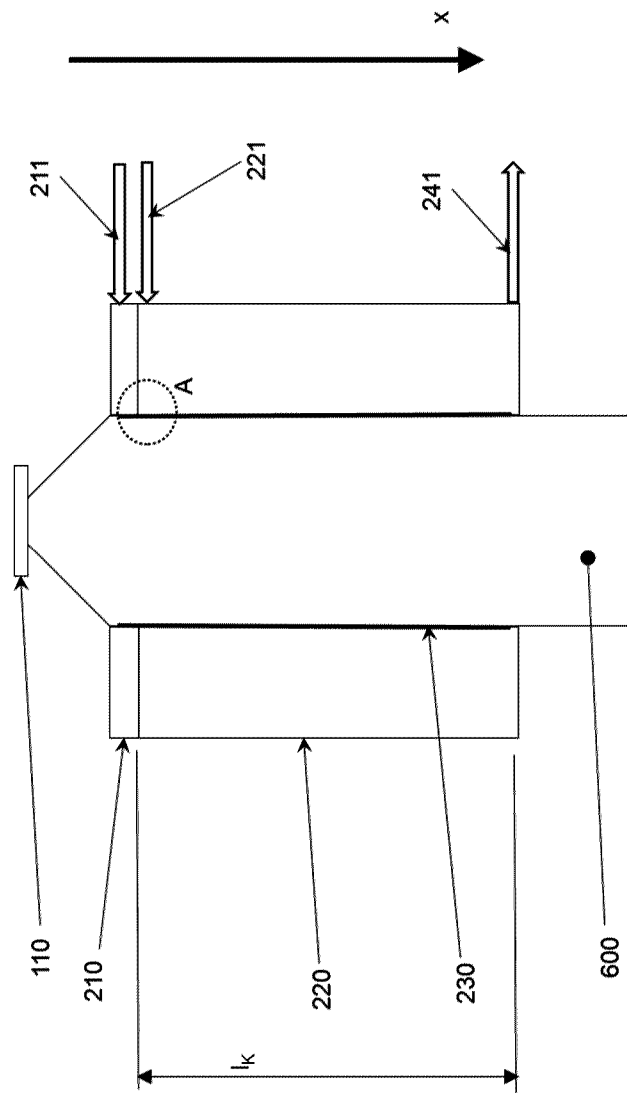


Fig.1

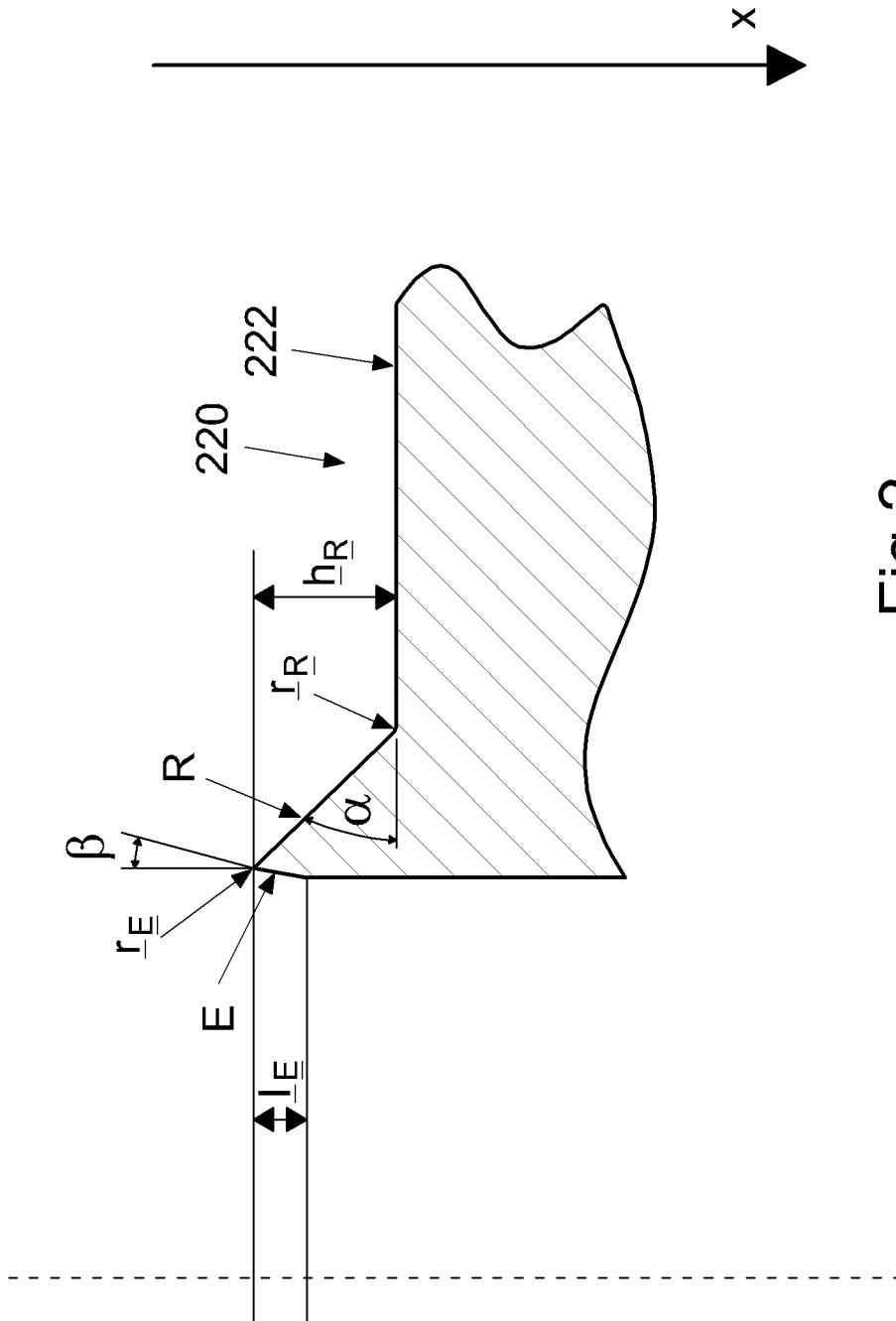


Fig.2

