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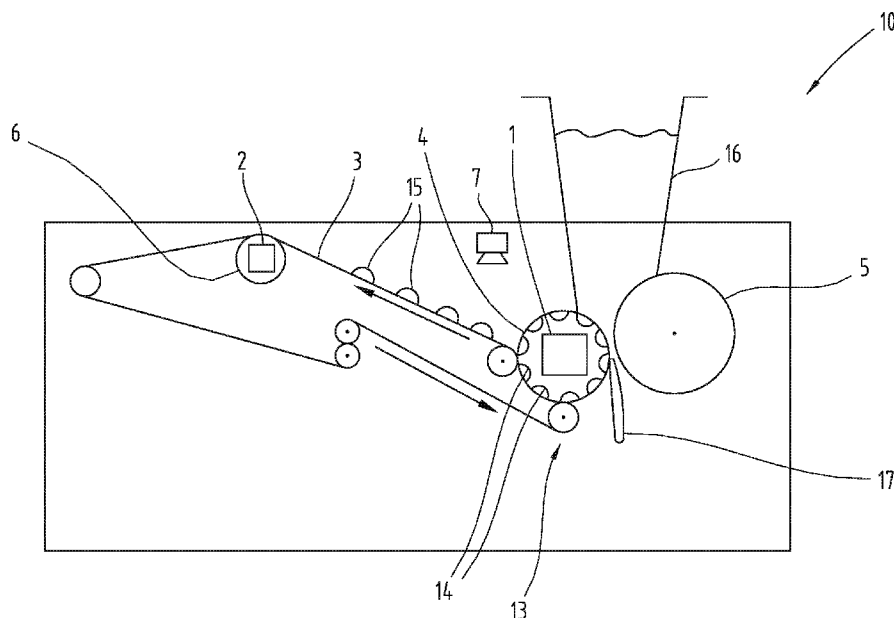
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(54) Title: ROTARY DOUGH MOLDING MACHINE

Fig.1



(57) Abstract: The invention relates to a rotary dough molding machine (10), comprising: - a rotatable die roller (4) having on its surface a plurality of molds (14), - a first drive (1) for rotating the die roller (4), - an extracting web (3) for receiving molded dough pieces (15) from the plurality of molds (14), wherein the extracting web (3) abuts against the surface of the die roller (4), and - a second drive (2) for driving the extracting web (3), said second drive (2) comprising a motor (22). In order to ensure reliable and reproducible extraction/release of dough pieces (15) from the molds (14) and high and constant quality, particularly regarding the shape of the dough pieces (15), the second drive (2) is a torque regulated drive capable of operating the motor (22) at constant torque or torques not exceeding an upper torque limit.

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Rotary dough molding machine

The invention relates to a rotary dough molding machine, comprising a rotatable die roller having on its surface a plurality of molds, a first drive for rotating the die roller, an extracting web for receiving molded dough pieces from the plurality of molds, wherein the extracting web abuts against the surface of the die roller, and a second drive for driving the extracting web, said second drive comprising a motor. In addition, the invention relates to a method for operating a rotary dough molding machine.

Rotary dough molding machines comprise a rotating die roller having on its surface a plurality of molds in the form of cavities (or recesses) for receiving dough. A feed roller (also called forcing roller) feeds dough coming from a hopper into the gap between die roller and feed roller and forces the dough into the molds of the die roller. In order to remove excess dough from the die roller a knife is provided for scraping the dough from the die roller's surface. The dough remaining in the molds is subsequently removed from the die roller by means of an extracting web, which runs in an abutting manner against the die roller.

Rotary molders according to prior art are controlled by setting the speed of the die roller as master speed and subsequently trimming the speed of the motor driving the extracting web by setting its speed relative to the master speed. Beside of complicated speed control, it has been found, that the extraction of dough pieces from the molds of the die roller by means of the extracting web is not reliable and reproducible yielding different qualities of dough pieces within a production cycle. Particularly, the shape of the dough pieces that are received by the extracting web significantly changes with time. Such unexpected deviations from the ideal shape, particularly elongations and shortenings of the dough pieces, are of course undesirable, particularly in applications in which an essential constant piece shape is important.

Accordingly, it is an object of the invention to provide an improved rotary dough molding device. In particular, the rotary dough molding device shall ensure reliable and reproducible extraction/release of dough pieces from the molds and high and constant quality, particularly regarding the shape of the dough pieces.

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The problem of the invention is solved by a rotary dough molding machine as defined in the opening paragraph, in that the second drive is a torque regulated drive capable of operating the motor at constant torque and/or at torques not exceeding an upper torque limit and/or at torques between a lower torque limit and an upper torque limit.

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The operation of the motor (which drives the extracting web) at constant torque and/or at torques not exceeding an upper torque limit and/or at torques between a lower torque limit and an upper torque limit yields reliable and reproducible results regarding constant product quality. The shape of the dough pieces extracted from the molds of the die roller by the extracting web does not significantly change with time. The motor control strategy according to the invention results in a well-defined tension within the extracting web. When driving the motor by controlling torque, preferably at constant torque, the tension of the extracting web or the force by which the extracting web is pulled through the machine remains essentially constant or changes only within narrow limits. This yields predictable wear rates of the components and predictable extraction and release of the dough pieces. It could be shown that the tension within the extracting web has a great influence on product quality, particularly on the shape of the dough pieces. With increasing the tension within the extracting web a stretching of the dough may be observed.

‘Torque regulated’ means that the second drive comprises a torque regulation controlling the electrical power to the motor according to a torque or torque limit setting(s). With other words: the control variable of the second drive is the torque. The motor of the second drive then delivers constant torque or torques below a certain torque limit or torques between a lower torque limit and an upper torque limit. During delivering constant torque the speed of the motor may change, e.g. in dependence of impacts of the die roller on the extracting web, such as torque changes of the die roller drive (first drive), time dependent mechanical resistances, friction changes, etc. Constant torque results in a constant tension of the extracting web independent of other impacts on the extracting web. The torque value corresponding to constant torque to be delivered by the motor – as well as the value(s) of the torque limit(s) in the case of torque to be limited below or between certain values – may be given by a control device or an operator and may depend on dough consistence, type of die roller, shape of molds, etc.

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The prior art control method as mentioned above, i.e. speed regulation of the extracting web drive, yields fluctuating currents and results in unexpected speed differences between the die roller and the extracting web causing a tension within the extracting web of unknown magnitude. The resulting pressure exerted on the extracting web by the drive roller (driving the extracting web) causes a high level of friction between the die roller and the extracting web. The friction coefficient is further dependent by a number of factors such as temperature, humidity, etc. Particularly during times when friction between the extracting web drive roller and the extracting web is very high, e.g. when the extracting web is relatively new, the control method according to prior art would result in very high and unpredictable loads on all components involved.

In contrast, the present invention allows for a well-defined tension within the extracting web which results in a predictable extraction, shape and release of the product.

The die roller has on its surface a plurality of molds in the form of cavities (or recesses) for receiving dough. It is preferred that the rotary dough molding machine comprises a rotatable feed roller, wherein the rotational axes of the die roller and the feed roller are essentially parallel to each other. The feed roller (also called forcing roller) feeds dough into the gap between die roller and feed roller and forces the dough into the molds formed in the surface of the die roller. Although other feeding or forcing means (forcing belt, stationary wall, etc.) for pressing dough into the molds of the die roller would be possible, a feed roller is very advantageous yielding optimal results relating to the shape of the products. Usually, a hopper (for facilitating dough input) is provided above the gap formed between the die roller and the feed roller.

Usually a knife is used to remove (scrap) excess dough from the die roller's surface. In the scraping position the knife extends into the gap between the die roller and the feed roller. The dough remaining in the molds is subsequently removed from the die roller by means of the extracting web.

The rotary dough molding machine is used for making bakery products, such as biscuits, cookies, crackers, etc. After being shaped by means of the rotary dough molding machine the dough pieces (intermediate products) are brought into a baking oven for baking.

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In a preferred embodiment the extracting web is a belt, preferably made of cotton linen or rubber. The extracting web is a circulating belt supported and deflected by rollers.

5 In a preferred embodiment the second drive (for driving the extracting web) is adjustable to different torques or torque limits. Such an adjustment may be done, by adjusting the electrical power and/or frequency to the motor. With this embodiment an optimal torque setting or torque limit setting may be found with regard to product quality (desired shape). The load on components and thus the wear may be minimized by finding an optimal setting.

10 In a preferred embodiment the torque of the second drive and/or the torque limit(s) for the second drive can be set by a control device, preferably automatically and/or in dependence of a command generated by means of a user interface and/or in dependence of values measured by at least one sensor.

15 Preferably, the sensor provides a direct or indirect measure of

- the torque of the motor of the second drive, and/or
- the tension of the extracting web, and/or
- the shape of the dough pieces.

20 This allows for a precise and reliable control and adjustment of the torque also during operation of the machine. Deviations of an optimal production mode can be corrected immediately.

In a preferred embodiment the first drive is a speed regulated drive preferably capable of operating the die roller at constant speed or at speeds not exceeding a speed level. The combination of a speed regulated first drive (die roller) and a torque regulated second drive (extracting web) yields optimal results with respect to constant product quality. There are no or at least no significant deviations from an ideal product shape.

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In a preferred embodiment the second drive is coupled to a drive roller for driving the extracting web, wherein preferably the drive roller is arranged downstream - preferably at least 0,5 m, more preferred at least 1 m downstream - of the abutting area between die roller and extracting web. A drive roller optimally converts the rotational movement of the motor to the transport movement of the extracting web.

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In a preferred embodiment the rotary dough molding machine comprises a pressing means pressing the extraction web against the surface of the die roller, wherein preferably the pressing means comprises a pressing roller. The pressing means causes the extracting web to abut
5 against the die roller. In a possible embodiment the second drive acts on the pressing roller, i.e. rotates the pressing roller, which then transfers the movement on the extracting web. With other word: in this embodiment the second drive drives the extracting web via the pressure roller.

10 In a preferred embodiment the rotary dough molding machine comprises at least one sensor providing a direct or indirect measure of the torque of the motor (of the second drive) and/or the tension of the extracting web and/or the shape of the dough pieces. In such a way a closed loop control of the second drive (for driving the extracting web) may be realized. The sensor may be an encoder or transducer within the second drive. The sensor may be e.g. an ampere
15 or volt meter or a frequency encoder or a flux sensor, etc., or a force, tension or pressure sensor. With respect to the tension of the web and the shape of dough pieces the sensor may be also an imaging sensor, such as a (video) camera.

In a preferred embodiment the second drive comprises a motor controller, which comprises an
20 adjustable inverter, preferably a frequency inverter and/or a PWM-inverter, for adjusting the torque and/or torque limit(s) of the motor of the second drive. The inverter provides the motor with electrical power, which corresponds to a set torque or a set torque limit. In order to adjust the torque of the motor the inverter is controlled in order to adjust its output power. This may be done by PWM (pulse width modulation) and/or frequency modulation. The motor
25 may be a DC- or AC- motor. Preferably, the second drive comprises a servomotor with torque control.

The extracting web drive motor may be fed by a highly advanced frequency inverter. This inverter has a fast current regulation algorithm which yields a constant torque.

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In a preferred embodiment the second drive comprises a motor controller, which comprises a closed loop regulation of torque and/or a current regulation, preferably in the form of an algorithm, yielding constant torque and/or torques not exceeding an upper torque limit and/or torques between a lower torque limit and an upper torque limit.

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In a preferred embodiment the rotary dough molding machine is operable in at least two operational modes, wherein at least one operational mode is a dough piece production mode and wherein preferably at least one operational mode is an auxiliary mode, preferably a starting mode and/or a shutting down mode and/or a cleaning mode, and wherein each of the at least
10 two operational modes has a different torque setting or torque limit setting of the second drive. Here, adjustments by the user and/or pre-programmed setting may be realized.

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The problem is also solved by a method for operating a rotary dough molding machine according to the invention, wherein the second drive is torque regulated and operates the motor at constant torque and/or at torques not exceeding an upper torque limit and/or at torques between a lower torque limit and an upper torque limit at least during a phase of operation.

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In a preferred embodiment the first drive is speed regulated and operates the die roller at constant speed or at speeds not exceeding a speed limit at least during a phase of operation, in which the second drive operates the motor at constant torque and/or at torques not exceeding an upper torque limit and/or at torques between a lower torque limit and an upper torque limit. As already mentioned, the combination of speed control of the first drive (die roller) and torque control of the second drive (extracting web) yields optimal results in product quality as well as in minimizing load on and wear of components.

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In a preferred embodiment the torque or torque limit(s) of the second drive is adjusted, preferably automatically and/or in dependence of a command generated by means of a user interface and/or in dependence of values measured by at least one sensor, wherein preferably the sensor is a sensor measuring directly or indirectly the torque of the motor and/or the tension of the web and/or the shape of the dough pieces. Thus also the user may influence the process within a production cycle.

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In a preferred embodiment the method comprises the step of adjusting quality of dough pieces, particularly the shape of the dough pieces, wherein the adjusting step is performed by adjusting the torque or torque limit(s) of the second drive. As already mentioned it was found that the quality of dough pieces (particularly their shape) depends on the torque provided by the second drive driving the extraction web. This dependence may be used to adjust dough piece quality by means of torque control.

In a preferred embodiment the second drive comprises a frequency inverter and wherein the frequency fed to the motor of the second drive is varied to compensate for the fluctuating mechanical resistance. This reliably allows for providing constant torque.

For a better understanding of the invention the latter is explained in more detail with reference to the following Figures. In a simplified, schematic representation:

Fig. 1 shows in a schematic illustration a rotary dough molding machine,
Fig. 2 shows the communication between drives, sensor and control device,
Fig. 3 shows the frequency and current amplitude of the first drive,
Fig. 4 shows the frequency and current amplitude of the second drive,
Fig. 5 shows a flow diagram, and
Fig. 6 shows an alternate embodiment of a rotary dough molding machine.

Generally, the same parts or similar parts are denoted with the same/similar names and reference signs. The features disclosed in the description apply to parts with the same/similar names respectively reference signs. Indicating the orientation and relative position (up, down, sideward, etc.) is related to the associated Figure, and indication of the orientation and/or relative position has to be amended in different Figures accordingly as the case may be.

Fig. 1 shows a rotary dough molding machine 10 comprising a frame, a die roller 4 and a feed roller 5, both rotatably mounted within the frame about parallel axes of rotation, and a knife 17 for scraping dough from the die roller 4. A first drive 1 coupled to the die roller 4 and causes rotation of the die roller 4. A plurality of molds 14 (in form of cavities for receiving dough) is formed in the surface of the die roller 4. The knife 17 extends along the die roller 4

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and scraps excess dough from the surface of the die roller 4. Fig. 1 shows the scraping position of the knife 3 that extends into the gap between the die roller 4 and the feed roller 5.

5 The rotary dough molding machine 10 further comprises an extracting web 3 for receiving molded dough pieces 15 from the plurality of molds 14, wherein the extracting web 3 abuts against the surface of the die roller 4. A second drive 2 is coupled to the extracting web and causes movement of the extracting web 3 in transport direction (indicated by arrows in Fig. 1). The second drive 2 comprises a motor 22 (Fig. 2). The second drive 2 is a torque regulated drive capable of operating the motor 22 at constant torque or – in an alternative embodiment –
10 at torques not exceeding given torque limit(s).

It is preferred, if the second drive 2 is adjustable to different torques/torque limits. As can be seen from the embodiment of Fig. 2 the torque of the second drive 2 can be set by a control device 9. This may be performed automatically and/or in dependence of a command gener-
15 ated by means of a user interface 8 and/or in dependence of values measured by at least one sensor 7. Preferably, the sensor provides a direct or indirect measure of the tension of the extracting web 3 and/or of the shape of the dough pieces 15. In the embodiment of Fig. 1 the sensor is a camera monitoring the quality of dough pieces 15 transported by the extracting web 3. In another embodiment the sensor may be integrated in the second drive 2 and be e.g.
20 an ampere or volt meter or a frequency encoder or a flux sensor.

Fig. 2 shows the communication between control device 9, user interface 8 and drives 1, 2. A sensor 7 providing sensory data to the control device 9 is also indicated. The drives 1, 2 each comprise a motor controller 11, 21 and a motor 12, 22. Motor controller 12 of the second
25 drive comprises torque regulation.

It is preferred if the first drive 1 is a speed regulated drive capable of operating the die roller 4 at constant speed. In an alternate embodiment the first drive may be operated at speeds not exceeding a given speed limit. The speed regulation is done by the motor controller 11 of the
30 first drive 1.

Fig. 3 illustrates the fixed speed control of the die roller 4 by means of the first drive 1 in dependence of time t . Here, f is the frequency and I the current amplitude fed to the first motor

12. The aim of such a control system is to yield constant speed, while the current through the motor will vary according to mechanical resistances which are dependent in time. This is shown in Fig. 3. This type of control system yields fluctuating currents and thereby torques and forces of unknown magnitude.

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Fig. 4 illustrates the extracting web drive torque control (second drive) in dependence of time t . Here, f is the frequency and I the current amplitude fed to the second motor 22. The aim of the control strategy of the second drive 2 (driving the extracting web 3) is to yield constant current and thereby constant torque. The frequency fed to the second motor 22 will vary to compensate for the fluctuating mechanical resistance. This is shown in Fig. 4. This type of control yields a near constant current and thereby constant torque and forces of known magnitude. In the preferred embodiment the (second) motor controller 21 comprises a frequency inverter.

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The motor controller 21 of the second drive 2 preferably comprises an adjustable inverter, preferably a frequency inverter and/or a PWM-inverter, for adjusting the torque of the motor 22 of the second drive 2. In a further embodiment the motor controller 21 comprises a closed loop regulation of torque and/or a current regulation, preferably in the form of an algorithm, yielding constant torque.

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The second drive 2 is coupled to a drive roller 6 for driving the extracting web 3. In the embodiment of Fig. 1 the drive roller 6 is arranged downstream - preferably at least 0,5 m, more preferred at least 1 m downstream - of the abutting area between die roller 4 and extracting web 3. In an alternate embodiment shown in Fig. 6 the drive roller 6 acts at the same time as pressing means 13 (pressing roller) pressing the extracting web 3 against the die roller 4.

25

As schematically shown in Fig. 5 the rotary dough molding machine 10 may be operable in at least two operational modes 18, 20, wherein each of the at least two operational modes 18, 20 has a different torque setting of the second drive 2. In step 19 the torque setting of the second drive 2 is adjusted. Here, one of the modes is a testing mode 18 and another mode is a dough piece production mode 20. Additional production modes and/or auxiliary mode, such as a starting mode and/or a shutting down mode and/or a cleaning mode, would be possible.

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According to an inventive method the second drive 2 is torque regulated and operates the motor 22 at constant torque (or at torques not exceeding an upper torque limit or torques between two limits) at least during a phase of operation. It is preferred that - at the same time - the first drive 1 is speed regulated and operates the die roller 4 at constant speed or speeds below a certain speed limit. A preferred method comprises (Fig. 5) a step 19 of adjusting quality of dough pieces 15, particularly the shape of the dough pieces 15, wherein the adjusting step is performed by adjusting the torque or torque limit(s) of the second drive 2.

In the foregoing the invention has been described with the embodiment of constant torque control. In an embodiment of the invention torque control may be performed such, that a certain torque limit is not exceeded. The second drive then has the function of a torque limiter. The torque limit may be set in the same way as a constant torque value e.g. by an automatic control (device) and/or by commands entered by an operator. The second drive then operates only at torques below that torque limit. As already mentioned torque could be also controlled between a lower torque limit and an upper torque limit.

It is noted that the invention is not limited to the embodiments disclosed hereinbefore, but combinations of the different variants are possible. In reality, the rotary dough molding machine may have more or less parts than shown in the Figures. The machine and parts thereof may also be shown in different scales and may be bigger or smaller than depicted. Finally, the description may comprise subject matter of further independent inventions.

List of reference signs

- | | |
|----|------------------------------|
| 1 | first drive |
| 2 | second drive |
| 3 | extracting web |
| 4 | die roller |
| 5 | feed roller |
| 6 | drive roller |
| 7 | sensor |
| 8 | user interface |
| 9 | control device |
| 10 | rotary dough molding machine |
| 11 | first motor controller |
| 12 | first motor |
| 13 | pressing means |
| 14 | molds |
| 15 | dough pieces |
| 16 | hopper |
| 17 | knife |
| 18 | testing mode |
| 19 | step of adjusting |
| 20 | production mode |
| 21 | second motor controller |
| 22 | second motor |

C l a i m s

1. Rotary dough molding machine (10), comprising:
 - a rotatable die roller (4) having on its surface a plurality of molds (14),
 - 5 - a first drive (1) for rotating the die roller (4),
 - an extracting web (3) for receiving molded dough pieces (15) from the plurality of molds (14), wherein the extracting web (3) abuts against the surface of the die roller (4), and
 - a second drive (2) for driving the extracting web (3), said second drive (2) comprising a motor (22),
 - 10 characterized in that the second drive (2) is a torque regulated drive capable of operating the motor (22) at constant torque and/or at torques not exceeding an upper torque limit and/or at torques between a lower torque limit and an upper torque limit.
2. Rotary dough molding machine according to claim 1, wherein the second drive (2) is
15 adjustable to different torques and/or torque limits.
3. Rotary dough molding machine according to claim 2, wherein the torque of the second drive (2) and/or torque limit(s) for the second drive (2) can be set by a control device (9), preferably automatically and/or in dependence of a command generated by means of a user
20 interface (8) and/or in dependence of values measured by at least one sensor (7), wherein preferably the sensor (7) provides a direct or indirect measure of the torque of the motor (22) of the second drive (2) and/or the tension of the extracting web (3) and/or the shape of the dough pieces (15).
- 25 4. Rotary dough molding machine according to one of the preceding claims, wherein the first drive (1) is a speed regulated drive preferably capable of operating the die roller (4) at constant speed and/or at speeds not exceeding a speed limit.
5. Rotary dough molding machine according to one of the preceding claims, wherein
30 the second drive (2) is coupled to a drive roller (6) for driving the extracting web (3), wherein preferably the drive roller (6) is arranged downstream - preferably at least 0,5 m, more preferred at least 1 m downstream - of the abutting area between die roller (4) and extracting web (3).

6. Rotary dough molding machine according to one of the preceding claims, wherein the rotary dough molding machine (10) comprises a pressing means (13) pressing the extrac-
tion web (3) against the surface of the die roller (4), wherein preferably the pressing means
5 (13) comprises a pressing roller.

7. Rotary dough molding machine according to one of the preceding claims, wherein the rotary dough molding machine (10) comprises at least one sensor (7) providing a direct or
indirect measure of the torque of the motor (22) of the second drive (2) and/or the tension of
10 the extracting web (3) and/or the shape of the dough pieces (15).

8. Rotary dough molding machine according to one of the preceding claims, wherein the second drive (2) comprises a motor controller (21), which comprises an adjustable in-
verter, preferably a frequency inverter and/or a PWM-inverter, for adjusting the torque and/or
15 torque limit(s) of the motor (22) of the second drive (2).

9. Rotary dough molding machine according to one of the preceding claims, wherein the second drive (2) comprises a motor controller (21), which comprises a closed loop regula-
tion of torque and/or a current regulation, preferably in the form of an algorithm, yielding
20 constant torque and/or torques not exceeding an upper torque limit and/or torques between a
lower torque limit and an upper torque limit.

10. Rotary dough molding machine according to one of the preceding claims, wherein the rotary dough molding machine (10) is operable in at least two operational modes (18, 20),
25 wherein at least one operational mode is a dough piece production mode (20) and wherein
preferably at least one operational mode is an auxiliary mode, preferably a starting mode
and/or a shutting down mode and/or a testing mode (18) and/or a cleaning mode, and wherein
each of the at least two operational modes (18, 20) has a different torque or torque limit set-
ting of the second drive (2).

11. Method for operating a rotary dough molding machine (10) according to one of the
preceding claims, wherein the second drive (2) is torque regulated and operates the motor (22)

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at constant torque or at torques not exceeding an upper torque limit or at torques between a lower torque limit and an upper torque limit at least during a phase of operation.

12. Method according to claim 11, wherein the first drive (1) is speed regulated and operates the die roller (4) at constant speed and or at speeds not exceeding a speed limit at least during a phase of operation, in which the second drive (2) operates the motor (22) at constant torque or at torques not exceeding an upper torque limit or at torques between a lower torque limit and an upper torque limit.

13. Method according to claim 11 or 12, wherein the torque or the torque limit(s) of the second drive (2) is adjusted, preferably automatically and/or in dependence of a command generated by means of a user interface (8) and/or in dependence of values measured by at least one sensor (7), wherein preferably the sensor (7) is a sensor measuring directly or indirectly the torque of the motor (22) and/or the tension of the extracting web (3) and/or the shape of the dough pieces (15).

14. Method according to one of the claims 11 to 13, wherein the method comprises a step (19) of adjusting quality of dough pieces (15), particularly the shape of the dough pieces (15), wherein the adjusting step is performed by adjusting the torque or the torque limit(s) of the second drive (2).

15. Method according to one of the claims 11 to 14, wherein the second drive (2) comprises a frequency inverter and wherein the frequency fed to the motor (22) of the second drive (2) is varied to compensate for the fluctuating mechanical resistance.

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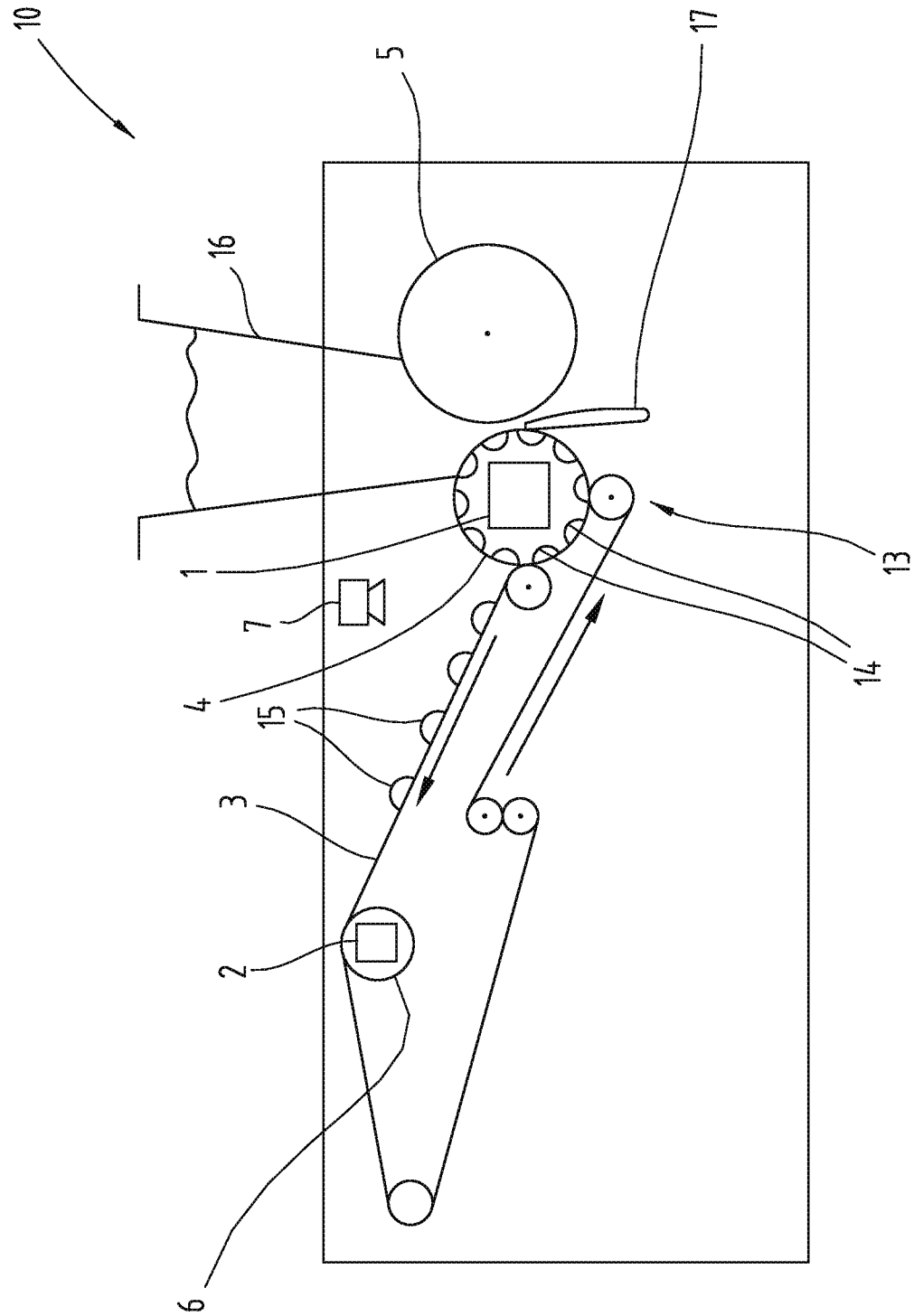
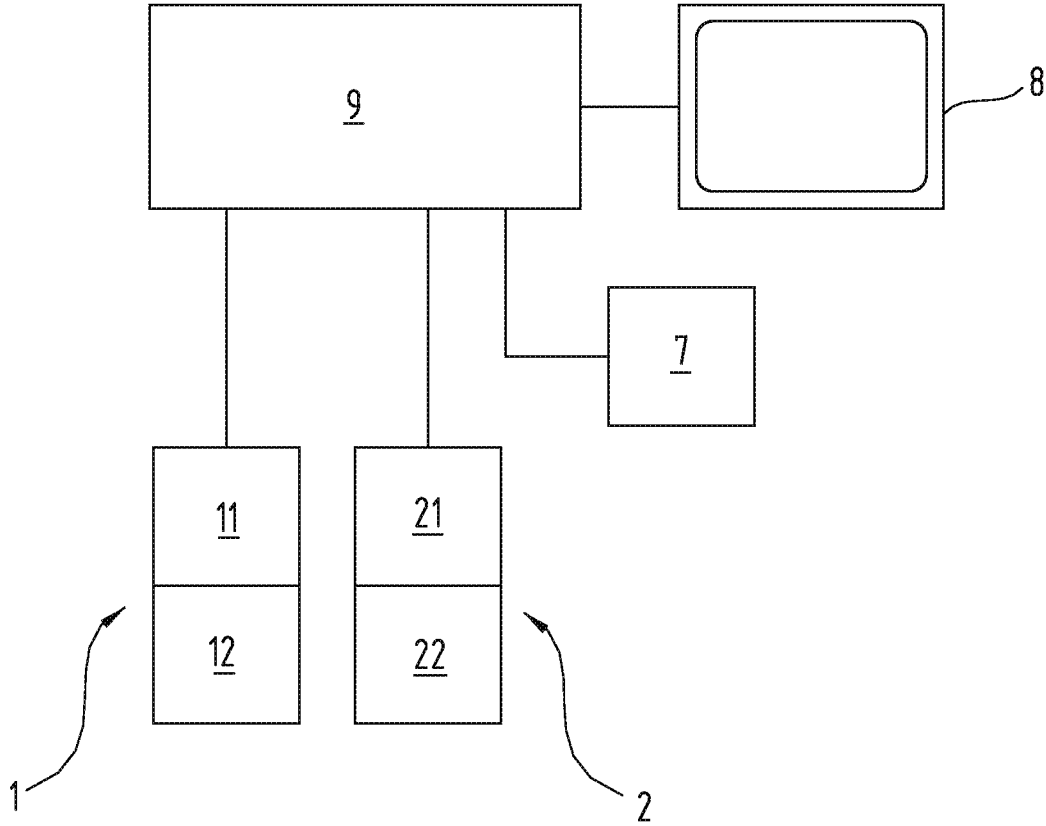


Fig.2



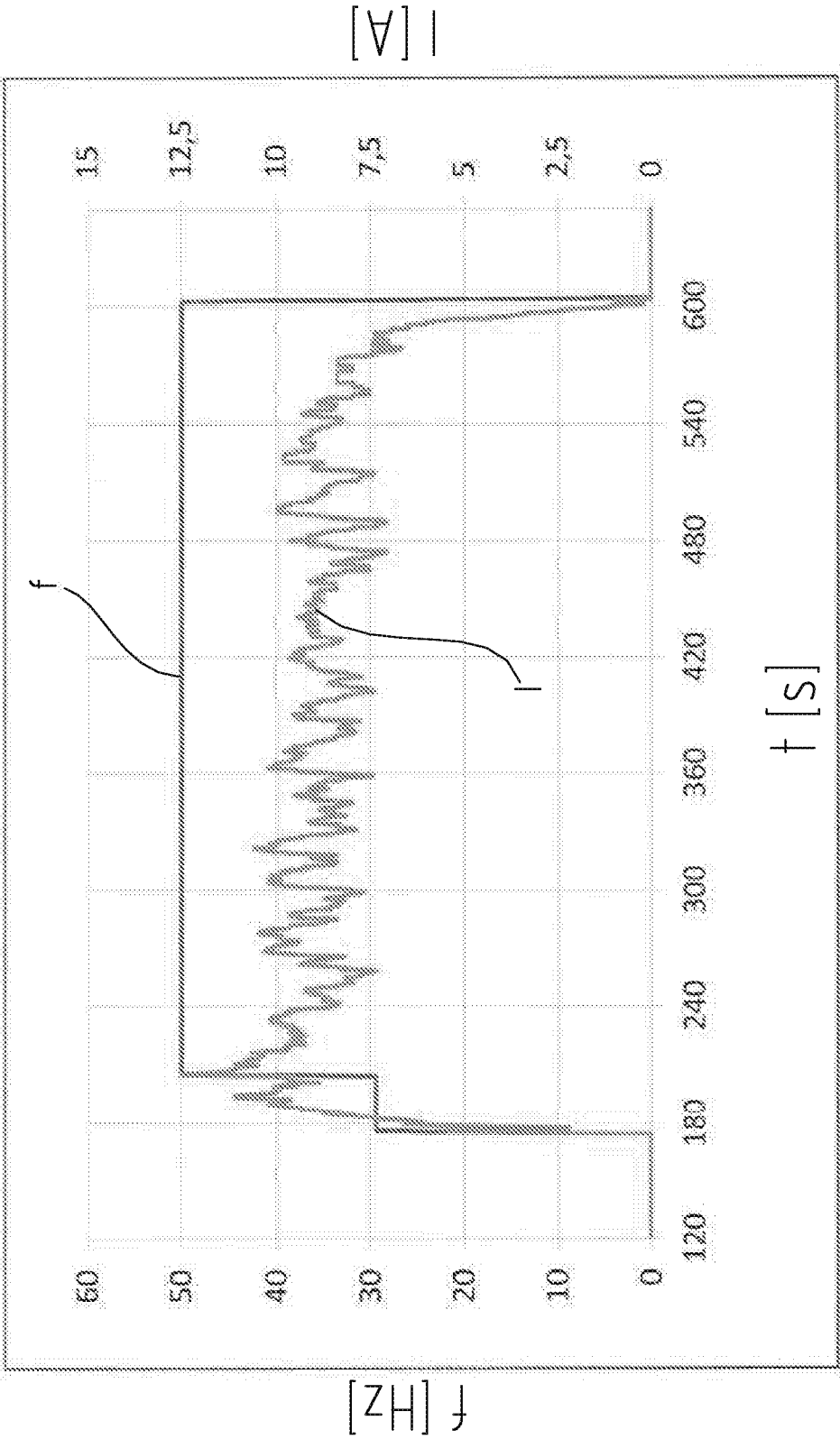


Fig. 3

Fig.4

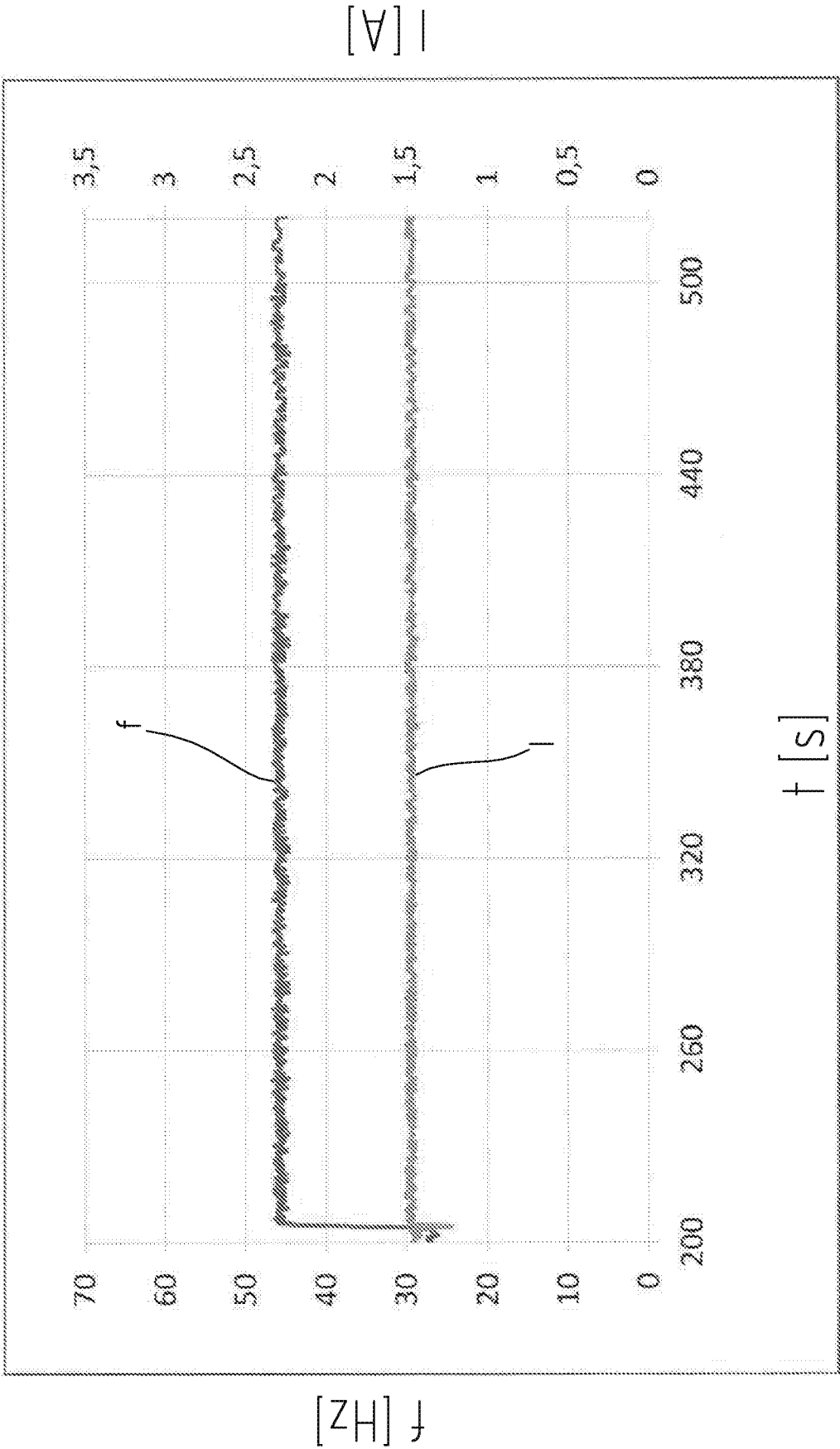


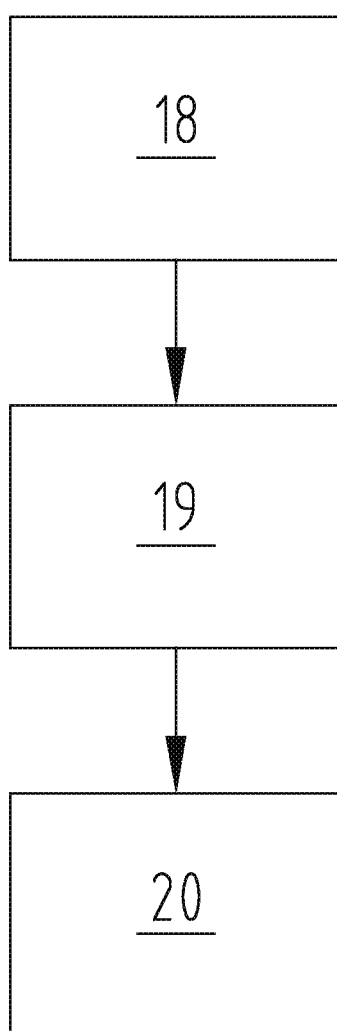
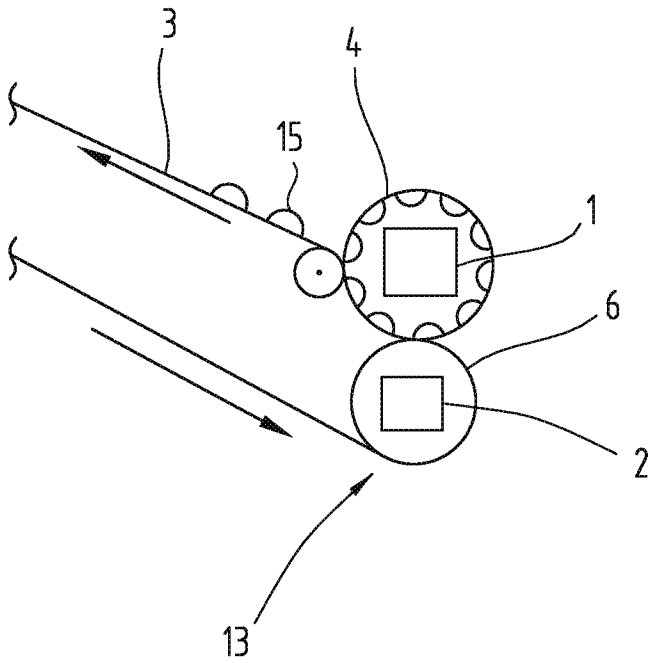
Fig.5

Fig.6



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

INV. A21C11/00 A21C11/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A21C B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3 689 280 A (WERNER FRANK CHARLES) 5 September 1972 (1972-09-05) column 4, line 28 - line 33; figure 2 -----	1-15
Y	EP 0 049 513 A2 (SISTIG CORP [US]) 14 April 1982 (1982-04-14) page 1, line 21 - line 26 page 5, line 3 - line 8 ----- -/--	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No

PCT/AT2017/060229

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	K Moss: "Variable Frequency Drives for conveyor starting", 31 May 2014 (2014-05-31), XP055426221, Retrieved from the Internet: URL:http://www.eandcspoton.co.za/resources/docs/Drives/Variable_Frequency_Drives_for conveyor_starting.pdf [retrieved on 2017-11-17] column 1 - column 2 -----	2,3, 7-11, 13-15
A	US 2006/045939 A1 (MIHALOS MIHAELOS N [US] ET AL) 2 March 2006 (2006-03-02) figure 9 -----	1,11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/AT2017/060229

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