

This invention relates to an apparatus for displacing a length of material to be cut into slices in the direction of its longitudinal extent. The apparatus consists of a guide channel and a feed plate, which is matched to the free cross-section of the guide channel. The feed plate is provided with pin-shaped fixing elements which can be driven into an end face of the length of material.

A cutting machine for meat and similar items for consumption, in which magazines rotating about a vertical axis are provided for receiving the material to be cut, is known from NL-A-7 102 408. The material is held firmly by means of a plate matched to the free cross-section of the magazine, wherein sharp pins extending perpendicularly from the plate penetrate the material and prevent it from tilting during the cutting operation. If the material to be cut is to be held sufficiently securely by the pins, the pins have to be made relatively long. If the plate functions as a feed plate the cutting operation then has to be terminated when a relatively large residual piece of material to be cut is still held by the pins, so that their points do not extend into the region of action of a cutting element.

Depending on the nature of the material to be cut, a length of material which consists of meat to be cut into slices, for example, which is moved coaxially through a channel and from which successive slices are cut off in a short temporal sequence by means of rotating cutter vanes, tends to be lifted off from the bottom surface of the channel after each cut, which is made in a sudden manner, and due to this effect is momentarily without guidance. If the next cut is made whilst this situation exists, the length of material is in fact pressed against the bottom surface of the channel again by the cutting force of the cutter vane. However, a previously effected axial displacement of the length of material cannot be carried out accurately, so that slices which are geometrically inaccurate are produced.

In order to hold a length of material consisting of meat at the base of a guide channel, even during the cutting period, and to prevent the length of material from executing oscillating movements thereon which are transmitted overall to the apparatus and which impair the smoothness of running of the latter, it is known that a feed plate, which can be displaced in

the guide channel, which can be pressed against an end face, and which effects the forward feed of the length of material, can be provided with pin-shaped fixing elements which can be driven into the relevant end face of the length of material. The fixing elements, which are bent in the shape of sickles, and which have points pointing downwards towards the base of the guide channel, are mounted in holes in the feed plate and due to this can only be driven into the end face of the length of meat, because the axially displaceable fixing elements are not advanced beyond the plane of the stop plate of the feed plate until after the stop plate is seated firmly against the relevant end face of the length of meat. A residual piece of the length of meat can likewise only be detached from the feed plate by previously moving the fixing elements back into their starting position. Moreover, the sickle-shaped fixing elements result in the formation of relatively large residual pieces of the length of meat, which cannot be processed to form slices, due to which the number of slices which can be obtained from a length of meat may be reduced by up to 10%, depending on the length of the piece of meat. In addition, the coupling of the length of meat to the feed plate and the uncoupling of the residual piece of the length of meat from the feed plate is associated with a relatively high operating cost, which can only be limited to an extent which is still justifiable if the numerous fixing elements on the side of the feed plate remote from the length of meat are attached to each other. By this means, all the fixing elements can be actuated via a handle provided on the means of attachment. The synchronous actuation of all the fixing elements has a serious disadvantage, however. If one of the fixing elements penetrating the end face of the length of meat encounters a piece of bone, for example, all the fixing elements are then prevented from penetrating further into the length of meat, so that the proper fixing of the length of meat can be prevented due to this effect.

The underlying object of the present invention is to construct an apparatus of the type described initially so that a length of material can be securely fixed therein and can be cut substantially free from losses into slices without any operating cost, and so that an unavoidable residual piece of the length of material can also be removed effortlessly.

This object is achieved starting from an apparatus of the type cited in the precharacterising clause of claim 1, which according to the invention comprises the features cited in the characterising clause of the same.

Due to the rigid arrangement of the fixing elements on the feed plate according to the invention, their actuation is dispensed with. Moreover, the rigid arrangement of the fixing elements is less expensive in terms of the manufacture and maintenance of such an apparatus compared with an apparatus with movably mounted fixing elements. The rigid arrangement of the fixing elements is made possible by their alignment according to the invention sloping at an angle $< 90^\circ$ to the plane of the feed plate, wherein the points of the fixing elements point towards the base of the channel. In particular, if the feed plate with the fixing elements is pressed against the end face of a length of material, the points of the fixing elements penetrate the length of material and fix the latter more intensively the more the length of material tends to rear up and lift off from the base of the channel. In this respect the fixing elements behave like barbs, wherein a particularly great depth of penetration into the material does not occur, since a sliding movement of the end face of the length of material over the supporting surface of the feed plate is completely ruled out by the fixing elements. Even an end face of the length of material which is not seated fully against the feed plate does not prevent the length of material from being securely held in the guide channel. On the other hand, a residual piece of the length of material can automatically be detached from the fixing elements on pulling back the feed plate, because the small residual piece, which in general is not supported by the base of the guide channel, is pulled towards the base due to the force of gravity and can fall freely from the fixing pins.

According to one embodiment of the invention, each fixing element is formed from a triangular tongue with a tongue root which is likewise triangular and is punched in this form from the material of the feed plate, wherein the fixing element is provided with a crease which forms it into the shape of a spear tip in the longitudinal direction.

By means of this form of construction the fixing elements can be manufactured in a simple manner from the material of the feed plate without additional expenditure on material, and have a high bending resistance moment, even if they are of very narrow construction.

Tests in which numerous lengths of meat of different natures were employed have shown that the fixing elements perform their function particularly optimally if each tongue is bent out of the plane of the feed plate until the angle between the longitudinal edges of the tongue and

the plane of the feed plate is 30° . In this connection it has been found that the length of each tongue may amount to 15 mm as far as the tongue root and 22 mm including the tongue root in order to obtain good fixing.

According to other embodiments of the invention, the tongues are arranged in uniformly distributed rows over the face of the feed plate, the tongues of one row preferably being disposed offset in relation to the tongues in adjacent rows by half the distance of the tongues from each other.

This form of construction results in a uniformly distributed engagement of the fixing elements over the end face of a length of material, by means of which the length of material can be securely held within the guide channel.

An embodiment of an apparatus according to the invention is described in more detail below and illustrated in the drawings, where:

Figure 1 is a side view of the apparatus;

Figure 2 is a plan view of the apparatus;

Figure 3 is a horizontal projection of the apparatus;

Figure 4 is a horizontal projection of a fixing element;

Figure 5 is a plan view of the fixing element; and

Figure 6 is a section through the fixing element along the line VI - VI of Figure 5.

The apparatus essentially consists of a feed plate 1 which is mounted so that it can be displaced in relation to its longitudinal extent in a guide channel 2, in order to advance a length of meat 3 in strokes, for example, so that slices can be cut from it by means of a

cutter 4. A drive arm 5 attached to the back of the feed plate 1 is provided with a guide bushing 6 which can be displaced via a spindle 7 disposed parallel to the guide channel 2.

The side of the feed plate 1 facing the length of meat 3 is equipped with fixing elements 8, which are disposed sloping at an angle of 30° towards the plane of the feed plate 1 so that the point 9 of each fixing element 8 points towards the base of the channel 2.

Each fixing element 8 is formed from a triangular tongue 10 with a tongue root 11 which is likewise triangular, and is punched out of the material of the feed plate 1. The fixing element 8 is provided in its longitudinal direction with a crease 12, by means of which the side of the fixing element 8 facing the length of meat 3 is given the shape of the tip of a spear.

When the cutter 4 is guided transversely through the length of meat 3 in the direction of the arrow 14 after a forward feed movement of the length of meat 3, the end of the latter facing the feed plate 1 tends to rear up. The fixing elements 8, which in this respect increasingly penetrate the length of meat 3, prevent this. After the last slice has been cut from a residue of the length of meat 3, the fixing elements also make it possible for the length of meat to fall out of the fixing elements as a result of the force of gravity acting on it when the feed plate 1 is pulled back.



Claims:

1. An apparatus for displacing a length of material (3) to be cut into slices in the direction of its longitudinal extent, consisting of a guide channel (2) and a feed plate (1), which is matched to the free cross-section of the latter, and which is provided with pin-shaped fixing elements (8) which can be driven into an end face of the length of material (3), characterised in that the centre line of each fixing element (8) rigidly attached to the feed plate (1) is aligned sloping at an angle $< 90^\circ$ to the plane of the feed plate (1) and the point (9) of the fixing element (8) points towards the base of the guide channel (2).
2. An apparatus according to claim 1, characterised in that each fixing element (8) is formed from a triangular tongue (10) with a tongue root (11) which is likewise triangular and is punched in this form from the material of the feed plate (1), wherein the fixing element (8) is provided with a crease (12) which forms it into the shape of a spear tip in the longitudinal direction.
3. An apparatus according to claim 1 and 2, characterised in that each fixing element (8) is bent out of the plane of the feed plate (1) until the angle between the longitudinal edges of the tongue (10) and the plane of the feed plate (1) is 30° .
4. An apparatus according to at least one of claims 1 to 3, characterised in that the length of each fixing element (8) is 15 mm as far as the tongue root and 22 mm including the tongue root.
5. An apparatus according to at least one of claims 1 to 4, characterised in that the fixing elements (8) are arranged in uniformly distributed rows over the face of the feed plate (1).
6. An apparatus according to at least one of claims 1 to 5, characterised in that the fixing elements (8) of one row are disposed offset in relation to the fixing elements



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(8) in adjacent rows by half the distance of the fixing elements (8) from each other.