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- (72) **Inventor; and**
- (71) **Applicant: KNOETZE, Johan** [ZA/ZA]; 36 Abbot Road,
Robindale, 2194 Randburg (ZA).
- (74) **Agent: MCCALLUM RADEMEYER & FREIMOND;**
390 Kent Avenue, Ferndale, (P.O. Box 1130, Randburg),
2125 Johannesburg (ZA).

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(54) **Title:** INDICATION OF MOISTURE CONTENT OF MEAT

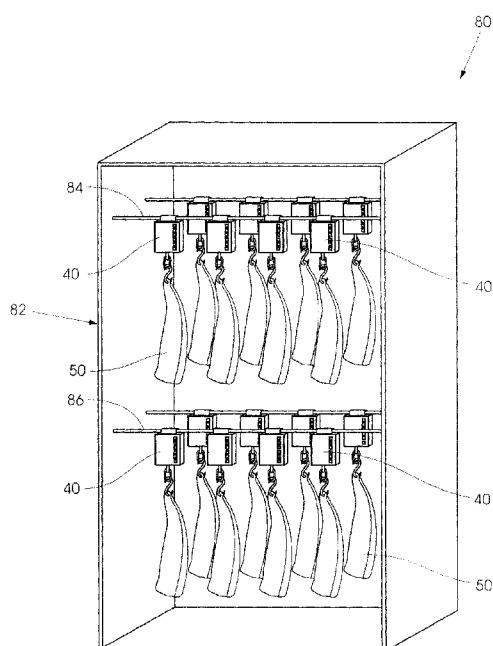


FIGURE 3

(57) **Abstract:** A method of obtaining a dryness factor of a portion of meat which is subjected to a drying process which includes the steps of at a first time obtaining a first measurement of the weight of the meat portion, at a second time which is after the first time obtaining a second measurement of the weight of the meat portion and using the first and second weight measurements to provide an indication of the dryness factor of the meat portion at the second time.



INDICATION OF MOISTURE CONTENT OF MEAT

BACKGROUND OF THE INVENTION

[0001] This invention relates to the drying of meat to produce a food product which, in South Africa, is known as biltong.

5 **[0002]** The dryness of biltong influences the taste of the biltong. Some consumers prefer biltong which is substantially completely dried i.e. with a dryness factor of about 50% where $\text{dryness factor} = (\text{decrease in weight [from wet weight] due to drying}) / (\text{wet weight i.e. weight prior to drying})$ while other consumers prefer a product which has a relatively high water content.

10 **[0003]** To the applicant's knowledge there is no readily available method of indicating to a consumer the dryness of biltong. The invention aims to address this aspect at least to some extent.

SUMMARY OF INVENTION

[0004] The invention provides a method of obtaining a dryness factor of a portion of
15 meat which is subjected to a drying process, the method including the steps of:
at a first time obtaining a first measurement of the weight of the meat portion, (referred to herein as the wet weight);
at a second time which is after the first time obtaining a second measurement of the weight of the meat portion, (referred to herein as the dry weight); and
20 using the first and second weight measurements to provide an indication of the dryness factor of the meat portion at the second time.

[0005] The invention is based on the premise that as the weight of the meat portion diminishes due to the decrease in its water content, the dryness factor is increased.

[0006] The first time is preferably at the onset or commencement of the meat drying process.

5 **[0007]** The second time may be at the end of a time interval of a pre-determined duration, commencing at the first time.

[0008] The second weight measurement may be taken automatically or it may be taken in response to human intervention.

[0009] The invention may be implemented in different ways. In one technique weight
10 measurements are taken at regularly spaced time intervals.

[0010] In a different approach the weight is continuously monitored and a calculation is constantly or repeatedly implemented to relate the weight measurement, at any time, to the dryness factor of the meat portion.

[0011] An output signal may be provided to indicate the dryness factor of the meat
15 portion. This may be done in a digital fashion or in an analogue fashion. It is convenient, however, to provide an indication of the dryness factor of the meat portion using one or more light emitting devices which are energised in different configurations which respectively present indications of different dryness factors of the meat portion.

[0012] The invention also extends to a device for providing an indication of the dryness
20 factor of a meat portion which is subjected to a drying process, the device including a weight measuring mechanism which measures the weight of the meat portion and which generates an output signal which is dependent on the weight measurement, a

controller adapted to receive the signal and to calculate therefrom and from at least one similar signal previously received, a reduction in the weight of the meat portion over a preceding time interval and to derive from such calculation an indication of the dryness factor of the meat portion, and an output unit which indicates to a user the
5 dryness factor of the meat portion.

[0013] The weight measuring mechanism may be any appropriate mechanism such as a scale, a load cell or the like. The invention is not limited in this respect. Conveniently the weight measuring mechanism should provide an output signal in electrical form which can be directed to the controller. The output signal may be a
10 digital signal or an analogue signal.

[0014] The weight measuring mechanism may operate continuously in that over an extended time period it constantly measures the weight of the meat portion. As the weight of the meat portion is reduced, due to the drying process, it is possible for the controller, at threshold values of weight reduction, e.g. 10% weight reduction, 20%
15 weight reduction etc., to initiate the presentation of a corresponding output signal to a user.

[0015] The weight of the meat product would be reduced if a user cuts a portion off the meat product and leaves the remainder in situ. In that instance without corrective action being taken the indication of the dryness factor would be erroneous. To address
20 this possibility data relating to the dryness factor is saved in a memory unit when a piece of the meat is removed e.g. for consumption or to be sold to a user. The weight of the meat portion at that time is recorded i.e. the weight after removal of the piece in question.

[0016] Typically the meat portion would be removed from a housing or disengaged from the weight measuring mechanism and a part thereof would be detached. When the remainder of the meat portion is returned to the housing or to the mass measuring mechanism a new weight measurement is taken and this is recorded as the initial weight. The recorded dryness factor prior to the process is then used in the calculations and the reduction in the weight thereof is monitored in the manner described.

[0017] The invention further extends to an apparatus which includes a housing and a plurality of devices positioned inside the housing, each device being of the aforementioned kind.

[0018] A respective meat portion may be attached to, or suspended from, each weight measuring mechanism.

[0019] Drying of the meat portions may be carried out inside the housing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The invention is further described by way of example with reference to the accompanying drawings in which:

Figure 1 illustrates steps in the implementation of the method of the invention;

Figure 2 depicts a device according to the invention;

Figure 3 shows an apparatus which includes a plurality of devices each of the kind

shown in Figure 2; and

Figure 4 depicts a possible variation to the device or apparatus of the invention.

DESCRIPTION OF PREFERRED EMBODIMENT

[0021] Figure 1 of the accompanying drawings illustrates various steps in the implementation of a method, according to the invention, of assessing the dryness factor of a meat portion which is subjected to a drying process to produce the food product known as biltong.

5 **[0022]** The drying process can be done by exposing the meat portion to atmospheric conditions, or by subjecting the meat portion to a forced-drying process using specific equipment or techniques designed for the purpose. These aspects are however not important to an understanding of the present invention which is primarily directed to a method of providing an indication of the dryness factor of a biltong product.

10 **[0023]** At the outset of the meat drying process a measurement 10 is made of the weight of a meat portion 12. This measurement is also referred to as a measurement of the wet weight of the meat portion. A signal 16 which is dependent on the wet weight measurement is transmitted to a memory unit 20 which is under the control of a processor 22. At the end of a timing interval of a defined duration after the initial or wet
15 weight measurement, controlled by a timer 24, the process is repeated and a second weight measurement is made of the meat portion. The second weight measurement is also referred to as an intermediate dry weight measurement. The resulting data is transferred to the unit 20. The process is continued in this way under the control of the processor 22.

20 **[0024]** The processor 22 executes a routine which ascertains the reduction in weight of the meat portion 12 for the second weight measurement and for each subsequent weight measurement and attributes each reduction to a corresponding reduction in the moisture content of the meat portion. A unit 30 is used to provide an output signal indicative of the dryness factor of the meat portion 12 at any time.

[0025] The dryness factor is given by the expression “dryness factor = (wet weight - intermediate dry weight) / (wet weight). Preferably each time an intermediate mass measurement is made or at times or intervals as may be requested or selected by a user a calculation is done to determine the dryness factor namely: (weight reduction) / (initial or wet weight).

[0026] The dryness factor can be given as a numerical value (a ratio), as a percentage, or in any other way. Preferably use is made of optical signals which are generated to display the dryness factor. For example a plurality of light sources such as LEDs can be energised in different colours, or a number of them can be energised in different ways, to indicate particular dryness factors. For example a red LED may be energised to indicate a dryness factor of zero. As the dryness factor increases a successive number of green LEDs may be energised in a corresponding manner. The objective in this regard is to indicate in an easy to understand manner to a user what the dryness factor of the meat product is at the particular time.

[0027] The invention can be implemented in different ways. In one approach a dry weight measurement of the meat portion 12 is measured at the end of each of a plurality of successive time intervals, each interval being of a pre-determined duration. In a different approach the dry weight of the meat portion 12 is continuously monitored and the signal 16 is continuously output to the memory unit 20. An ongoing comparative process is executed by the processor 22 in that the signal 16 is monitored to determine the time instant at which a predetermined dryness factor, which is at the outset entered by means of an input unit 32 and captured in the memory 20 via the processor 22, of, say, 20% has been reached. A signal is then generated by the processor 22 and applied to the output unit 30. When the dryness factor is further

increased by a figure of, say 10%, i.e. to a value of about 30% another signal is generated and applied to the output unit 30.

[0028] In broad terms, therefore, in the first approach the weight of a meat portion is determined at each of a plurality of spaced apart time intervals and a corresponding signal is generated. In the second approach the weight of the meat portion is continuously monitored and as different weight reduction threshold values are reached respective output signals are generated which are indicative of different dryness factors for the meat portion.

[0029] It is possible for the processor 22 to execute either technique according to a consumer's, or operator's, requirement, or in fact for the processor to execute both techniques in parallel. The invention is not limited in this respect.

[0030] One benefit of using the processor 22, in a forced drying process which is controlled by using dedicated equipment known in the art, is that it is possible for a user to select the dryness factor of a chosen meat portion and then, once the dryness factor is reached, the processor produces an output signal which stops the forced drying process and notifies the operator or user that the target dryness factor has been reached. The invention thus makes it possible for a dryness factor selected in advance for a particular meat cut to be obtained. Similarly, in a natural drying process, when a desired level of dryness is reached the user may stop the drying process by removing and appropriately storing the meat portion 12 by means of vacuum packing etc.

[0031] Figure 2 illustrates in block diagram form a device 40 for executing the method shown in Figure 1. The device 40 includes a weight measurement mechanism 44 which, in this example, is adapted to be suspended from an overhead support 46. A

hook 48 on the mechanism 44 is provided so that a meat portion 50 can be suspended from the hook.

[0032] The device 40 is used to support the meat portion 50 while it is being dried in any appropriate way. Typically the meat portion 50 is inside a housing 52 in which, using any suitable technique known in the art, control over the drying process can be exercised. This technique is, however, not essential, for the meat product 50 could be exposed directly to, and dried by a natural process in, the atmosphere.

[0033] The device 40 includes a processor 54, a timer 56, a load cell 58, a memory unit 60 and a display 62. The various components are powered by means of an on-board battery 66. The load cell 54 is configured so that the hook 48 is directly suspended from its operative part.

[0034] When the device 40 is used the load cell 58 constantly monitors the weight of the meat portion 50. A signal 70, corresponding to the weight measurement, is generated and a corresponding weight measurement value is stored in the memory unit 60.

[0035] Weight measurements are taken under the control of the processor 54 and the timer 56. As indicated the weight measurements can be taken continuously or at spaced apart time intervals. By using historical data and by taking into account user preferences, threshold weight measurement values can be established. These values can be equated, by way of example only, to weight reductions of 10%, 20%, 30%, 40% and 50%. A respective dryness factor may be calculated, as required, for each weight measurement. As each threshold dryness factor is reached a signal is made available to energise the display 62. It is possible for the display to be energised continuously

but, in order to save energy, it is preferred for the display to be energised only if a display process is initiated via the input unit 32 which is connected to the processor 54.

[0036] As explained hereinbefore a user or operator could select a desired dryness factor for one or more of the meat cuts and through the mechanism of the processor 54 a signal is generated to notify a user that a chosen dryness factor has been reached.

[0037] The display 62 can take on various forms. Conveniently and cost effectively the display comprises a plurality of light emitting diodes 76. The diodes can be of different colours with a particular colour being associated with a particular dryness factor. For example a red diode can be used to indicate a dryness factor of 40%, a green diode can be used to indicate a dryness factor of 30% and so on. Alternatively, a plurality of similar diodes can be progressively energised as the moisture content drops i.e. one diode will be energised if the dryness factor is 20%, two diodes are energised if the dryness factor increases to 30%, three diodes are energised if the dryness factor goes to 40% and so on. Such display variations are exemplary only and are non-limiting.

[0038] Figure 3 illustrates apparatus 80 according to the invention. The apparatus 80 comprises a housing or cabinet 82 in which a meat drying process is implemented using techniques known in the art and which for this reason are not described herein.

Inside the cabinet 82 are upper and lower supports 84 and 86 respectively. A number of devices 40, each of the kind shown in Figure 2, are attached to the supports at respective spaced apart locations. Respective meat portions 50 are suspended from the devices 40. The meat portions 50 can be dried in the cabinet 82 or the meat portions, once dried, can be suspended in the cabinet for display and sale purposes.

A prospective purchaser can then choose a portion of meat which has been dried to a level according to the preference of the user – the choice is facilitated by the availability of a corresponding display, generated on demand, which indicates the respective dryness factor of a chosen meat portion.

- 5 [0039] It is possible, particularly in a commercial outlet, that a part of a meat portion 50 is sold to a user and that the remainder of the meat portion 50 is then kept suspended from the respective device 40. To ensure that the removal of a part of the meat portion 50 is not considered to be a variation in the dryness factor the processor 54 would then use data relating to the dryness factor of the meat portion at the time of
10 the removal of the sold part thereof, and to the weight of the meat portion at that time. Thereafter the (reduced) weight of the remaining part of the meat portion would be used when calculating the dryness factor of such remaining portion.

- [0040] Figure 4 shows a communication unit 90 which can be connected to the processor 22 or the processor 54. Communication by the unit 90 can be effected in
15 any convenient way e.g. by the use of wired or wireless signals, or by way of Bluetooth™, NFC or other techniques. Data is output by the unit 90 to an external device 94 which may be at a remote location and which can log information relating to the meat drying process and which can include a screen 96 to display relevant information.

CLAIMS

1. A method of obtaining a dryness factor of a portion of meat which is subjected to a drying process, the method including the steps of:
 - a) at a first time obtaining a first measurement of the weight of the meat portion (i.e. the wet weight);
 - b) at a second time which is after the first time obtaining a second measurement of the weight of the meat portion (i.e. the intermediate dry weight);
 - c) determining the reduction in weight of the meat portion from the first time to the second time, and
 - d) using the ratio of (the reduction in weight) / (the wet weight) to provide an indication of the dryness factor of the meat portion at the second time.
2. A method according to claim 1 wherein the first time is at the commencement of the meat drying process.
3. A method according to claim 1 wherein the second time is at the end of a time interval of a predetermined duration, commencing at the first time.
4. A method according to claim 1 wherein the second weight measurement is taken automatically or in response to human intervention.
5. A method according to claim 1 wherein the weight of the meat portion is continuously monitored and a calculation is implemented for each weight measurement to provide the corresponding dryness factor of the meat portion.
6. A method according to claim 1 which includes the step of generating an output signal to indicate the dryness factor of the meat portion.

7. A device for providing an indication of the dryness factor of a portion of meat, the device including a weight measuring mechanism which measures the weight of the meat portion and which generates an output signal which is dependent on the weight measurement, a controller adapted to receive said
5 output signal and to calculate therefrom and from at least one similar output signal previously received, a reduction in the weight of the meat portion over a preceding time interval and to derive from such calculation an indication of the dryness factor of the meat portion, and an output unit which indicates to a user the dryness factor of the meat portion.
- 10 8. A device according to claim 8 wherein the weight measurement mechanism is selected from the following: a scale and a load cell.
9. An apparatus for providing a respective indication of the dryness factor for each of a plurality of portions of meat, the apparatus including a housing, a plurality of devices inside the housing, each device including a weight measurement
15 mechanism to measure the weight of a respective meat portion and to generate an output signal which is dependent on such weight measurement, a controller which receives the respective output signals and which, using stored data relating to earlier weight measurements, calculates for each meat portion, the dryness factor of the meat portion at the time of the respective weight
20 measurement, and an output unit, responsive to the controller, which is operable to provide an indication to a user of the dryness factor of each meat portion.

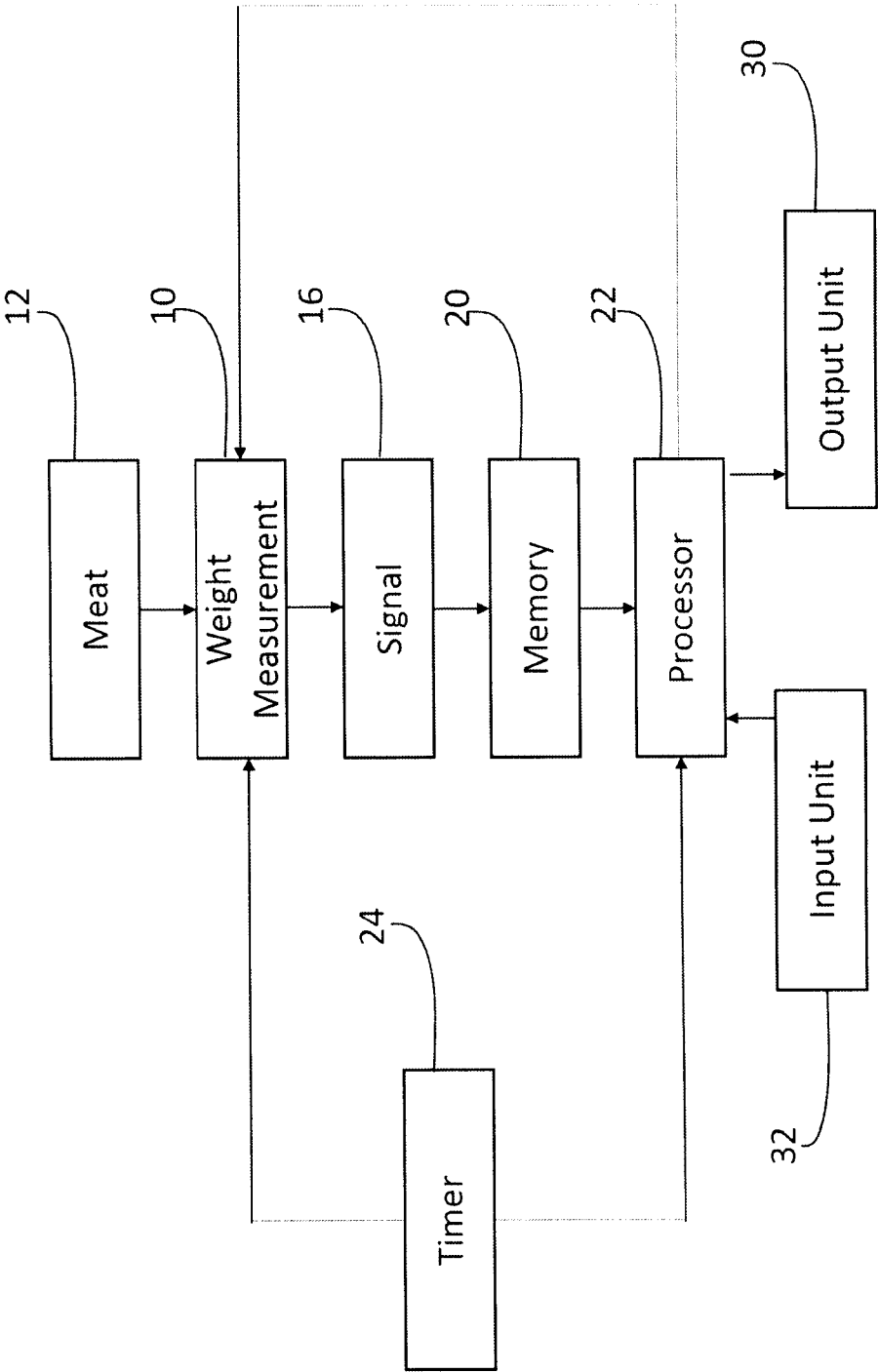


FIGURE 1

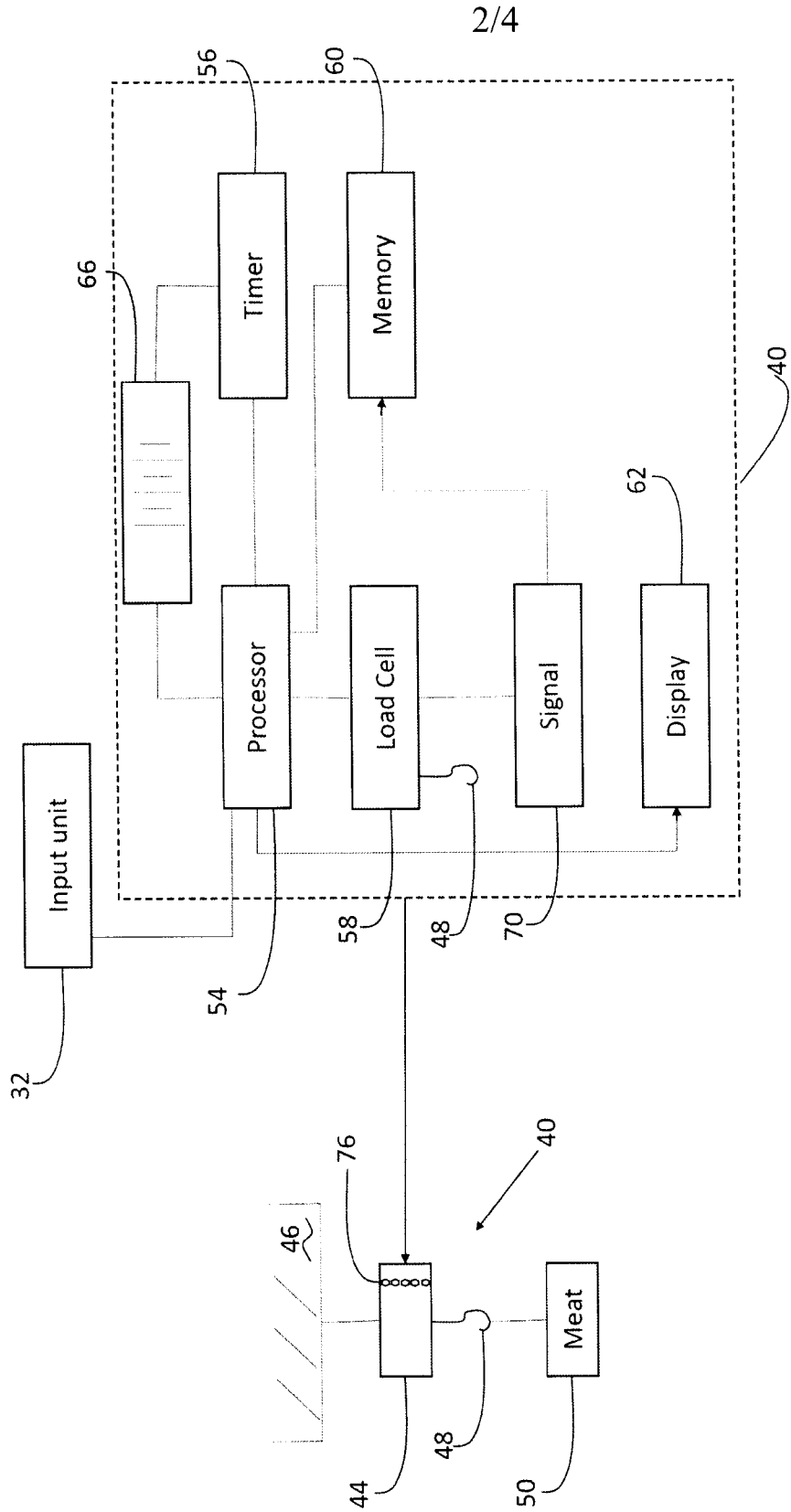


FIGURE 2

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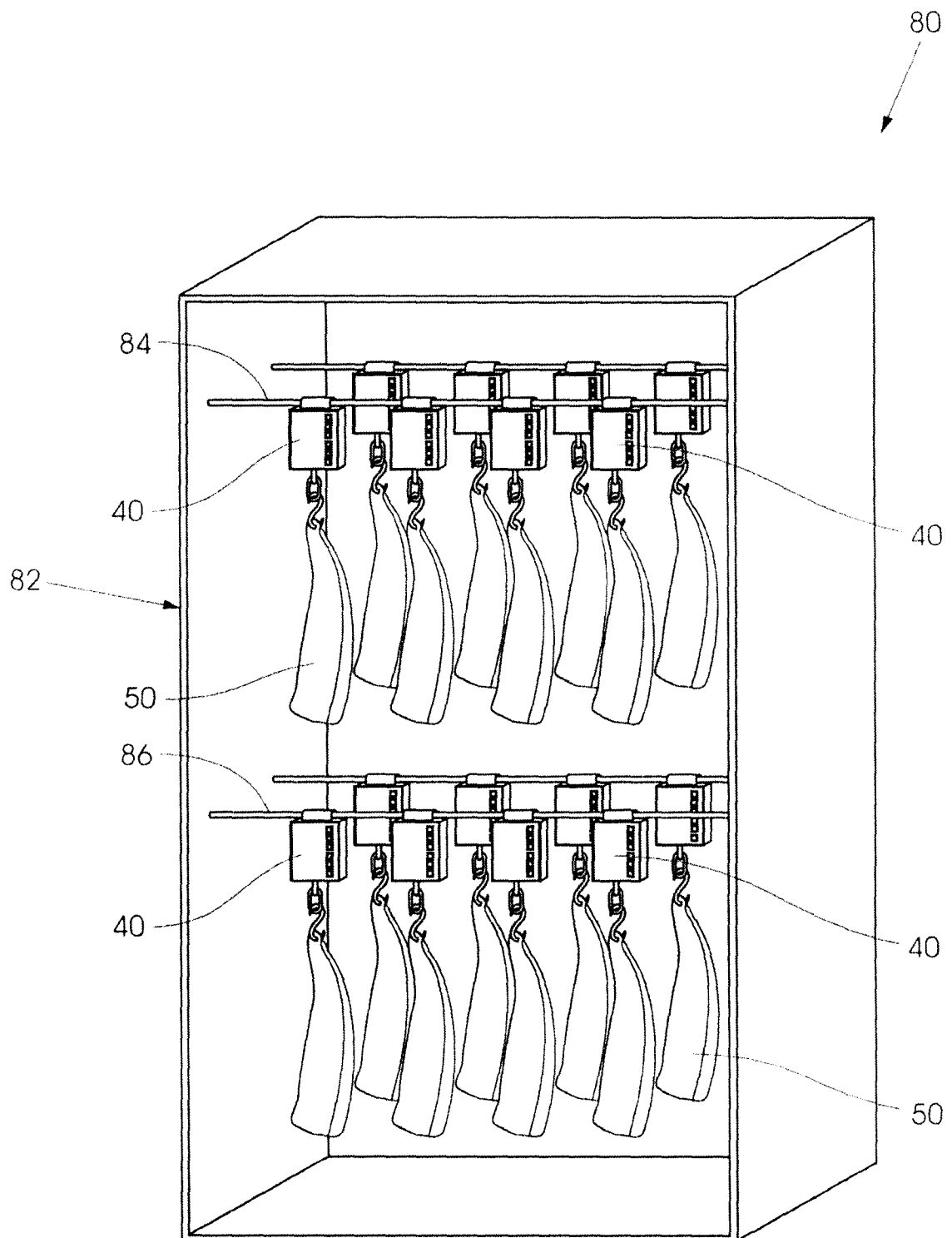
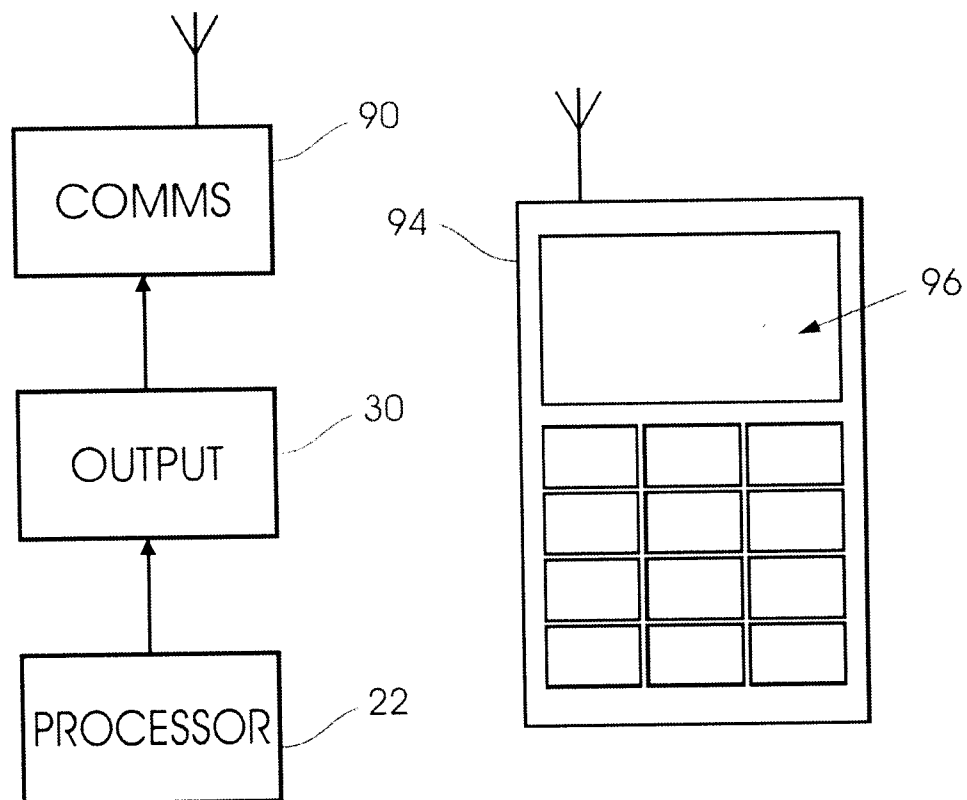


FIGURE 3

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*FIGURE 4*

INTERNATIONAL SEARCH REPORT

International application No
PCT/ZA2020/050014

A. CLASSIFICATION OF SUBJECT MATTER
INV. G01N33/12 G01N5/04
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)
G01N A23B

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.
X	International Standardization Organisation: "ISO 1442 Meat and meat products - Determination of moisture content", 1 February 1997 (1997-02-01), XP055701374, Retrieved from the Internet: URL: http://www.eac-quality.net/fileadmin/eac_quality/user_documents/3_pdf/CD-K-719-2010_Meat_and_meat_products_-_Moisture_content.pdf [retrieved on 2020-06-04] page 2, line 3 - page 3, line 8 -----	1-4,6-8
X	US 4 767 629 A (IGLESIAS MANUEL A [ES] ET AL) 30 August 1988 (1988-08-30) column 4, line 60 - column 9, line 25; figures 2,3 ----- -/-	1-9



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NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 108 302 901 A (GUANGZHOU HUANGSHANGHUANG GROUP CO LTD) 20 July 2018 (2018-07-20) abstract; figure 3 -----	1-9
X	DE 34 03 189 A1 (ALPAS PETER SCHULDT KG [DE]) 26 September 1985 (1985-09-26) page 15, line 11 - page 20, line 8; figure 1 -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/ZA2020/050014

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