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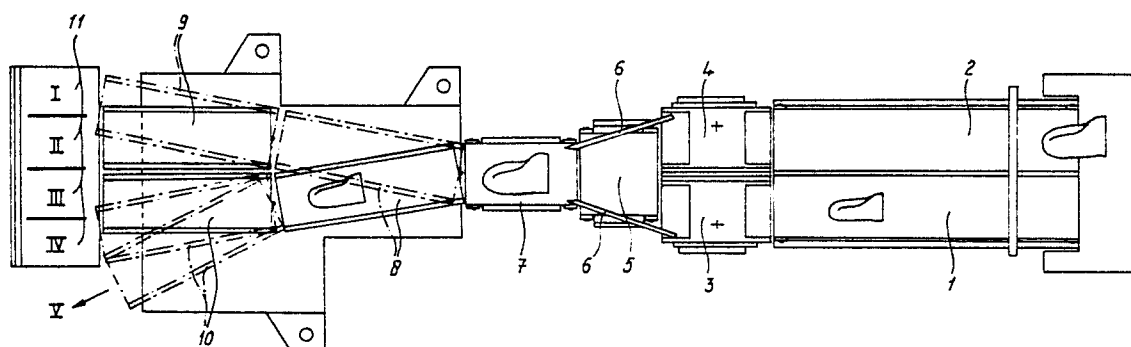
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⑤ Device for sorting pieces of meat.

⑤ For sorting pieces of meat, a sorting device contains a fixed conveyor belt (1, 2) with weighing means (7) and means (3, 4) for measuring the thickness of the fat layer. In the direction of conveyance, a movable conveyor belt (8) is connected to the fixed one, which movable conveyor belt (8) is swung between a number of positions controlled by a computer to which the measurements are fed. At the respective positions of the free end of the movable conveyor belt (8), additional computer-controlled movable conveyor belts (9, 10) are provided.

fig - 1



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Device for sorting pieces of meat.

The present invention relates to a device for sorting pieces of meat, such as middles, comprising a fixed conveyor belt with means for measuring the thickness of the fat layer and means for measuring the weight of the individual pieces.

Such devices are known in the meat-processing industry. The pieces of meat are placed with the fat layer facing down on the conveyor belt, held still at the device for measuring the fat thickness, and a sensor, which is known per se, is subsequently forced into the fat layer from the bottom up through the supporting face. The pieces of meat are then conveyed further for measurement of their weight. On the basis of the measuring results, the pieces of meat are subsequently divided by hand into specific quality grades, ranging from lean to fat.

Such an operation for the sorting of pieces of meat is very labour-intensive and is also difficult for the personnel, who always have to watch both the upper and lower limit of the fat layer and the weight of the pieces of meat for various quality grades. Mistakes are bound to be made, so that pieces of meat can go into the wrong grades.

The object of the invention is therefore to produce a device for sorting pieces of meat, avoiding these disadvantages.

This object is achieved according to the invention in that the device comprises a movable conveyor belt which connects to the fixed conveyor belt in the direction of conveyance, is provided with an operating device, and can be swung between a number of positions, in each of which another receiving element is connected to the movable conveyor belt, and a computer which receives input signals from the thickness measuring means and from the weighing means, and which, on establishing one of a number of quality grades, transmits appropriate output signals to the operating device for the purpose of taking the movable conveyor belt to the position suitable for the piece of meat to which the input signals relate, in which position it connects to the receiving element corresponding to the established quality grade.

With the device according to the invention, a middle lying within certain limits as regards weight and fat layer thickness is now fed to the correct receiving element by the swinging conveyor belt. The intervals between the middles are chosen depending on the speed of conveyance and the swinging speed of the swinging conveyor belt.

The swinging conveyor belt can be designed in various ways. For example, it can be such that it swings in the horizontal and vertical plane, in order to convey the pieces of meat, such as middles, to

receiving elements which are situated adjacent to and/or above each other.

For division into four quality grades, there would then be, for example, two groups of two receiving elements laying above one another.

For division into four quality grades, it is preferable for the device to be designed in such a way according to the invention that it comprises three conveyor belts, each swinging between two positions, the second and third of which connect to the first swinging conveyor belt in its first and second positions respectively, and each of which also has an operating device connected to the computer. Depending on the measured data, the computer now controls the movements of the three conveyor belts. The receiving elements are adjacent to each other in this embodiment and are formed, for example, by roller conveyors over which the sorted middles are conveyed further.

According to another preferred embodiment, the device is designed in such a way that the fixed conveyor belt is double, each part comprising a device for measuring the thickness of the fat layer and in conveyance direction connecting to a conveyor belt part having vertical walls sloping towards each other in said direction, which are above said conveyor belt part and leave open a passage the width of a piece of meat, and behind that is a conveyor belt part with a weighing sensor.

Since the middles always have to be held still for the thickness measurement, the working speed of the whole device is determined by the working pace of the thickness measuring device. If the measuring device with conveyor belt is now made double, the working speed of the sorting device can be increased.

For the discharge of the middles which meet none of the programmed quality standards, the device is, finally designed in such a way that the second or third conveyor belt has a third position.

The invention will now be explained further below with reference to the drawing.

Fig. 1 shows the device according to a preferred embodiment of the invention, in plan view.

Fig. 2 shows a sketch with quality grades for the middles from which bacon is made.

In Fig 1 the device is designed with two fixed conveyor belts 1 and 2, each provided with a device for measuring the thickness of the fat layer 3, 4. These measuring devices are of a known type and contain measuring needles which can move from the bottom up through slits in the supporting face, and which have optical detection means which are pushed into the fat layer lying on the supporting face. During the measurement of the

thickness the middle is therefore stationary, which is achieved by the supporting face being formed by a conveyor belt working at intervals. Connecting to the measuring devices 3 and 4 is a conveyor belt 5 with guide walls 6 slanting towards each other, through which the streams coming from the measuring device are combined to one.

The middles then run over a known weighing conveyor belt 7 with weighing device.

Connecting to the weighing conveyor belt 7 in the direction of conveyance is a first swinging conveyor belt 8, which can be swung, e.g. in the horizontal plane between two positions. A second swinging conveyor belt 9 and a third swinging conveyor belt 10 are placed in both positions of the conveyor belt 8, connecting in each case. The conveyor belts 9 and 10 together have four positions, to each of which further conveyor devices 11 or packing or despatch stations connect for discharge of the sorted middles. The swinging conveyor belts 8, 9 and 10 are controlled depending on the data obtained with the measuring devices 3 and 4 and the weighing device 7. This takes place by means of a computer. This computer contains a number of combinations of fat thickness and weight to each of which a quality standard is allocated. An example of a classification into quality grades, depending on the fat thickness and weight, is given in Fig. 2. The four quality grades I, II, III, IV found therein each correspond to one of the four positions of the conveyor belts 8 and 9. Middles falling outside these standards go into area V, corresponding to the third position of conveyor belt 10 for the discharge of rejected middles.

A middle with a weight of 12.5 kg, but with too low fat thickness of, say, 8 mm goes into area I and is regarded as unsatisfactory in quality.

The computer thus has fed to it the measured value of the thickness of fat layer and the weight, it always compares each combination with the quality standards, and it then controls the conveyor belts.

Claims

1. Device for sorting pieces of meat, such as middles, comprising a fixed conveyor belt with means for measuring the thickness of the fat layer and means for measuring the weight of the individual pieces,
characterized in that the device comprises a movable conveyor belt which connects to the fixed conveyor belt in the direction of conveyance, is provided with an operating device, and can be swung between a number of positions, in each of which another receiving element is connected to the movable conveyor belt, and a computer which receives input signals from the thickness measur-

ing means and from the weighing means, and which, on establishing one of a number of quality grades, transmits appropriate output signals to the operating device for the purpose of taking the movable conveyor belt to the position suitable for the piece of meat to which the input signals relate, in which position it connects to the receiving element corresponding to the established quality grade.

2. Device according to Claim 1, characterized in that it comprises three conveyor belts, each swinging between two positions, the second and third of which connect to the first swinging conveyor belt in its first and second positions respectively, and each of which also has an operating device connected to the computer.

3. Device according to Claim 2, characterized in that the fixed conveyor belt is double, each part comprising a device for measuring the thickness of the fat layer and in conveyance direction connecting to a conveyor belt part having vertical walls sloping towards each other in said direction, which are above said conveyor belt part and leave free a passage the width of a piece of meat, and behind that is a conveyor belt part with a weighing sensor.

4. Device according to Claim 2 or 3, characterized in that the second or third conveyor belt has a third position.

5. Process for operating the device according to one of the preceding claims, characterized in that the computer is provided with memory means in which an allocated quality grade is stored for each possible combination of measured thickness and weight, and during operation the quality grade corresponding to the current thickness and weight data is derived from said memory means for each piece of meat.

fig-1

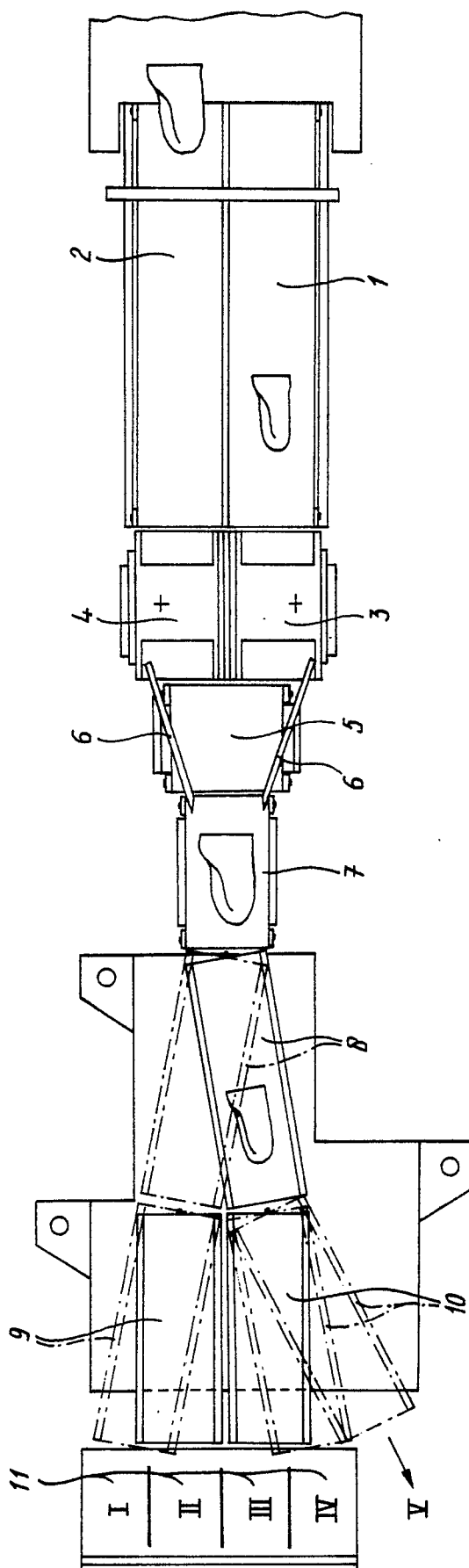
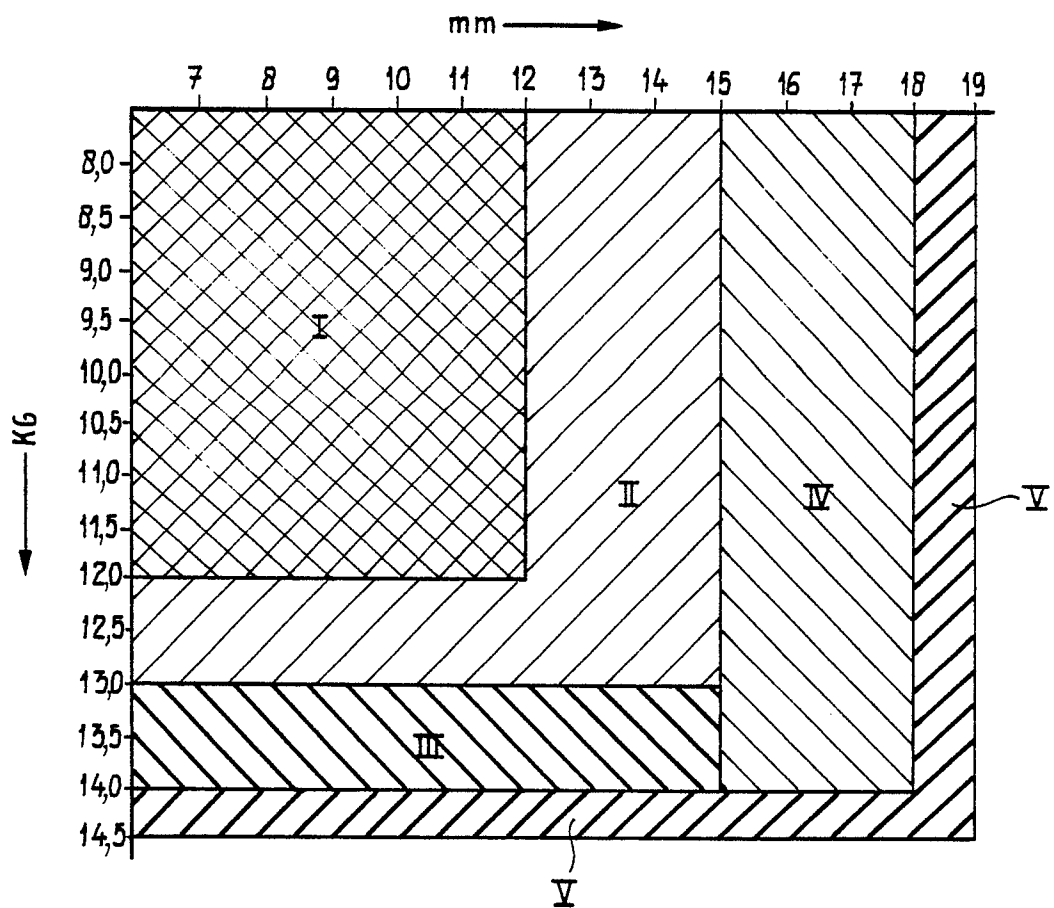


fig - 2





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 20 0464

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	CH-A- 487 054 (ROTHENBACH) * Figures 1,2; column 2, line 25 - column 5, line 20 * ---	1,2,5	B 07 C 5/36
Y	US-A-3 080 033 (SCOTT et al.) * Whole document * ---	1,2,5	
Y	PATENT ABSTRACTS OF JAPAN, vol. 10, no. 30 (P-426)[2087], 5th February 1986; & JP-A-60 181 606 (YOSHIO TAKEMORI) 17-09-1985 * Whole abstract * ---	1,2,5	
A	CA-A-1 152 946 (FLEURY) * Figure 1; page 2, lines 1-33; page 5, line 1 - page 6, line 8 * ---	1,2,5	
A	FR-A-2 530 501 (HORII) * Figures 7,8; page 6, line 31 - page 7, line 28; page 10, line 16 - page 12, line 5 * ---	1,5	
A	DE-A-2 855 913 (SCHMITT) * Figures; page 1 * ---	1,2	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	FR-A-2 226 219 (SHEVINOV) * Page 2, line 26 - page 4, line 19 * ---	1	B 07 C A 22 B
A	US-A-3 661 255 (TOTH) * Figure 1; abstract * -----	1	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 04-07-1988	Examiner FORLEN G.A.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	