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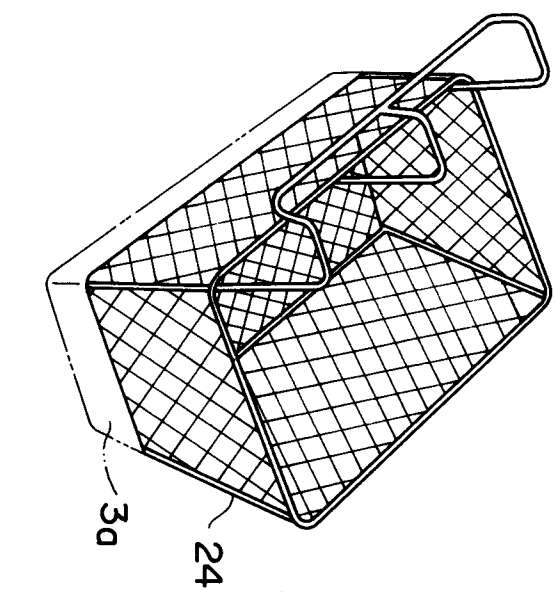
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54 **Boiled egg shell removing device.**

57 There is disclosed a device for peeling and removing shells from boiled eggs and characterized in that a window (6) is formed at a portion of the bottom end on the circumferential wall of a fixed cylindrical casing (7), a circular rotating disc (8) is provided at the bottom of the casing (7) so as to be rotated at a relatively higher speed, a convex stripe (8a) is formed on the surface of the rotating disc (8), and a rotor (13) having partitions (14) is provided in the upper portion of the rotating disc (8) and rotates at a relatively slower speed, whereby the shell of the egg (60) accommodated in each compartment is removed by the collision against the convex stripe (8a) due to the rotation of the rotating disc (8), while the eggs (60) travel once round in accordance with the rotation of the rotor (13). Further, when a fixed disc (120) and partitions (114) are added to the above-mentioned device and a chute (140) for sending the eggs to a supply window (106a) is provided in the neighborhood of the casing (107), the operation of removing the shells from the boiled eggs is continuously and automatically done by placing a large number of eggs on the chute (140).

FIG. 1 is a perspective view of a mechanical device, likely a food processor or blender, showing its internal components and a separate wire mesh basket. The main unit consists of a base (1) with a motor housing (2) and a central shaft (13) with a mixing blade (14). A drive pulley (12) is mounted on the shaft, and a belt (16) connects it to a motor pulley (18) on the motor shaft (17). A safety switch mechanism (19) is located on the side. The top of the unit features a lid (4) with a locking mechanism (6) and a feed chute (8). A wire mesh basket (24) with a handle (30) is shown separately, designed to fit inside the main unit. Various other components are labeled with numbers: 3, 7, 9, 11, 13, 14, 17, 18, 19, 24, 30, 40, 60, and W.L.



This invention relates to a device for peeling and removing shells from boiled eggs.

The disclosure in Japanese Patent Publication No. 54-25115 has been known as a prior art of a device for removing shells from boiled eggs. In the above-mentioned device, a rotating plate forming irregular stripes on the surface is accommodated in the bottom portion of a cylindrical container having an inner circumferential wall with its irregular surface. Numerous boiled eggs are accommodated in the internal portion of the cylindrical container, and the egg shells are peeled off by rotating the rotating plate.

The above-mentioned device has, however, a structure for making the rotating plate rotated in the condition that numerous boiled eggs are accommodated together. Therefore, the following defects are available. The peelings of the egg shells are done earlier or slower differently depending on their solid differences of eggs and are intermingled. As a result, the eggs peeled off from their shells earlier are struck on those whose peelings are delayed and the circumferential wall or the like. Therefore, the circumferential surfaces of the eggs are damaged, and the yolks in the internal portion of the eggs are protruded into the surfaces, resulting in their damages.

In addition, in case of using the above-mentioned device, the eggs collected in a certain number block are processed batchwise, and their shells are removed. According to device, it is necessary for an operator to start and stop the device and to supply and taken out eggs every time the operation for removing the shells is done. Therefore, as the conventional device cannot be continuously operated, there are economically unfavorable weak points that the labor expense costs highly and the operation efficiency becomes bad as well.

Furthermore, in the prior art, the supply of eggs to the device must be operated manually and, therefore, the operation for removing the shells cannot be automated.

In the present invention, a window for releasing eggs is formed at a portion of the bottom end on the circumferential wall of a fixed cylindrical casing in order to solve the above-mentioned problems. At the bottom of the casing, a circular rotating disc forming irregularity on its surface is provided so as to be rotatably driven at a relatively higher speed. A rotor rotating at a relatively slower speed in the same or reversed direction to the rotation of the rotating disc is provided in the upper portion of the rotating disc. The rotor is also provided with partitions for dividing the inside of the casing into a plurality of compartments.

According to the present invention, eggs are orderly accommodated in the compartments divided by the partitions of the rotor and then, the resulting shells are removed by a certain time operation. Therefore, as the supplied eggs never collide with each

other and the weight of each egg is not applied on the other egg in comparison with such a conventional type of the device that a number of eggs are supplied simultaneously, the shells can be removed uniformly and completely from the eggs with giving no damages to any of these eggs. Even though there are some differences of eggs in size and those of their shells in thickness and hardness, their results are all the same as above.

In addition, with reference to an alternative device for automatically supplying eggs each by each into the compartments for removing their shells, the present inventors have proposed a device added with both a fixed disc and partitions to the configuration of the above-mentioned device as well. In this case, the available window is used not only for releasing eggs but also for supplying the eggs. A chute for forwarding the eggs to the supply window is provided in the neighborhood of a cylindrical casing. At the edge of the window side in the fixed disc, there is an egg-setting mechanism for placing the eggs forwarded from a chute. Furthermore, a hole for dropping the eggs through is arranged at a portion of the edge in the fixed disc. The rotors at the upper and lower portions have their same number of partitions as their corresponding same positions on the upper and lower sides, respectively.

As above-mentioned, it becomes possible to automate the operation for removing the shells from the eggs and to continuously operate the device by setting so as to supply the eggs from the chute automatically. Therefore, the labor for supplying and releasing the eggs can be saved in comparison with that of the conventional device.

In addition, the efficiency of the operation can be improved, and it becomes possible to remove a number of egg shells for a certain time. For instance, according to the conventional device having a casing and a rotating disc in their same dimensions, it was possible to process 1,500 eggs an hour. The present invention, however, has made it possible to process 3,000 through 4,000 eggs.

Furthermore, as the above-mentioned device is basically composed of the rotating disc, the casing and the rotor, it is easy to manufacture the device and to operate and maintain the device as well. Moreover, the failures of the device rarely happen, and the machine itself may be virtually available in a very low cost.

The foregoing and other objects and features of the invention will become apparent from the following description of preferred embodiments of the invention with reference to the accompanying drawings, in which:

Fig. 1 is an over-all perspective view showing a device as a first embodiment of the present invention;

Fig. 2 is a sectional front view of the main point of

the device in Fig. 1;

Fig. 3 is a partially sectional perspective view showing a rotating disc;

Figs. 4 and 5 are fragmentary front views showing devices as second and third embodiments of the present invention, respectively;

Fig. 6 is a perspective view showing a fourth embodiment of the present invention; and

Fig. 7 is an exploded perspective view showing the main point of Fig. 6.

Figs. 1 through 3 illustrate a first embodiment of the present invention. A pallet 2 in a form of relatively shallower box is fixed to the upper portion of a table-like frame 1. The pallet 2 is made of stainless steel. A stocker 3 is formed between the end of the pallet 2 and the front end of the frame 1.

A cylindrical and flake casing 7 having a C type cross section is fixed vertically on a bottom plate 4 in the pallet 2. A window 6 opened to the front side is provided in the casing 7. The casing 7 is also made of stainless steel. A rotating disc 8 made of zinc alloys or the like is fixed rotatably to a shaft on the bottom in the casing 7. A number of convex stripes 8a in a radial form are formed on the upper surface of the rotating disc 8. The rotating disc 8 is rotated by a driving gear, such as motor 9, installed to the lower portion of the pallet 2. The rotational speed of the rotating disc 8 is relatively rapid (e.g., 400 through 500 r.p.m.).

In addition, a gate-like frame 11 is provided from the upper center of the casing 7 to its left and right. A rotor 13 is provided in the gate-like frame 11. The rotor 13 is accommodated in the casing 7 and supported rotatably by a shaft 12 from its top. The rotor 13 has the shaft 12 at the center of the rotating disc 8, and a number of partitions 14 are provided in a radial form around the shaft 12. The partitions 14 are made of steel, have a blade-like shape, and further, divide the inside of the casing 7 into six compartments 7a.

A pulley 16 is set at the top end of the shaft 12 for the rotor 13, and a belt 19 is connected to both of the pulley 16 and a driving pulley 18. The driving pulley 18 is driven by a motor 17. The rotor 13 rotates in the same direction (clockwise) as that of the rotating disc 8. The rotational speed is relatively slower (e.g., 7.5 through 10 r.p.m.).

A box-type motor cover 21 is provided on the rear end of the frame 1 and accommodates the motor 17. A supply pipe 40, such as a chute, is provided in the neighborhood of the window 6 for the casing 7. The supply pipe 40 supplies a boiled egg 60 orderly to each compartment 7a which moves in accordance with the rotation of the rotor 13. In an illustrated embodiment, each boiled egg 60 is supplied to each compartment, and while the rotor 13 travels round, total six boiled eggs 60 are supplied.

The pallet 2 and the stocker 3 are filled with water, and the upper surface of the rotating disc 8 is covered adequately with a water surface W.L. This is available

for the purposes of moderating any impulses against the eggs 60, protecting the surface of the eggs 60 after terminating the processes of peeling their shells and separating the splinter of the shells from the eggs 60.

The eggs 60 supplied in turn to each compartment 7a move orderly in a clockwise direction in accordance with the rotation of the rotor 13. The boiled eggs 60 rotatably repeat their collision against the convex stripes 8a of the rotating disc 8, and while the boiled eggs 60 travel round once within the casing 7, the shells of the eggs 60 are peeled off. Then, when the rotor 13 travels round once, the operation of removing the shells of six eggs 60 is completed, and the total six boiled eggs 60 are released from the window 6 into the water within the stocker 3.

As shown in Fig. 1, a basket 24 with a rough net is accepted at the upper portion within the stocker 3. According to the basket, the splinter of the shells from the eggs 60 settles at the bottom of the stocker 3, and the boiled eggs 60 are left within the basket 24. In the condition that the basket 24 is accommodated in the stocker 3, a space 3a is formed at the bottom of the stocker 3. Therefore, the splinter of the shells or the like can be stayed at the space 3a. When the basket 24 is filled with the eggs 60 terminated the peeling of the shells, it is exchanged with another one.

Fig. 4 shows a second embodiment of the present invention. In this embodiment, the casing 7 is fixedly attached to the gate-like frame 11 by a bracket 27, and a slight gap 28 is formed between the lower end of the casing 7 and the outer circumference of the rotating disc 8. The splinter of the peeled shells can be released from the gap. The rotating disc 8 is driven by a motor 9. The motor 9 is provided in a motor casing 29, and the motor casing 29 is provided in the pallet 2. Furthermore, nozzles 31 are arranged around the shaft 12 on the casing 7, and when the operation of peeling the shells, water is injected into the casing 7 in a radial form.

Moreover, a chute plate 32, a belt conveyor 33, shower nozzles 34, a brush 36 and a chute 37 are all arranged, respectively.

The chute plate 32 guides the boiled eggs 60 released from the window 6 to its outer portion. The belt conveyor 33 receives the eggs 60 guided by the chute plate 32 and then carries the eggs 60 to the subsequent process. The shower nozzles 34 wash away the splinter of shells deposited on the eggs 60 on the belt conveyor 33. The brush 36 removes the shells of the eggs 60 deposited on the downstream of the belt conveyor 33. The chute 37 receives the eggs 60 from the belt conveyor 33 and then moves the eggs 60 to another position. The shells of the eggs 60 are released or dropped from the gap positions illustrated by arrow signs a_1 , a_2 and a_3 , respectively.

Fig. 5 shows a third embodiment of the present invention. The boiled eggs 60 are released from the

casing 7 through the chute plate 32. The boiled eggs 60 drop on a spiral conveyer 38 provided in the lower portion of the chute plate 32, and then, the carried by the spiral conveyer 38. The spiral conveyer 38 is formed by a pair of parallel rollers, and spiral stripes 38a are attached to either of the rollers. The shell splinter deposited on the boiled eggs 60 is flown away by the water supplied from the upper shower nozzles 34 and made to drop downwards from the gap between the pair of rollers.

Moreover, as shown in the embodiment, it is preferable that the direction of rotation for the rotor 13 is set in the same direction as that for the rotating disc 8 from the standpoint of preventing the damage of the eggs 60. However, it also makes it possible to set both of the direction of rotation for the rotor 13 and that for the rotating disc 8 in the mutually reversed directions of their rotations by adjusting both rotational speeds, respectively.

Figs. 6 and 7 are a front perspective view of a device for removing the shells from the eggs and an exploded perspective view of a rotor portion as a fourth embodiment of the present invention, respectively. The structure of the rotating part for removing the shells in this embodiment is in common with those of the above-mentioned first through third embodiments. That is, in this embodiment, a rotating disc 108 and a rotor 113 are provided in a casing 107 similarly to the above-mentioned embodiments. Furthermore, a fixed disc 120 and an upper portion rotor 113a or the like are provided on the rotor 113. The rotating disc 108 rotates by a driving gear (e.g., motor) attached within a case 101. The rotational speed is relatively faster (e.g., 400 through 500 r.p.m). Convex stripes 108a are also provided on the rotating disc 108. There is a window 106 formed at the front side of the casing 107. The upper portion of the window 106 is used as a window for supplying the eggs 60, and the lower portion of the window 106 is also used as a window for releasing the eggs 60.

An egg-holding hole 122 is opened at the end on the side of the window 106 of the fixed disc 120, and each egg can be placed on the egg-holding hole 122. An L-letter guide 123 is placed in the neighborhood of the egg-holding hole 122 to make it sure to place the egg on the egg-holding hole 122. Moreover, an egg-dropping hole 121 is provided in the fixed disc 120. A guide wall 124 is set on the upper surfaces of the fixed disc 120 so as to guide the eggs 60 to the egg-dropping hole 121 and to send the eggs 60 out completely.

The upper portion rotor 113a and the rotor 113 are fixed to the same shaft 112, respectively, and the shaft 112 is connected to a pulley 116. By driving a motor connected to the pulley 116, both of the rotors are driven to rotate clockwise. Their rotational speeds are relatively slower (e.g., 7.5 through 10 r.p.m.).

The upper portion rotor 113a and the rotor 113 have six sheets of partitions 114a, 114 at their upper

and lower same positions, respectively, which divide the inside of the casing 107 into six compartments. The partitions 114a in the upper portion rotor 113a roll the eggs 60 placed on the egg-holding hole 122 by passing on the fixed disc 120 and leading to the egg-dropping hole 121, where the eggs 60 are then allowed to drop through onto the rotating disc 108.

A cylindrically curved chute 140 is also provided while taking a gradient, in the neighborhood of the casing 107. The end of the chute 140 is extended up to the egg-holding hole 122. The chute 140 is a device for supplying the eggs to the L-letter guide 123. A stock plate 142 for stocking several eggs 60 is installed to one or both sides of the chute 140, while taking a gradient. The eggs placed on the stock plate 142 roll and drop into the chute 140 and then, are supplied to the L-letter guide 123 by their own weight.

Therefore, the eggs which have waited at the end of the chute 140 until the subsequent partition passes by after the partition 114a sends out the egg on the egg-holding hole 122 to the egg-dropping hole 121, lose their support, roll downwards and is placed on the egg-holding hole 122. If a plurality of eggs are placed on the chute 140, these eggs are supplied each by each to each compartment on the rotating disc 108 automatically.

While the egg shells are removed by the rotation of the rotating disc 108, the eggs travel round once within the casing 107 by the rotor 113. Then, the eggs whose shells were removed are released from an egg-releasing window 106b. The released eggs drop down and are sent by a spiral type conveyer 150 to an outlet 151 to be released from the outlet 151 to the external portion.

Furthermore, in addition to the above-described embodiments, it is possible for a number of modifications to be practiced as shown in the following.

(1) Each window 6, 106 of the casing 7, 107 is formed by cutting out a portion of the bottom end of the circumferential wall of each casing 7, 107.

(2) A number of projections on a spherical surface are formed on each rotating disc 8, 108, instead of forming each convex stripe 8a, 108a on the surface of each rotating disc 8, 108. Otherwise, a number of rubbers or irregular rubbers made of resins are provided on each rotating disc 8, 108.

(3) A number of holes are provided in the surface of each rotating disc 8, 108.

(4) Each rotor 13, 113, 113a and each rotating disc 8, 108 are driven by means of a single motor through a change gear or the like.

Claims

1. A device for removing the shells from eggs, in the mechanism which is provided with a rotating disc (8) for forming the bottom of a fixed and cylindrical

casing (7) within said casing (7) and also provided with a rotor (13) within said casing (7), characterized in that:

a releasing window (6) for releasing the eggs is formed at a portion of the bottom end of the circumferential wall in the casing (7);

the rotating disc (8) forms its irregularity (8a) on the upper surface and is driven to rotate at a relatively higher speed; and

the rotor (13) has partitions (14) for dividing the inside of the casing (7) into a plurality of compartments and rotates at a relatively slower speed in accordance with the rotation of the rotating disc (8).

2. A device for removing the shells from eggs according to claim 1, wherein said casing (7) is made of stainless steel.

3. A device for removing the shells from eggs according to claim 1, wherein said rotating disc (8) is made of zinc alloys.

4. A device for removing the shells from eggs according to claim 1, wherein water is reservoired so as to cover substantially over the rotating disc (8) within said casing (7).

5. A device for removing the shells from eggs according to claim 1, wherein washing showers (31, 34) are provided for separating the shells from eggs against the rotating disc (8) within the casing (7).

6. A device for removing the shells from eggs according to claim 1, wherein a slight gap (28) is formed between the circumferential wall of said casing (7) and the rotating disc (8) for enabling to release the splinter of the shells.

7. A device for removing the shells from eggs, in the mechanism which is provided with a rotating disc (108) for forming the bottom of a fixed and cylindrical casing (107) within said casing (107), a fixed disc (120) fixed to the inner circumferential wall of said casing (107), an upper portion rotor (113a) at the upper side of the fixed disc (120), and a lower portion rotor (113) at the lower side of the fixed disc (120), characterized in that:

a supply window (106a) for supplying the eggs and a releasing window (106b) for releasing the eggs are formed at a portion of the circumferential wall of the casing (107);

the rotating disc (108) forms irregularity (108a) on the upper surface and is driven to rotate at a relatively higher speed;

the upper portion rotor (113a) and the lower portion rotor (113) both have the same

number of partitions (114, 114a) for dividing the inside of the casing (107) into a plurality of compartments and rotate relatively slower at the same speed in accordance with the rotation of the rotating disc (108);

mechanisms (122, 123) for placing the eggs are provided at the circumferential end of the fixed disc at the side of the supply window (106a); and

a hole (121) for dropping each egg is provided in a portion of the fixed disc 120.

8. A device for removing the shells from egg according to claim 7, wherein a chute (140) having the end reaching the mechanisms (122, 123) for placing the eggs is provided in the external portion of said casing (107).

Fig. 1

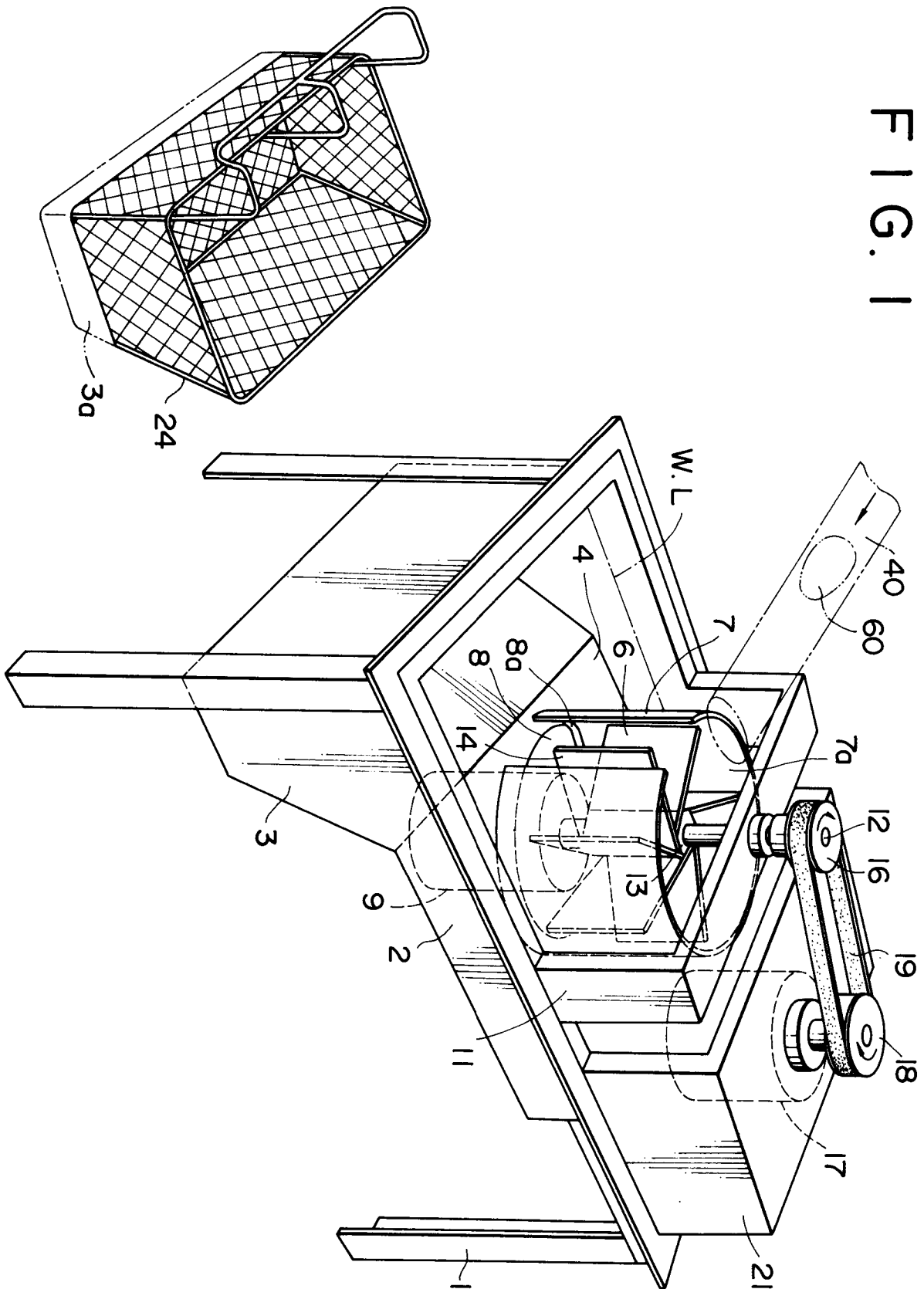


FIG. 2

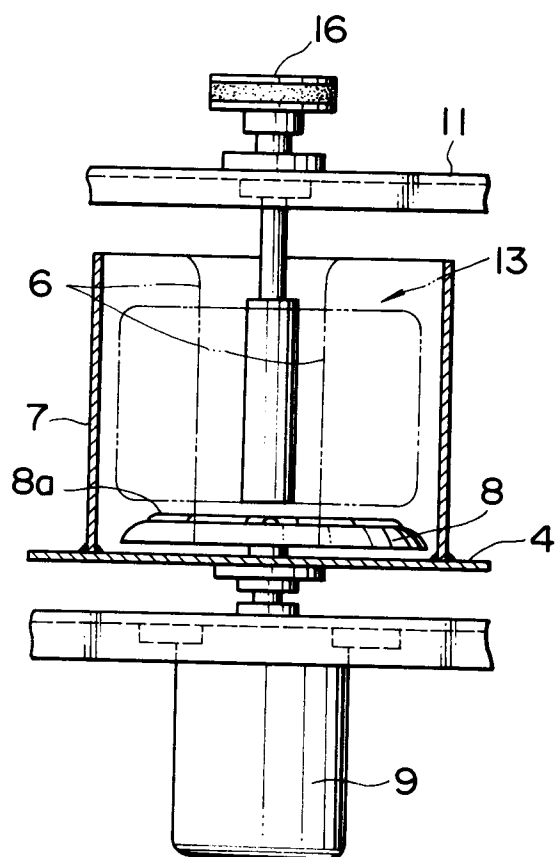


FIG. 3

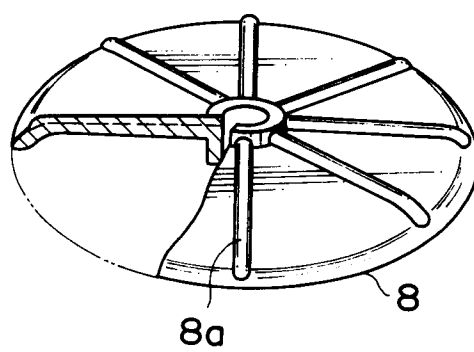


FIG. 4

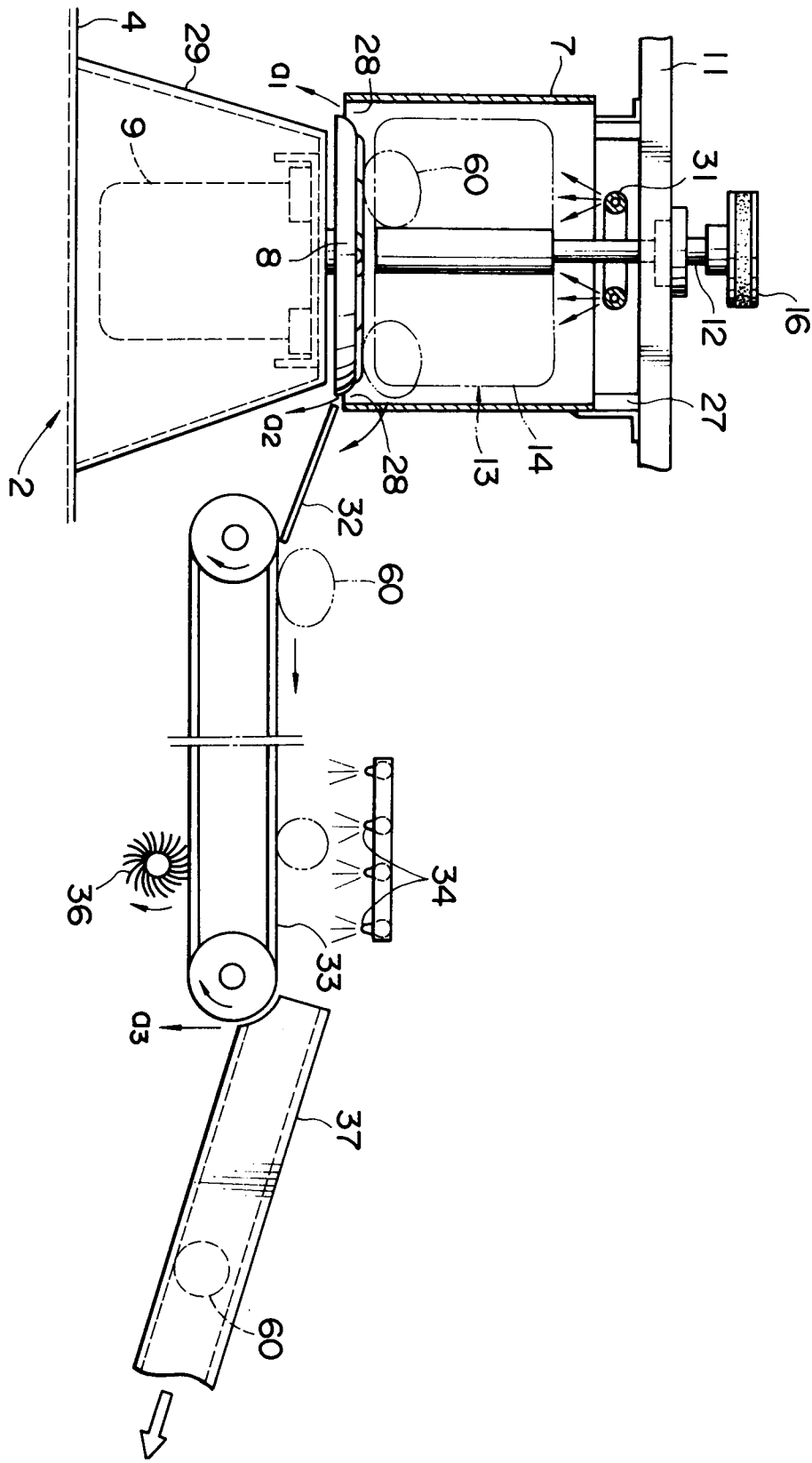


FIG. 5

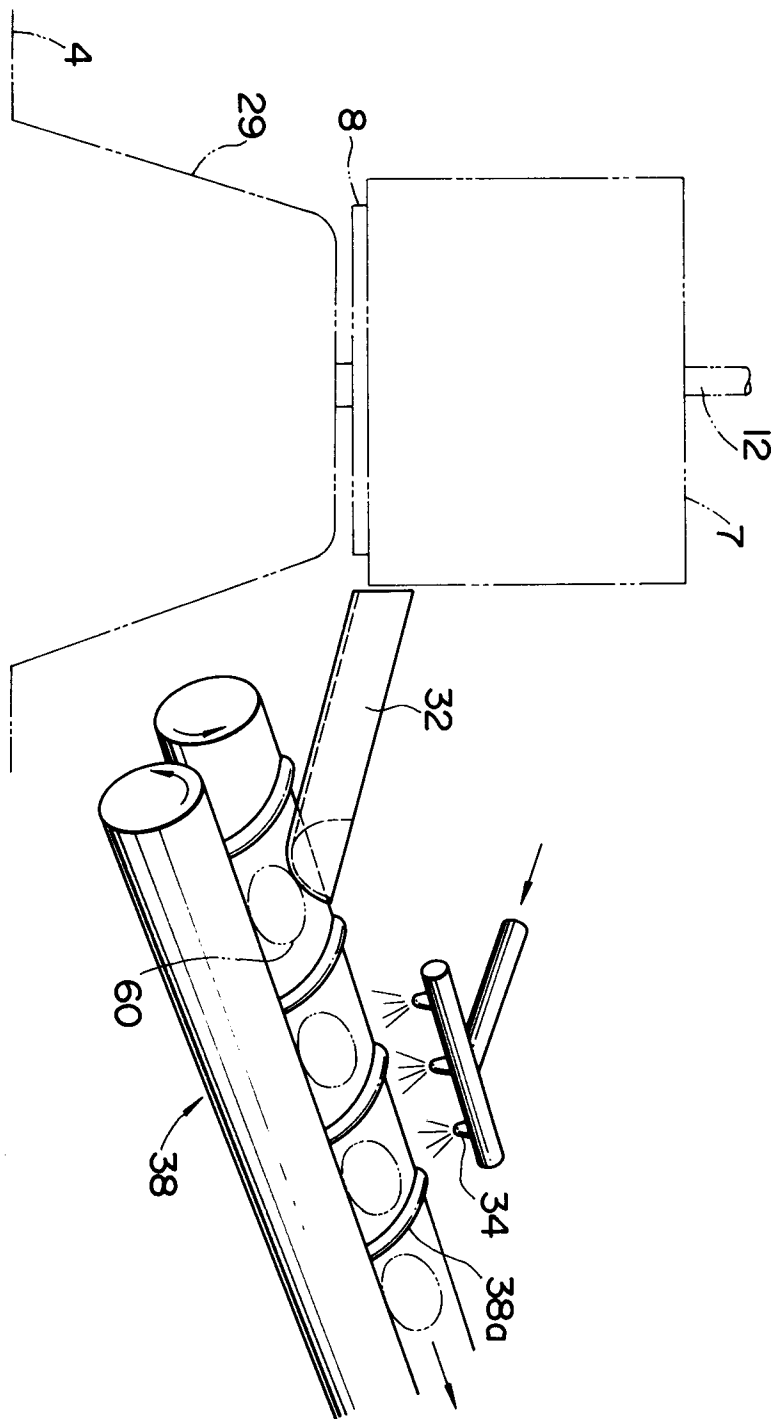


FIG. 6

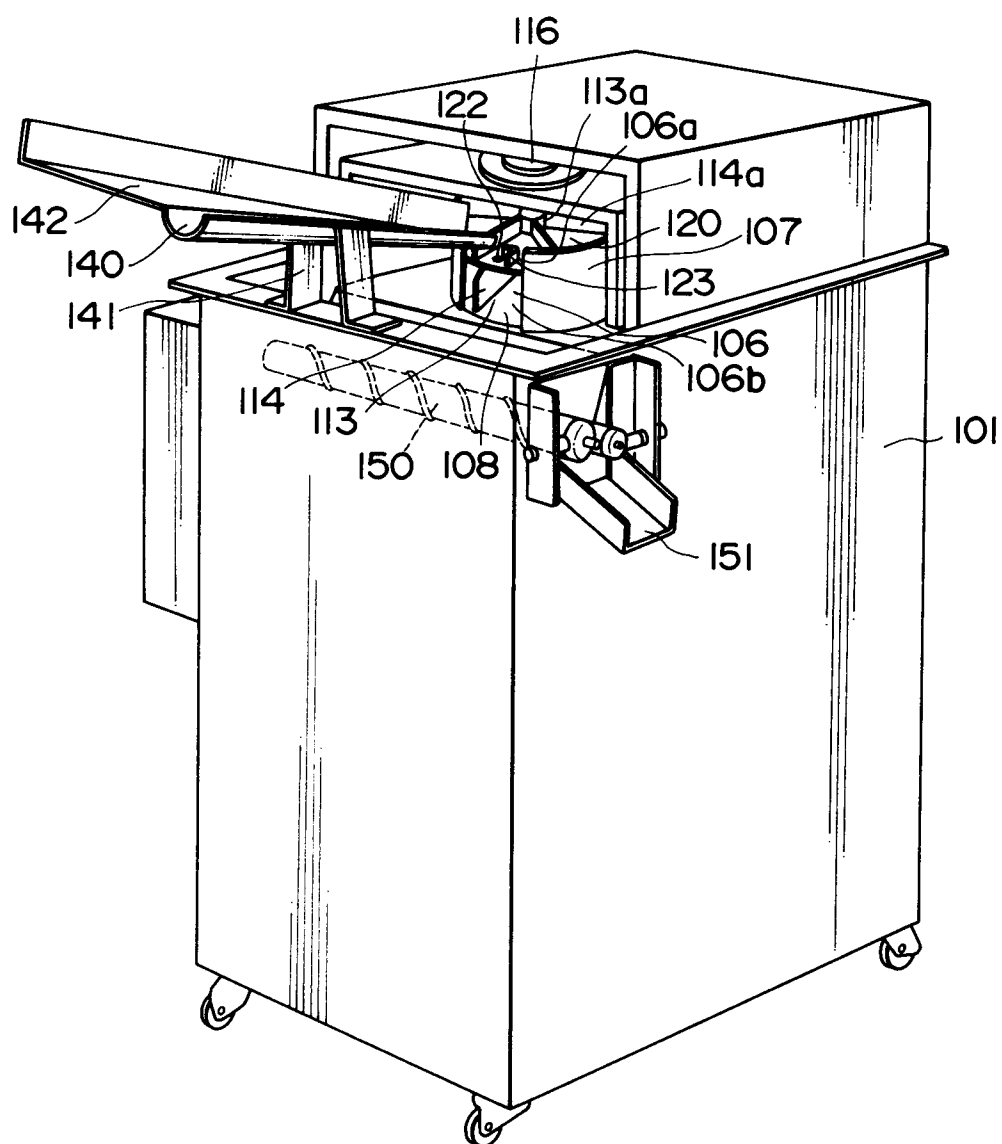
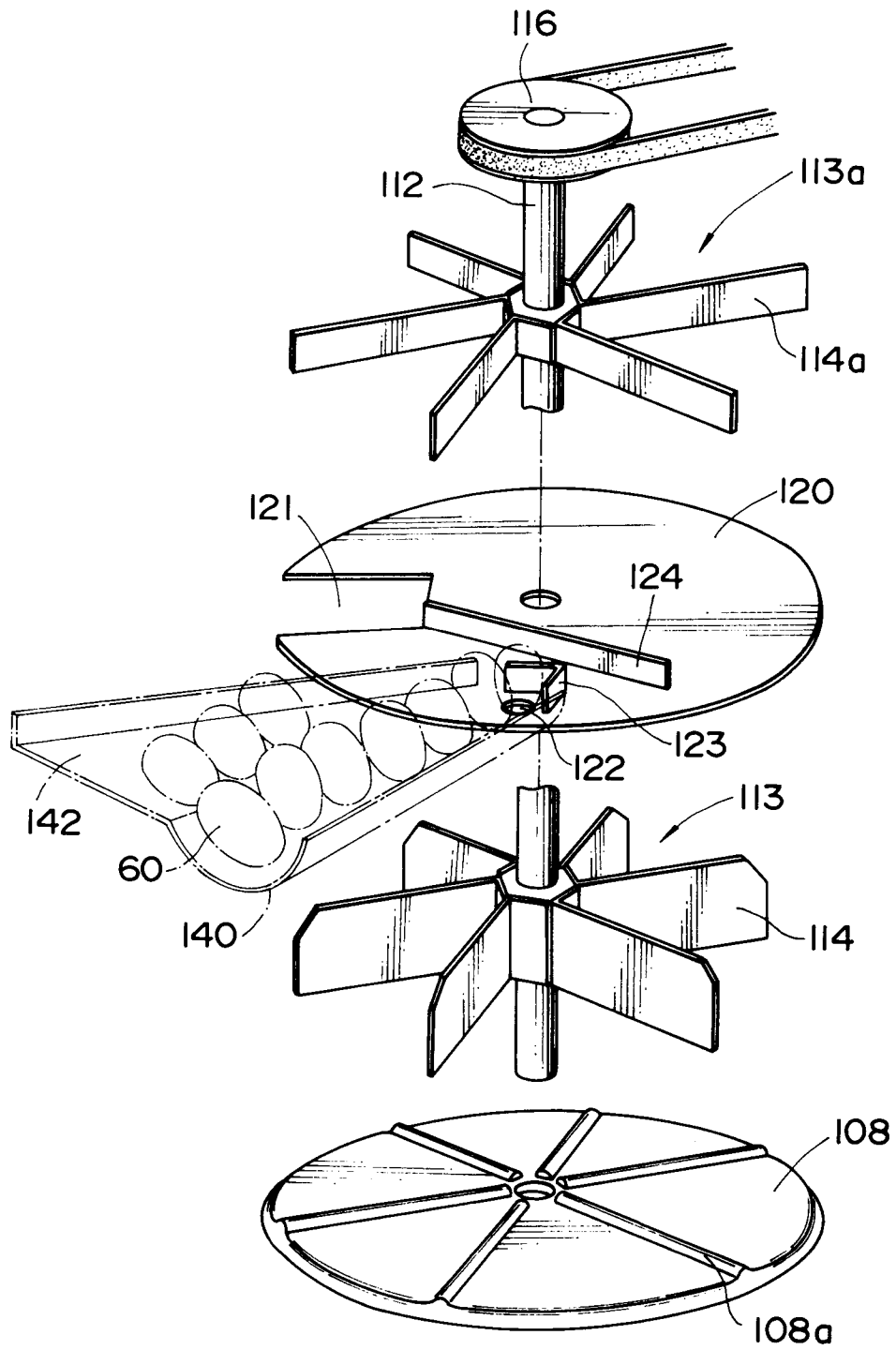


FIG. 7





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 6580

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.5)
D, A	JP-B-5 425 115 (...) * the whole document *	1, 7	A47G19/28
A	US-A-4 082 856 (ZWIEP ET AL.) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A47G A47J
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 28 OCTOBER 1991	Examiner VISTISEN L.
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