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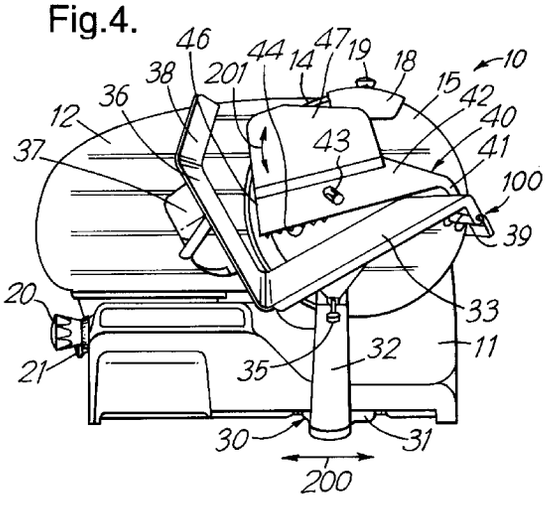
(54) Safety device for an electric food slicer.

(57) The invention concerns an electric slicer of the gravity ham-slicer type, comprising a frame (11), a circular blade (14) driven by an electric motor, an inclined support plate (12), and a mobile carrier (30) consisting of an inclined support base (33) equipped, on one side, with a support rim (36) and, on the other side, with a pivoting pusher-plate (40), mounted to be able to slide freely on its shaft (39) between two associated stops.

The electric slicer (10) includes a safety device (100) associated with the pusher-plate (40) to prevent slicing in the event of excessive raising of this pusher-plate, the said device being functionally linked to the electric motor driving the blade to cut out this motor as soon as the pusher-plate (40) is pivoted through an angle exceeding a pre-determined threshold value, from its rest position on the support base (33), whatever the axial position of the said pusher-plate (40) on its shaft (39).

Fig.4.



EP 0 635 341 A1

The present invention concerns electric food slicers, and more especially electric slicers of the gravity ham-slicer type.

This type of equipment is generally used in delicatessens or butchers shops of all sizes, for cutting into slices products such as hams, meats, sausages, saveloys, etc.

The state of the art is illustrated for example by Patent Applications EP-A-0 115787, FR-A-2 249 749, EP-A-0 149 473, EP-A-0 115 788, EP-A-0 115 785, EP-A-0 248 354, EP-A-0 1 16 294.

Conventional slicers comprise a frame, a circular blade with an inclined axis and with the blade covered by a blade-cover plate allowing only a part of the cutting edge to appear and an electric motor for driving the blade. An inclined support plate is in addition mounted on the slicer frame, being directly adjacent to the cutting edge of the blade; this support plate is generally adjustable in position perpendicular to its plane by an associated adjuster which the user operates to obtain the desired slice thickness. A mobile carrier is finally mounted on the frame so that it can be moved manually in a direction which is parallel to the plane of the blade, this carrier being generally composed of an inclined support base equipped, on one side, with a support rim, and on the other side, with a pivoting pusher-plate, mounted to be able to slide freely on its shaft between two associated stops.

The product to be cut is thus held in a V-shaped chute (formed by the support base and the support rim of the mobile carrier), which is inclined towards the support plate and the blade-cover plate against which the product to be cut naturally rests, in accordance with the name "gravity ham-slicer". The manual movement of the mobile carrier then allows the product to be sliced over its whole width, the slice falling onto a delivery plate on the frame, the user performing as many forward and return operations as slices one required.

When the product to be cut is presented in the form of a large block (meat or ham, for example), the user uses the pusher-plate, of which the active face has spikes preventing any unintended sliding of the product during slicing. After placing the block to be cut on the support base, against the support rim, the block is pushed against the inclined support plate (often called meat-carrying plate), the pusher-plate is then lowered (which was raised for placing the block), and pushed against the block: all these operations must be performed before starting the motor driving the circular blade.

On the other hand, when the product to be cut is long (sausages or saveloys, for example), the user must lower the pusher-plate onto the product, the lower edge of the pusher-plate having anchoring spikes for this purpose. The traditional expression pusher-plate is kept, although on this occasion it does not push directly on the heel of the product to be cut. However, it may happen that the user prefers not to lower the push-plate, in order to operate faster by pushing the product by hand, with the pusher-plate raised. It is obvious that such a manoeuvre is dangerous for the user, despite the mechanical protection already present (protective hand-guard on support rim, cutter-cover plate).

The invention aims at solving this problem, by designing a means which obliges the user to use the pusher-plate systematically, so that it ensures that in all circumstances it provides both its function of mechanical pusher and its function of safety device.

The purpose of the invention is thus to produce an electric slicer on which the pusher-plate has to be used, in order to confer an extra degree of safety in handling the device.

According to the present invention there is provided an electric slicer of the gravity ham-slicer type, comprising a frame, a circular blade with inclined axis and with the blade covered by a cutter-cover plate allowing only a part of the cutting edge to appear, an electric motor for driving the blade, an inclined support plate mounted on the frame being directly adjacent to the cutting edge of the blade, the support plate being adjustable in position perpendicular to its plane by an associated adjusting device for obtaining the desired slice thickness, a mobile carrier mounted on the frame so that it can be moved manually in a direction parallel to the plane of the blade, the carrier being composed of an inclined support base equipped, on one side, with a support rim, and on the other side, with a pivoting pusher-plate, mounted to be able to slide freely on its shaft between two associated stops, characterised in that it incorporates a safety device (100) associated with the pusher-plate (40) to prevent slicing in the event of excessive raising of this pusher-plate, the device being functionally linked to the electric motor (17) driving the circular blade (14) to remove power from this motor as soon as the pusher-plate (40) is pivoted through an angle exceeding a pre-determined threshold value, from its rest position on the support base (33) of the mobile carrier (30), whatever the axial position of the pusher-plate on its shaft (39).

Preferably the safety device consists of a proximity detector linked electrically to the supply circuit of the motor driving the circular cutter, the said proximity detector consisting of a sensor integral with the pusher-plate and a long actuator integral with the mobile carrier, the said target extending in a direction which is parallel to the pivot shaft of the pusher-plate being positioned so as to be able to be detected by the said sensor as long as the angle of pivot of the pusher-plate is less than the said pre-determined value.

According to a first possible method of implementation, the proximity detector consists of a sensor mounted on the articulation arm of the pusher-plate,

near the pivot shaft of the said pusher-plate, and of an actuator consisting of a bar mounted on the support base of the mobile carrier being adjacent to the shaft, the bar being fitted so that the distance between its upper and lower longitudinal edges defines the angular range of the pusher-plate in which the electric motor can be powered.

Advantageously the sensor is of the inductive type, and it is totally incorporated in the articulation arm of the pusher-plate, and the bar being a flat angle bar positioned angularly by its two end flaps, the angular setting of this angle bar being adjustable.

According to a second method of implementation, the proximity detector consists of a sensor mounted on the active arm of the pusher-plate, near the end edge of the arm, and of a band mounted on the support rim of the mobile carrier, the band being fitted so that the distance between its upper and lower longitudinal edges defines the angular range of the pusher-plate in which the electric motor can be powered. In particular, the sensor is of the capacitive type, and the band is a flat magnetized band.

According to a third method of implementation, the proximity detector consists of a sensor mounted on the articulation arm of the pusher-plate, near the pivot shaft of the pusher-plate, and of a band mounted on this pivot shaft, the band being fitted so that the circumferential distance between its two longitudinal edges defines the angular range of the pusher-plate in which the electric motor can be powered.

When an electric slicer has in addition at least one other electrical or electro-mechanical safety device provided to cut out the electric motor, it is advantageous for the safety device associated with the pivoting of the pusher-plate to be mounted in series with this or these other safety device(s).

Other characteristics and advantages of the invention will appear more clearly in the light of the description which follows and the attached drawings, concerning a particular method of implementation, with reference to the figures where:

Figures 1 and 2 illustrate two electric slicers, of very similar structure, equipped with a safety device conforming with the invention;

Figure 3 is a partial view showing the pusher-plate in two angular positions which define the angular range in which the electric motor can be powered, the broken-line position corresponding to the largest long product to be cut;

Figures 4 and 5 illustrate in perspective such an electric slicer, of which the pusher-plate is respectively partially raised (maximum authorized pivoting position in operation), and totally raised;

Figure 6 is an electrical diagram showing the series fitting of the safety device according to the invention and of another electrical safety device (for example associated with a mobile sharpener mounted on the support plate);

Figures 7a, 8a, 9a illustrate in perspective three different implementations of a safety device conforming to the invention, and Figures 7b, 8b, 9b are respective diagrams illustrating the respective operating principle of each of these devices.

Figure 1 shows an electric slicer 10, of the gravity ham-slicer type, comprising a frame 11 supporting a circular blade 14 with inclined axis, and with the blade covered by a blade-cover plate 15, integral with this frame, so as to allow only a part of the cutting edge of the blade to appear. An electric motor (not visible on the figure) drives the blade 14. A support plate 12, generally called a meat-carrying plate, is mounted on the frame 11, being directly adjacent to the cutting edge of the blade 14, this support plate being adjustable in position perpendicular to its plane (guide rods 13 are provided for this purpose to maintain the precision of guiding), by an associated slice adjuster 20, which the user can manipulate to obtain the desired slice thickness during operation of the electric slicer.

A mobile carrier 30 is in addition mounted on the frame 11 of the slicer, and can be moved manually in a direction represented by the arrow 200, which is parallel to the plane of the circular blade 14. The mobile carrier 30 has on the underside a support stirrup 31 which slides on associated rods and/or guides fitted on the underside under the frame (not shown), which stirrup is surmounted by a support column 32 carrying an inclined support base 33 which is equipped, on one side, with a support 36 and, on the other side, with a pivoting pusher-plate 40, mounted to be able to slide freely on its shaft 39 between two associated stops. In Figure 1, it is shown that the support 36 is itself equipped with a complementary protection plate 37 essentially parallel to the support plate 12. The support column 32 is surmounted by a rod 34 on which the support base 33 is mounted, the said rod having an operating handle 35 allowing the mobile carrier 30 to be moved manually in the direction of arrow 200. The support base 33 and the support 36 form, in a totally traditional manner, a V-shaped chute holding the product to be cut (not shown in the figure). When the product is placed on the support base 33, it naturally rests against the blade-cover plate 15, in accordance with the name of a slicer of the gravity ham-slicer type.

The pusher-plate 40, intended to ensure simultaneously a function of mechanical pusher and safety device, comprises an arm 41 fitted to slide freely on a shaft 39 carried by the support base 33 of the mobile carrier, and an active arm 42 of which the lower edge 44 has anchoring spikes. The end edge 46 of the active arm 42 of the pusher-plate 40 also bears an operating handle 43. The double arrow 201 represents the rotation of the pusher-plate about its shaft 39, while the double arrow 202 represents the free sliding of the pusher-plate 40 on the shaft, between two associated stops. Figure 1 also shows an oper-

ating switch 21, and a warning light 22 which is illuminated when the motor is actually driving the circular blade 14. The support plate 12 in addition has a sharpening device 18 surmounted by an operating handle 19: such a device, in the form of a stirrup straddling the edge of the support plate 12, is equipped with a grinding wheel and a sharpening wheel, and it can take two different positions pivoting 180 degrees about its shaft which is parallel to the support plate 12. In normal operating position, the two wheels of the sharpening device 18 are behind the support plate, so that the arm of the stirrup passing near the cutting edge of the circular cutter 14 acts as a mechanical protection device, while in the sharpening position, the two wheels come into contact with the cutting edge of the circular cutter.

The electric slicer 10 has a safety device 100 associated with the pusher-plate 40 to prevent slicing in the event of excessive raising of the pusher-plate, the device 100 being functionally linked to the electric motor driving the circular blade 14 to cut out this motor as soon as the pusher-plate 40 is pivoted through an angle exceeding a pre-determined threshold value, from its rest position on the support base 33 of the mobile carrier 30, whatever the axial position of the pusher-plate on its shaft 39.

As will be seen later, the safety device can have various structural means of ensuring this supplementary safety function.

Figure 2 shows an alternative form of electric slicer 10 analogous to that of Figure 1, the modification being essentially related to the shape of the frame 11. The slicer is also viewed in a different direction allowing a view of the rear of this frame, reference 16, which serves as a cover external to the electric motor 17 driving the blade 14, and as a support for a sharpening device 18 which can be operated by its handle 19. A platform 23 is also provided to receive slices falling under the support plate 12. As regards the mobile carrier, a support rim 36 is shown here surmounted by a plate 38 forming a protective hand-guard. This figure also shows the active face 45 of the arm 41 of the pusher-plate 40, and this active face 45 has anchoring spikes, as is well-known in the art.

The schematic view in Figure 3 allows a better appreciation of the general way what this invention seeks to protect. This figure shows the pusher-plate 40 illustrated firstly in a continuous line, in a rest position on the support base 33 and, secondly, in a broken line, in a slightly raised position. In the lower position, the pusher-plate 40 rests on its lower edge 44 having anchoring spikes on, the upper face of the support base 33. In accordance with the present invention, the intention is to oblige the user to use the pusher-plate 40, in other words to prevent the operation of the slicer when this pusher-plate is raised beyond a pre-determined angle.

Figure 3 illustrates a pivot angle α_o corresponding precisely to this pre-determined threshold value of pivot of the pusher-plate 40, this angle corresponding to a height h_o at the end of the lower edge 44 of the pusher-plate. In practice, the pre-determined threshold value α_o will be chosen so that the associated height h_o corresponds to the diameter of the largest long product cut (sausage, chitterlings, saveloy). In this way, it is ensured that the user will actually use the pusher-plate 40 when cutting this type of long product, and not a large block such as a block of meat or ham. As a result of the dependence on the angular position of the pusher-plate, the motor driving the circular blade is automatically cut out if the dimension h at the end of the pusher-plate exceeds the value h_o. The user then has no other choice, when cutting such a long product, than to lower the pusher-plate 40 onto this product, which allows the dual function of the pusher-plate to be preserved, both as a mechanical pusher and as a safety device. For guidance, for long products corresponding to those found in delicatessens, the threshold value h_o will be of the order of 8 cm, which corresponds, for the sizing usually found with such electric slicers, to a threshold angle α_o of about 18 degrees.

Figures 4 and 5 provide further view of such an electric slicer, where the pusher-plate 40 is respectively partly raised (the pivot angle corresponding to the pre-quoted threshold value), and totally raised.

Figure 4 shows additionally a supplementary protective plate 47 carried by the active arm 42 of the pusher-plate 40. In general, the position of maximum lift, illustrated in Figure 5, is limited by a stop (not shown) provided as a projecting pin on the end of the articulation arm 41 of the pusher-plate. The angular clearance of the pusher-plate is in general around 120 degrees. In Figure 4, part of the safety device 100 is seen, conforming to a method of implementation further illustrated in Figure 7a which will be described later in more detail.

Figure 3 showed the mechanical principle of the safety device. Figure 6 will illustrate the electrical circuit associated with the motor driving the circular blade.

The electrical circuit 50 serves to provide power to the motor 17 driving the blade, as well as the warning light 22 serving as an operating light. A contactor relay 51 is provided, connecting power to the motor 17 and to the warning light 22 from a mains socket 52 and a switch 21. One branch 55 of the circuit is connected to the safety device 100, and includes a fuse 54 and a cut-out device 60. The figure also shows the case where the electric slicer includes in addition at least one other electrical or electro-mechanical safety device, in the form of another cut-out 53, which is for example associated with the sharpening device 18 mentioned above. A safety device linked to the sharpening device is usually provided, so that, when the user grabs the handle 19 to pull and turn the sharp-

ening device through 180 degrees, the motor driving the blade is automatically cut out. It is be advantageous to provide, as illustrated in Figure 6, for the safety device to be mounted in series with this or these other supplementary electrical or electromechanical safety device(s). In this way, it is sufficient for one of these safety devices to be activated in order to cut off the supply to the electric motor 17 automatically.

In accordance with a particularly advantageous method of implementation of the invention, the safety device 100 consists of a proximity detector linked electrically to the power supply circuit of the motor 17 driving the circular cutter 14, this detector consisting of a sensor integral with the pusher-plate 40 and of a long actuator integral with the mobile carrier 30, the actuator extending in a direction which is parallel to the pivot shaft 39 of the pusher-plate 40 being positioned so as to be able to be detected by the sensor as soon as the pivot angle of the pusher-plate 40 is less than the pre-determined pivot value.

Figure 7a shows the support base 33 of the mobile carrier 30, with its fixing bars 33.1, and its pusher-plate 40 sliding freely on the associated shaft 39. The safety device 100 is then made up of a proximity detector 110 consisting of a sensor 111 mounted on the articulation arm 41 of the pusher-plate 40, near the pivot shaft 39 of the pusher-plate, and of an actuator consisting of a bar 112 mounted on the support base 33 of the mobile carrier adjacent to the shaft.

In the embodiment shown, the sensor 111 is of the inductive type, and it is totally incorporated in the articulation arm 41. This presents the advantage of optimum protection for the sensor, which allows the pusher-plate to be cleaned easily without risk of interfering with the operation of the safety device. The bar 112 is formed of an angle bar, held by its two ends 113, the angular setting of the bar being fixed or possibly adjustable. The diagram in Figure 7b shows the sensor 111 in a rest position (continuous line) and in a raised position corresponding to the pre-determined pivot threshold α_o (illustrated by the broken line). The principal direction of the sensor is noted x1 and x2 in these two positions, and it can be seen that the bar 112 is fitted so that the distance between its upper 114 and lower 115 longitudinal edges defines the angular range of the pusher-plate 40 in which the electric motor can be powered.

In Figure 8a, the safety device 100 consists of a proximity detector 120, which consists of a sensor 121 mounted on the active arm 42 of the pusher-plate 40, near the edge 46 of this arm, and of a band 122 mounted on the support 36 of the mobile carrier. The operation is shown more clearly in the diagram in Figure 8b, the band 122 being fitted so that the distance between its upper 124 and lower 125 longitudinal edges defines the angular range of the pusher-plate 40 in which the electric motor can be powered. The sensor 121 will for preference be mounted on the rear face of the pusher-plate, so as not to risk being touched by the product which is being cut. The sensor 121 can then be of the inductive type, and the band 122 can then be a flat magnetized band glued on the support rim 36. This method of implementation appears simpler than the preceding one, but it does however have the disadvantage of not being able to avoid contact between the product to be cut and the flat band 122 when a block product is being cut.

In Figure 9a, the safety device 100 consists of a proximity detector 130, which is composed of a sensor 131 mounted on the articulation arm 41 of the pusher-plate 40, near the pivot shaft 39 of the said pusher-plate, and of a band 132 mounted on this pivot shaft 39. As for the first variant described, the sensor 131 is totally incorporated in the articulation arm 41 of the pusher-plate 40. The band 132 is a curved band which can be glued or soldered onto the pivot shaft 39. The operating principle is shown in the diagram in Figure 9b, the band 132 being fitted so that the circumferential distance between its two longitudinal edges 134, 135 defines the angular range of the pusher-plate 40 in which the electric motor 17 can be powered. In particular, provision can be made for the band 132 to be a magnetized band, the sensor 131 being of the inductive type.

In general it will be advantageous to provide for the electrical circuit to involve the need to press the start/stop button 21 again in the event of tripping of the safety device associated with the pusher-plate, this resulting for example from a cut in the power to the relay. This constraint thus allows the user to be reminded that he must without fail use the pusher-plate at all times.

A means has been produced which obliges the user to make systematic use of the pusher-plate, in order that the pusher-plate in all circumstances ensures both its function of mechanical pusher and its function of safety device. The electric slicer thus implemented includes a pusher-plate which must compulsorily be used, in order to confer an extra degree of safety in the operation of the equipment. It is possible to equip an existing electric slicer with this safety device without having to make major alterations.

The invention is not limited to the methods of implementation which have just been described, but encompasses on the contrary any variant taking in, with equivalent means, the essential characteristics described above.

Claims

1. Electric slicer of the gravity ham-slicer type, comprising a frame, a circular blade with inclined axis and with the blade covered by a cutter-cover plate allowing only a part of the cutting edge to

appear, an electric motor for driving the blade, an inclined support plate mounted on the frame being directly adjacent to the cutting edge of the blade, the support plate being adjustable in position perpendicular to its plane by an associated adjusting device for obtaining the desired slice thickness, a mobile carrier mounted on the frame so that it can be moved manually in a direction parallel to the plane of the blade, the carrier being composed of an inclined support base equipped, on one side, with a support rim, and on the other side, with a pivoting pusher-plate, mounted to be able to slide freely on its shaft between two associated stops, characterised in that it incorporates a safety device (100) associated with the pusher-plate (40) to prevent slicing in the event of excessive raising of this pusher-plate, the device being functionally linked to the electric motor (17) driving the circular blade (14) to remove power from this motor as soon as the pusher-plate (40) is pivoted through an angle exceeding a pre-determined threshold value, from its rest position on the support base (33) of the mobile carrier (30), whatever the axial position of the said pusher-plate on its shaft (39).

2. Electric slicer according to claim 1, characterised in that the safety device (100) consists of a proximity detector (110; 120; 130) connected electrically to the supply circuit of the motor (17) driving the circular blade (14), the proximity detector comprising a sensor (111; 121; 131) integral with the pusher-plate (40) and a long actuator (112; 122; 132) integral with the mobile carrier (30), the target extending in a direction which is parallel to the pivot shaft (39) of the pusher-plate (40) and being positioned so as to be able to be detected by the sensor as soon as the pivot angle of the pusher-plate is less than the pre-determined value.

3. Electric slicer according to claim 2, characterised in that the proximity detector (110) consists of a sensor (111) mounted on the articulation arm (41) of the pusher-plate (40), near the pivot shaft (39) of the pusher-plate, and of an actuator consisting of a bar (112) mounted on the support base (33) of the mobile carrier being adjacent to the shaft, the bar being fitted so that the distance between its upper and lower longitudinal edges defines the angular range of the pusher-plate in which the electric motor (17) can be powered.

4. Electric slicer according to claim 3, characterised in that the sensor (111) is of the inductive type, and it is totally incorporated in the articulation arm (41) of the pusher-plate (40).

5. Electric slicer according to claim 3 or claim 4, characterised in that the bar (112) is a flat angle bar positioned angularly by its two end flaps (113), the angular setting of this flat angle bar being adjustable.

6. Electric slicer according to claim 2, characterised in that the proximity detector (120) consists of a sensor (121) mounted on the active arm (42) of the pusher-plate (40), near the end edge (46) of the arm, and of a band (122) mounted on the support rim (36) of the mobile carrier, the band being fitted so that the distance between its upper and lower longitudinal edges defines the angular range of the pusher-plate (40) in which the electric motor (17) can be powered.

7. Electric slicer according to claim 6, characterised in that the sensor (121) is of the inductive type, and the band (122) is a flat magnetized band.

8. Electric slicer according to claim 2, characterised in that the proximity detector (130) consists of a sensor (131) mounted on the articulation arm (41) of the pusher-plate (40), near the pivot shaft (39) of the pusher-plate, and of a band (132) mounted on this pivot shaft (39), the band being fitted so that the circumferential distance between its two longitudinal edges defines the angular range of the pusher-plate (40) in which the electric motor (17) can be powered.

9. Electric slicer according to claim 8, characterised in that the sensor (131) is of the inductive type, and it is totally incorporated in the articulation arm (41) of the pusher-plate (40).

10. Electric slicer according to claim 8 or claim 9, characterised in that the band (132) is a curved magnetized band.

11. Electric slicer according to one of the claims 1 to 10, including in addition at least one other electrical or electro-mechanical safety device (53) fitted to cut out the electric motor (17), characterised in that the safety device (100) is mounted in series with this or these other safety device(s).

Fig.1.

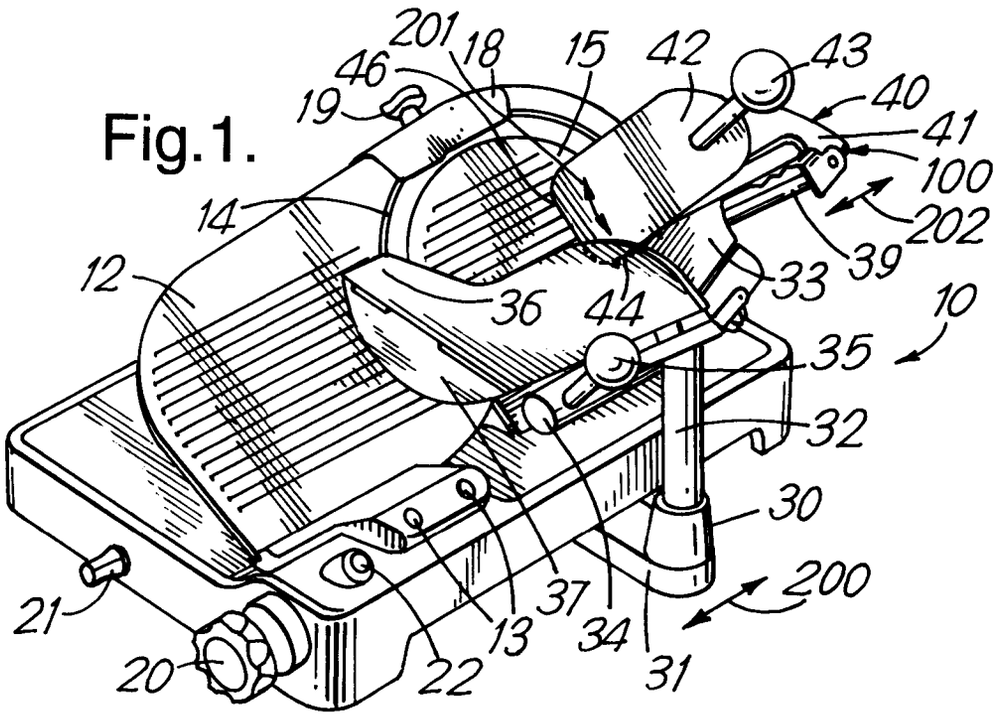

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Fig.2.

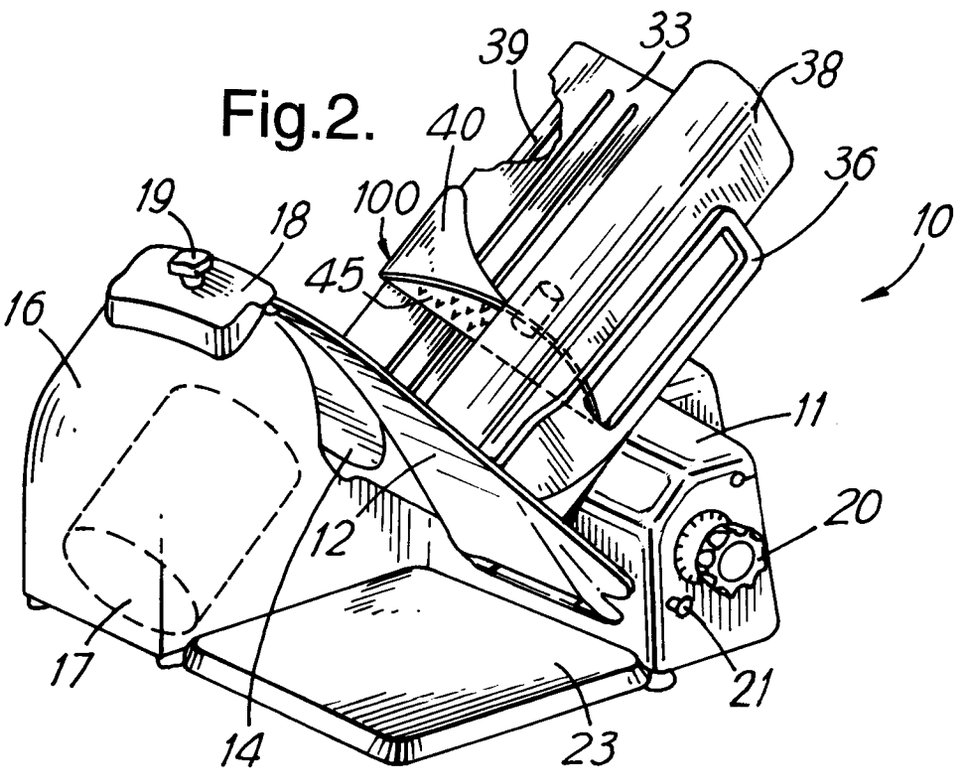
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Fig.3.

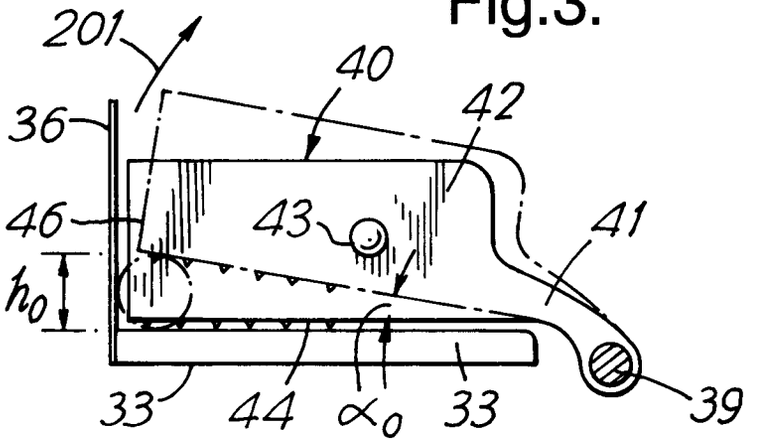
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Fig.4.

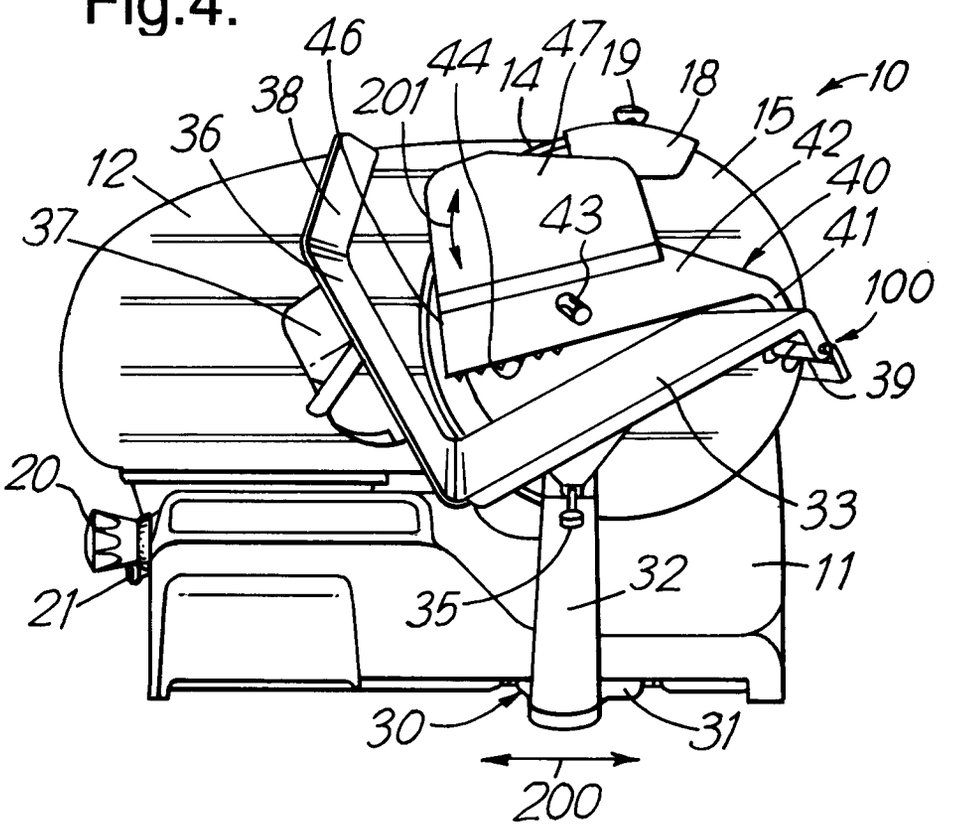
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Fig.5.

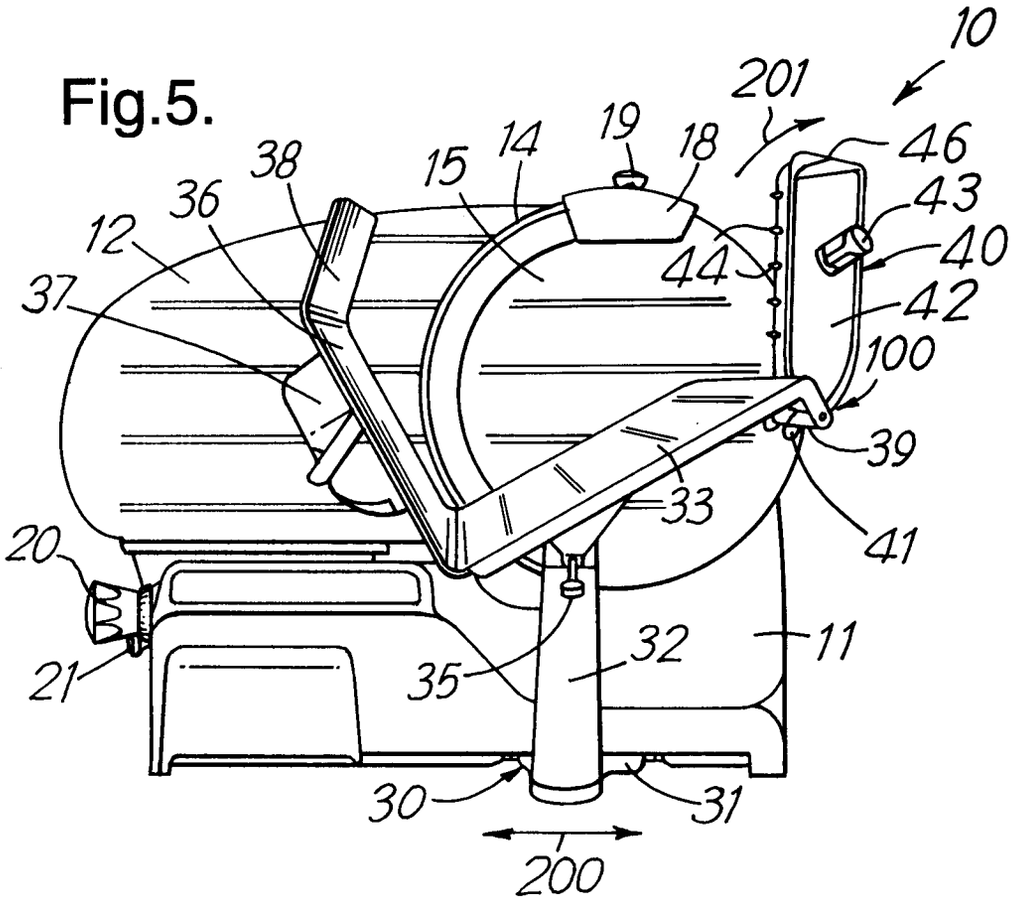
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Fig.6.

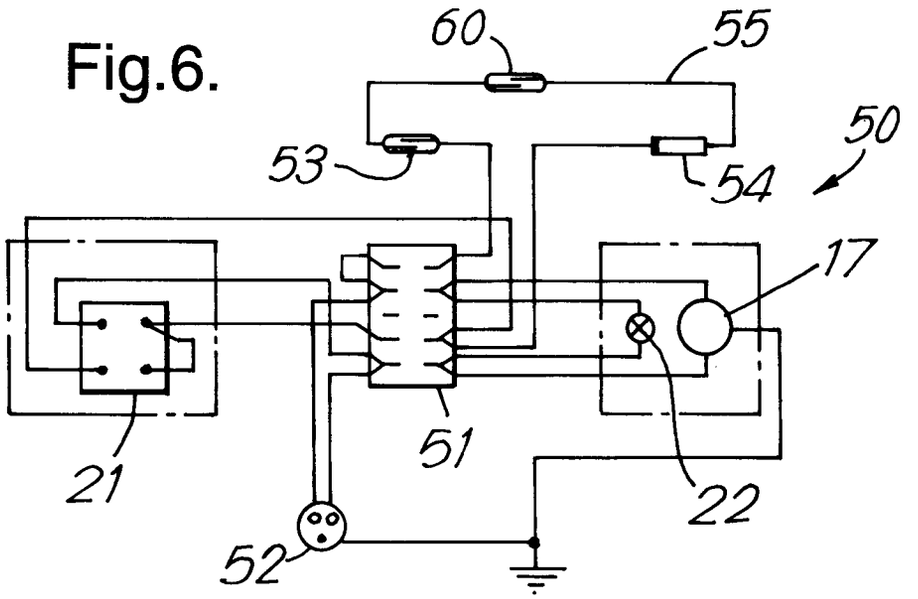
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Fig.7a.

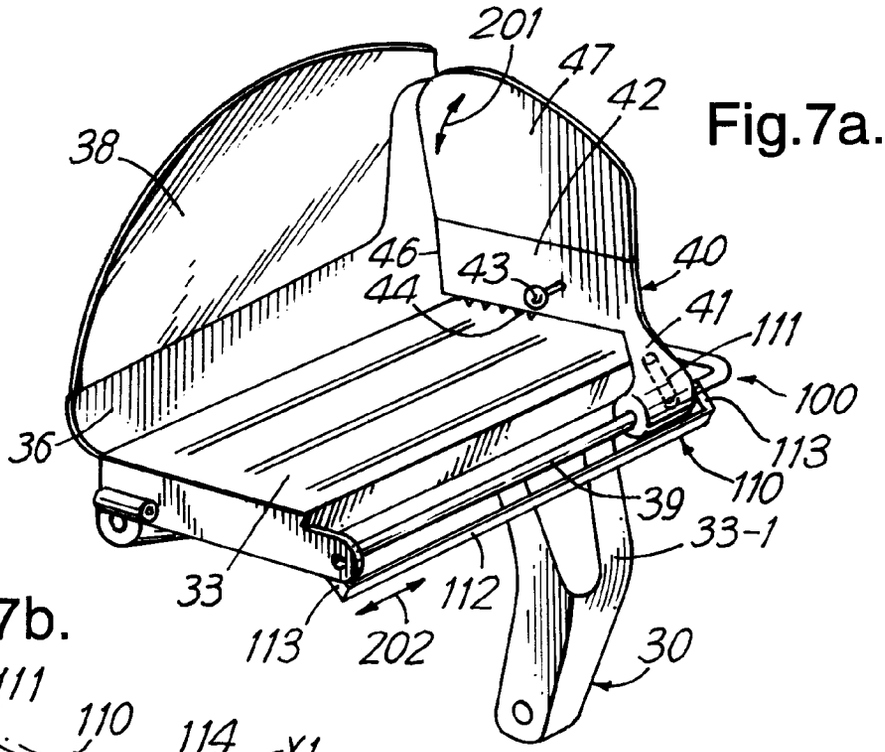

Fig.7b.

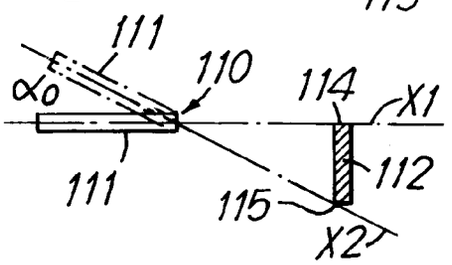

Fig.8a.

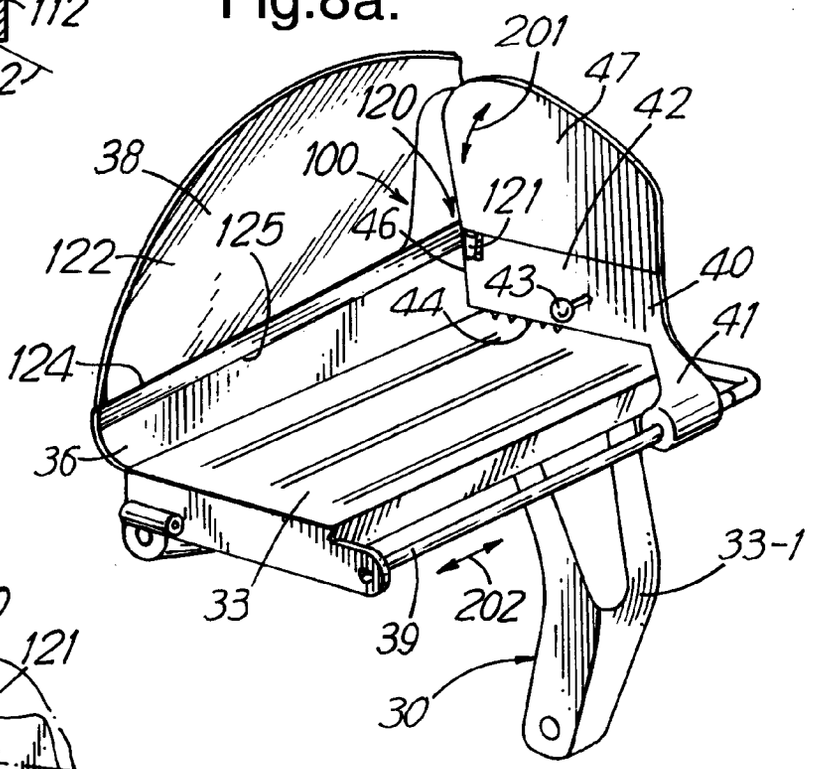

Fig.8b.

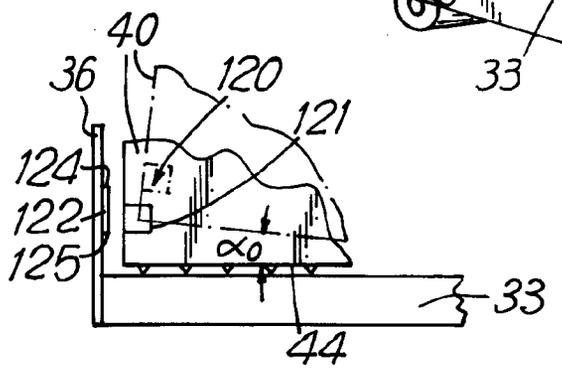

Fig.9a.

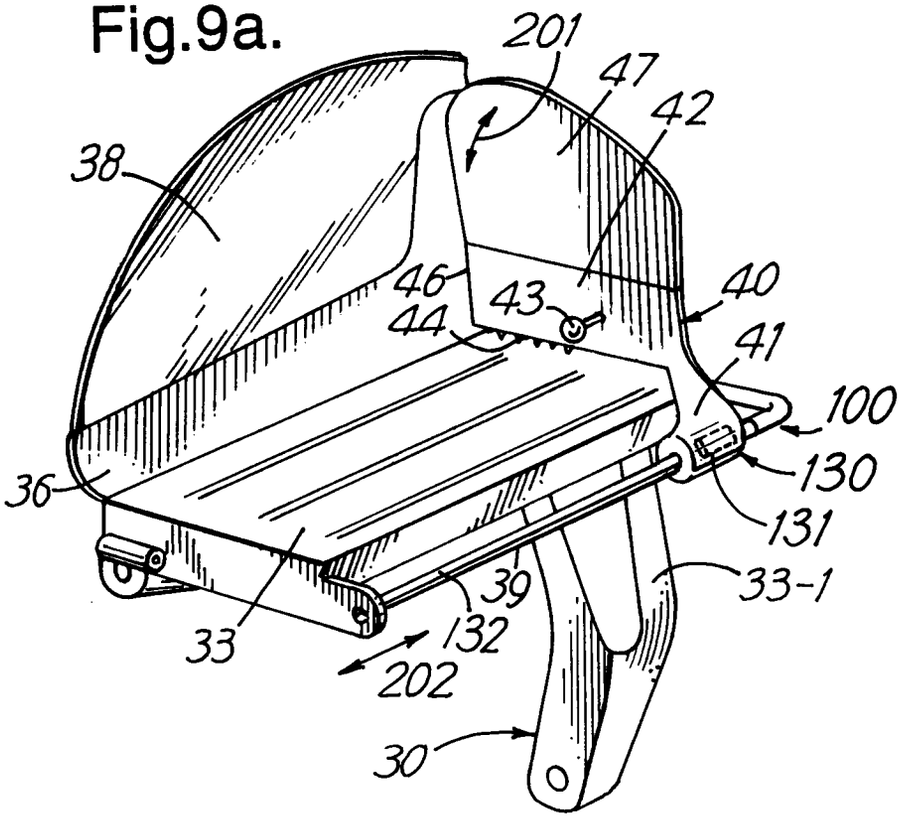
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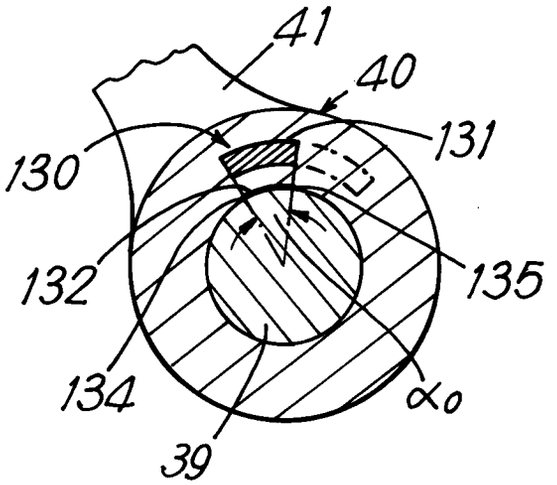
Fig.9b.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Application Number
EP 94 30 5176

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.6)
Y	FR-A-1 336 576 (DITTING) * page 3, left column, paragraph 6 - right column, paragraph 2; figures 7-9 *	1	B26D7/24
Y	FR-A-2 483 185 (REIFENHAUSER) * page 3, line 32 - page 4, line 7 *	1	
A	EP-A-0 395 123 (BETTCHER INDUSTRIES INC.) * page 4, line 29 - line 40 *	2,11	
A	EP-A-0 071 298 (MAATSCHPPIJ VAN BERKEL'S PATENT N.V.)		
A	EP-A-0 218 042 (WERNER TURCK GMBH & CO. KG)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B26D
B27G
F16P
H03K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 October 1994	Vaglienti, G

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