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(54) Improvements in an automatic machine for sterilization and aseptic packing of meat products

(57) Improvements in an automatic machine for sterilization and aseptic packing of meat products such as a piece of ham, shoulder meat or the like. The machine operates in a continuous cycle and comprises a first station (1) for the sterilization of the surface of a meat piece (2) which is fed in a stripped condition to the inside of said first station after a stage in which said meat piece (2) has been removed from a packing upon the conclusion of a previous pasteurization stage. The

improvements provide means (11, 16, 5) for removing the meat piece from the sterilization chamber (6) which remain in its inside during the thermal shock sterilization stage, said means (11, 16, 15) being shifted so as they transfer the sterilized meat piece (2) directly from the inside of said sterilization chamber (6) to the inside of a packing (5).

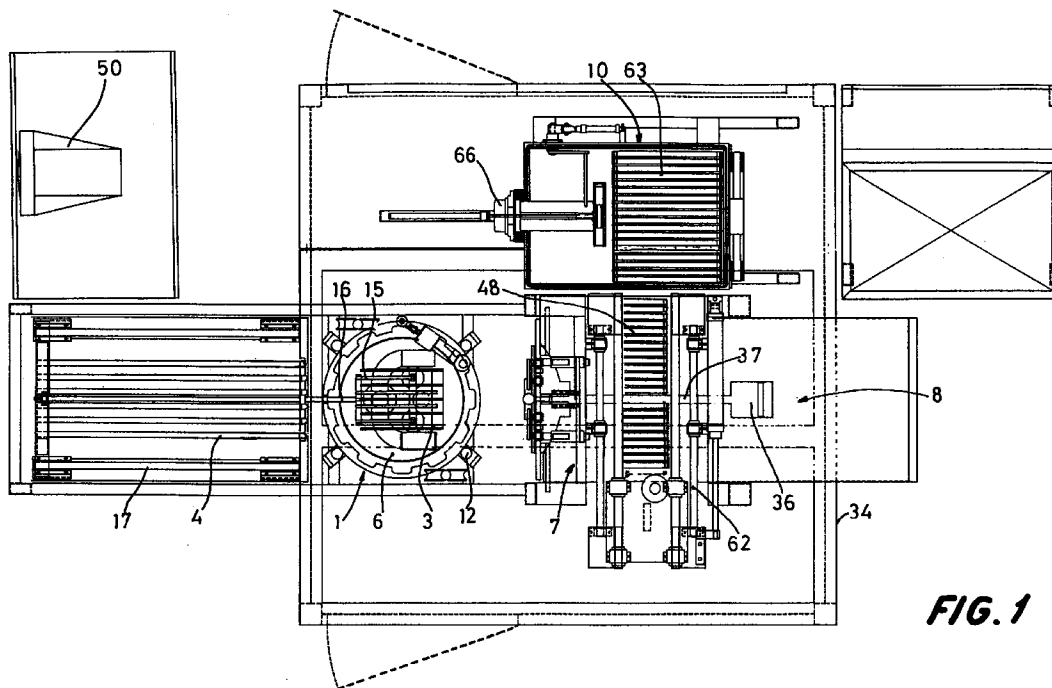


FIG. 1

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Description

The present invention relates to improvements introduced into an automatic machine for sterilization and aseptic packing of pasteurized meat products such as a piece of ham or shoulder meat which have previously sustained deboning, injecting of additives and/or various ingredients, tenderizing, massaging, curing and pasteurizing, said latter stage comprising the cooking of the piece inside a vessel with the interposition of an open or closed protecting or wrapping means till having reached a temperature at the thermal centre of the meat piece of 65° to 75°C and during a period of time sufficient for a proper pasteurization of the product which guarantees heating effects (F value 10°C-70°C) over 30 measured at the thermal centre of the piece, finally removing the pasteurized meat piece from its wrapping means in order to dispose of the exuded fluids and to condition the outer surface of the product or meat piece.

These improvements are more in particular applied to a machine like the one described in the EP-A-0506599 of the same applicant, said machine providing a sterilization of the surface layer or stratum of the stripped meat pieces after said previous treatment and before their final packing, said sterilization being obtained by submitting said stripped meat pieces to a high temperature thermal shock during a very short time interval as per a HTST technique (High Temperature Short Time) operating under conditions of ambient temperature in direct contact with the surface of the meat piece generally higher than 150°C and with a treatment time per piece of less than 15 seconds, thereupon proceeding to an immediate repacking of the product under aseptic conditions.

The improvements consist in a substantial redesigning and in a simplification of various members integrating the machine of the said EP-A-0506599 mainly with a view to:

- guarantee the asepsis of the process at all times, minimizing the maintenance tasks necessary for such a purpose;
- shorten the times for the transfer of the meat piece from inside the sterilization chamber to the inside of a packing such as a sack or bag or a packing of another type;
- speed up the drying of the meat piece after having opened the sterilization chamber and during the transfer of said piece towards the packing area;
- provide a transfer of packings of the tubular bag type up to a meat piece reception position in a regular and positive way, in order to guarantee the continuity and regularity of the operational cycle;
- reduce the time of transfer of the packed product up to the sealing station;
- dispose of the waste left over when carrying out the final vacuum sealing of the packings;
- simplify the discharge of the product from the vacuum sealing station.

The machine of the EP-A-0506599 patent includes a first station for the sterilization of the surface of a meat piece which is fed into said first station after a stage in which the meat piece has been stripped of a wrapper used in a previous pasteurizing stage in order to dispose of the exuded fluids and to condition the outer surface of the product. Said first station comprises: a tightly sealable chamber with means for receiving, supporting in a stable position in its inside and releasing the meat piece introduced in it by a movable supporting floor situated in the proximity of said chamber; means for tightly closing said chamber after having introduced in it the meat piece, and means for opening the chamber after a predetermined time necessary for a sterilization of the surface of the piece; and means for supplying heat to the inside of said chamber while it is tightly sealed, till the ambient inside has reached an average temperature comprised between 100 and 160 degrees, with a treatment time interval of less than 15 seconds.

According to the proposed improvements means have been provided for removing the meat product from the inside of said chamber which remain inside said sterilization chamber supporting the product during the thermal shock sterilization stage, and upon the conclusion of said stage transfer it directly to the inside of a packing. The improvements comprise as well means for sequentially grabbing, linearly transferring and positioning said packings with their secured opening completely open and facing said product removing means.

The above and other advantages and characteristics of the improvements being the object of this invention will be now described referring to an example of a preferred embodiment illustrated by means of the accompanying sheets of drawings. In said drawings:

Figure 1 is a top plan-view of the machine incorporating the improvements of the invention, said machine being enclosed in its entirety, excepting the feeding conveyor and the control monitor, in an enclosing cabin swept by a vertical laminar flow in order to guarantee the asepsis of the ambient where the working cycles are carried out;

Figure 2 is a side elevational, vertically sectioned view of the movable supporting floor to enter the meat inside the first station showing also a cylinder to whose rod is attached a grid for the removal of the meat product from the inside of the thermal shock sterilizing chamber;

Figure 3 is a side elevational view of the machine shown in Fig. 1;

Figure 4 is a side elevational detailed view of the means for transporting the just bagged product towards the vacuum sealing station;

Figures 5 and 6 show in respective front side and elevations the means for receiving the slightly open bag for the packing of the product, and for completely opening said bag presenting it in front of said grid for the removal of the meat product;

Figure 7 is an elevational detail, on a larger scale, of the means for gripping the bag by its leading, partially open part for its linear transfer till the rods of the means represented in Figs. 5 and 6 can be introduced into its opening;

Figure 8 shows in an elevational view the means for picking one by one the bags for the final packing of the product from a bag supply area, and for partially opening said bags;

Figure 9 is an elevational view of the station where the packings filled with the product are vacuum sealed, and Figure 10 shows a tilting roller floor deck the discharge of the product.

With reference to Figs. 1 to 9 the improvements of this invention are applicable to an automatic machine for sterilization and aseptic packing of meat products such as a piece of ham, shoulder meat or the like, said machine operating in a continuous cycle and including:

- a first station 1 for the sterilization of the surface of a meat piece 2 which is fed in a stripped condition to the inside of said first station 1 after a stage in which said meat piece has been removed from a packing upon the conclusion of a previous pasteurization stage, in order to dispose of the exuded fluids and to condition the outer surface of the product, said first station 1 comprising a tightly sealable chamber 6 with a grid supporting floor 3 associated to a fluid-operated cylinder to receive, support in a stable position and release the meat piece 2 introduced in its inside by a supporting floor 4 acting as a feeder situated in the proximity of said chamber 6; means for tightly closing said chamber 6 once having introduced in it the meat piece, and means for opening said chamber after a predetermined time necessary for a sterilization of the surface of the meat piece; and means for supplying heat to the inside of said chamber 6 while it is tightly sealed, till the ambient inside has reached an average temperature comprised between 100 and 160 degrees, with a treatment time interval of less than 15 seconds;

all as stated in the mentioned EP-A-0506599.

According to the present improvements the means for removing the meat piece from the sterilization chamber 6 consist in a floor which supports the meat piece 2 during the thermal shock sterilization stage inside said sterilization chamber, and said floor is associated to said chamber 6 in such a way that they remain in its inside during the thermal shock sterilization stage. Moreover the means for removing the meat piece are shifted with such a travel that they transfer it directly from the inside of said sterilization chamber to the inside of a packing.

To this aim the second station for packing the meat piece after its surface sterilization include means for sequentially positioning the packings 5 to be filled in

front of said means for removing the superficially sterilized meat piece, interposing themselves in their direction of travel.

The lateral edge 6a of the thermal shock sterilization chamber 6 is inclined and the mentioned floor for removing the meat piece comprise a support shaped like a fork 15 with multiple parallel arms between which can pass the strips of said supporting deck 3 located inside the chamber 6, said strips leaving the piece 2 on said fork-like support 15 where it remains during the sterilization stage, said fork-like support 15 being attached to the end of a rod 16 of a fluid-operated cylinder 11 operable to shift said support 15 when the cover 14 of the chamber 6 is lifted, and with it the meat piece 2, towards the outside of the chamber 6, said support 15 and rod 16 thereby passing above that portion of said inclined lateral edge 6a of the sterilization chamber 6 which is situated at the lowest level.

Therefore the travel of said fork-like support 15 for removing the meat piece from the sterilization chamber 6 is rectilinear and substantially parallel to a horizontal plane 7a of the second station 7 on which the packings 5 to be filled are shifted, and takes place at a level situated slightly above said plane 7a of the second station 7.

In order to provide a drying of the slightly wet surface of the meat piece 2 after its sterilization nozzles 19 have been provided for supplying jets of filtered, pressurized hot air which act on the outer surface of the meat piece 2 after the sterilization stage and the opening of the cover 14 of the chamber 6 and during the time of transfer of the meat piece 6 to the inside of the packing 5 presented in an open condition.

The feeder 4 for introducing the meat piece 2 inside the chamber 6 adopts the configuration of a grid of longitudinal strips and is associated to a fluid-operated cylinder 18 whose rod extends parallelly to mentioned fluid-operated cylinder 11 and at a higher level thereof.

The bag-type packings 5 for the final packing of the meat pieces once sterilized are stored in a magazine 8 connected to each other by removable tapes connecting their lateral parts, and are partially superimposed in such a way that a leading portion of each bag projects beyond the next following one, as per an arrangement known in itself. The bags 5 are pressed at its back part by a retainer 29 associated to a fluid-operated cylinder 30 sustained by a bridge structure 31 and a transversal rod 32a linked to a belt 32 driven by a motor 33 moves over the bags to eliminate corrugations thereof. The means for transferring the bags 5 from said magazine 8 to packing area on the plane 7a comprise suction pads 20 associated to a fluid-operated cylinder 21 and operable to get in touch with the top sheet 5a of the first bag 5 still connected to the assembly of bags in the magazine 8 and to lift said sheet 5a, and a tilting lever 23 in the shape of an inverted "L" which includes a curved member 23a at its end and can tilt after the actuation of said suction pads 20 to position itself inside the opening of the bag 5 and underneath said top sheet 5a. The

curved member 23a, ending said lever 23 has an opening, which is operable to get in contact with the inner face of said sheet 5a when the latter descends upon the member 23a through the actuation of the cylinder 21, there being a tube 24 ending in said opening to apply a vacuum through it in order to grip said top sheet 5a from the inside. The lever 23 integrates a gripper jaw 25 provided to be applied against the edge of the bottom sheet 5b of said bag 5 and to thereupon grip it when closing on said jaw 25 another lower jaw 26 actuated by a fluid-operated cylinder 26a for tightly gripping said edge of the bottom sheet 5b. These elements (lever, lower jaw) are assembled on a block 22 which is associated to a fluid-operated cylinder 28 of longitudinal travel operable to shift said block 22 along the second station (7) thus pulling said first bag (5) and separating it from the rest of the bags stored in the magazine 8 till arranging it in a position where it is presented in a partially open condition in a packing area of said second station 7 and penetrated by four rods 35 situated two at each side of said lever 23, extending parallelly to the direction of said travel and linked to a spreading mechanism. The bottom 7a of said second station 7 has an opening 36 to allow the tilting passage of the lever 23 in order to grab the first free bag 5 of the magazine 8, and a longitudinal opening 37 to facilitate its longitudinal travel up to said packing area.

Mentioned rods 35 are bent at their end that is not introduced into the bag 5, and are associated to the ends of first kind levers 38 linked on lateral supports 39 mounted in a sliding arrangement on transversal guides 40 so as to be mutually approached or spaced through the actuation of a fluid-operated cylinder 41 of vertical travel whose rod is attached to a cross member 42 from which derive in a hinged connection two diverging arms 43a, 43b which are link-coupled with said two lateral supports 39, the opposite end of said levers 38 being linked in a sliding arrangement along guiding slots 44 of vertical plates 45, said slots 44 having lengths which are conveniently inclined so that the shifting of the lateral supports 39 determines when pivoting the levers 38 the mutual spreading of said rods 35 and thereby the full opening of the bag 5 in whose opening the free ends of said rods 35 are introduced.

Associated to the plates 45 there are at both sides thereof photoelectric detectors 49 for detecting a packing 5 with the rods 35 introduced in its opening once having been duly positioned.

The whole assembly of the supports 39 to which are linked in a hinged connection the levers 38 carrying said rods 35 and the plates 45 and cylinder 41 are associated to the rod 46 of a fluid-operated cylinder 47 whose travel is coaligned with the direction in which the packings 5 are shifted, so as to produce once the packing 5 has been filled with the meat piece 2 a shifting motion which takes place in a forward direction combined with a retracting of the rods 35 in order to release the bag 5 filled with the meat piece 2 onto a roller deck 48 of said second station 7. After the release of the bag

and conveyance thereof on said roller 48 the fluid operated cylinder 47 moves in a rearward direction all the mentioned assembly in order to place the rods 35 in a packing position to receive a new empty bag 5 to be filled.

In addition to the free-turning roller deck 48 said second station 7 includes means for transporting the meat piece 2 up to a vacuum sealing 10 third station comprising an assembly consisting of a suction pad 51 which is resiliently loaded by a spring 52 which is applied against the top face of the bag 5 filled with the meat piece 2, and a tilting and articulated pusher 53 which is applied against a lateral face of the bag 5 filled with the meat piece, associated to a carriage 60 which travels transversally to the direction for positioning the bag 5 to be filled, sliding on transversal guides 62 and is actuated by a fluid-operated cylinder 61.

The third vacuum sealing station 10 includes a free-turning roller deck 63 which is coplanar with the roller deck 48 of said second station 7, tiltable, hinged at one of its lateral sides and linked with its other edge to a fluid-operated cylinder 64 of vertical travel. A rotating actuator 65 has been provided to which a twice bent lever 66 is attached which is operable to pick and remove from the station the bag 5 waste having been left over after having been cut by a vacuum sealing unit which is of a known type. The sealing station includes a tiltable lid 67, linked to a fluid-operated cylinder 68 and a duct 69 connected to a vacuum pump 70 provides the vacuum inside the station where operates a known type of closing device 71.

All the operations of the machine are controlled and adjusted by the assistance of a computer with a monitor 50.

Claims

1. Improvements in an automatic machine for sterilization and aseptic packing of meat products such as a piece of ham, shoulder meat or the like, said machine operating in a continuous cycle and including:

- a first station (1) for the sterilization of the surface of a meat piece (2) which is fed in a stripped condition to the inside of said first station after a stage in which said meat piece has been removed from a packing upon the conclusion of a previous pasteurization stage, in order to dispose of the exuded fluids and to condition the outer surface of the product, said first station (1) comprising: a tightly sealable chamber (6) with a grid deck (3) associated to a fluid-operated cylinder to receive, support in a stable position and release the meat piece (2) introduced in its inside by a feeder (4) situated in the proximity of said chamber (6); means for tightly closing said chamber once having introduced in it the meat piece (2), and means for opening

said chamber (6) after a predetermined time necessary for a sterilization of the surface of the meat piece; and means for supplying heat to the inside of said chamber (6) while it is tightly sealed, till the ambient inside has reached an average temperature comprised

- a second station (7) for packing the meat piece (2) after its surface sterilization, and means for removing the meat piece (2) from said first station 7 (1) and for transferring it onto said second station which includes: means for sequentially positioning packings (5) such as sacks or bags from a magazine (8) up to a position close to said second station (7); means for opening the opening of the packing and for holding at least two of its walls; means for transferring the meat piece from said second station to the inside of the packings with their opening open; and means for transferring the filled packings (5), with their opening still open, up to a third station (10) where said packings are then vacuum sealed;

characterized in that:

- the means (11, 16, 15) for removing the meat piece (2) from the sterilization chamber (6) are associated to said tightly sealable (6) chamber in such a way that they remain in its inside during the thermal shock sterilization stage;
- said means (11, 16, 15) for removing the meat piece (2) are shifted with such a travel that they transfer it directly from the inside of said sterilization chamber (6) to the inside of a packing (5).

2. Improvements as claimed in claim 1, characterized in that said means for removing the meat piece supports the meat piece (2) during the thermal shock sterilization stage inside said sterilization chamber (6).
3. Improvements claimed in claim 1, characterized in it further includes means for sequentially positioning the packings (5) to be filled with the superficially sterilized meat products (2) in front of said means (11, 16, 15) for removing the superficially sterilized meat piece, interposing themselves in their direction of travel.
4. Improvements as claimed in claim 1, characterized in said travel of said means (11, 16, 15) for removing the meat piece (2) from the sterilization chamber (6) is rectilinear and substantially parallel to a horizontal plane (7a) of the second station (7) on which the packings (5) to be filled are shifted, and

takes place at a level situated slightly above said plane of the second station (6).

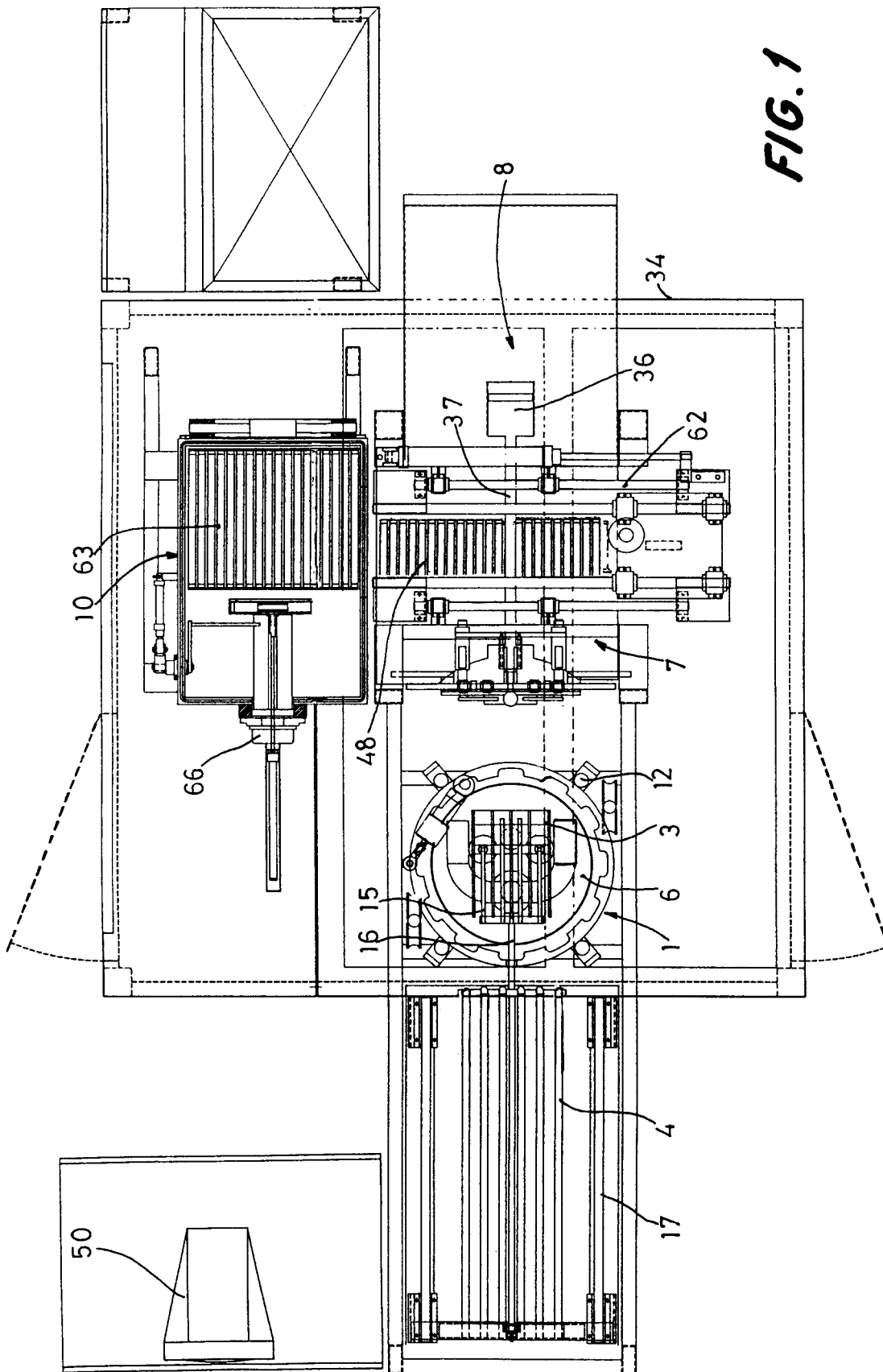
5. Improvements as per claim in claim 1, characterized in that the lateral edge (6a) of the thermal shock sterilization chamber (6) is inclined and the means for removing a meat piece comprise a support shaped like a fork (15) with multiple parallel arms between which can pass the strips of said grid deck (3) located inside the chamber (6), said strips leaving the meat piece (2) on said fork-like support (15) where it remains during the sterilization stage, and in that said fork-like support (15) is attached to an end of a rod (16) of a fluid-operated cylinder (11) operable to shift said support (15) when a cover (14) of the chamber (6) is lifted, and with it said meat piece (2), towards the outside of the chamber (6), said support (15) and rod (16) thereby passing above that portion of said inclined lateral edge (6a) of the sterilization chamber (6) which is situated at the lowest level.
6. Improvements as per claim 1, characterized in that nozzles (19) have been provided for supplying jets of filtered, pressurized hot air which act on the outer surface of the meat piece (2) after the sterilization stage and the opening of the cover (14) of said chamber (6) and during the time of transfer of the meat piece (2) to the inside of the packing (5) presented in an open condition.
7. Improvements as claimed in claim 5, characterized in that said feeder (4) for introducing the meat piece (2) inside the chamber (6) adopts the configuration of a grid of longitudinal strips and is associated to a fluid-operated cylinder (18) whose rod extends parallelly to said fluid-operated cylinder (11) and at a higher level.
8. Improvements as per claim 1, wherein bag-type packings (5) for the final packing of the meat pieces (2) once sterilized are stored in a magazine (8) associated to each other by removable tapes connecting their lateral parts, and are partially superimposed in such a way that a leading portion of each bag projects beyond the next following one, as per an arrangement known in itself, characterized in that the means for transferring the bags (5) from said magazine (8) comprise suction pads (20) associated to a fluid-operated cylinder (21) and operable to get in touch with the top sheet (5a) of the first bag still connected to the assembly of bags in the magazine (8) and to lift said sheet (5a) and a tilting lever (23) in the shape of an inverted "L" which includes a curved member (23a) at its end and can tilt after the actuation of said suction pads (20) to position itself inside the opening of the bag (5) and underneath said top sheet (5a), said curved member (23a), bearing an opening, which is operable

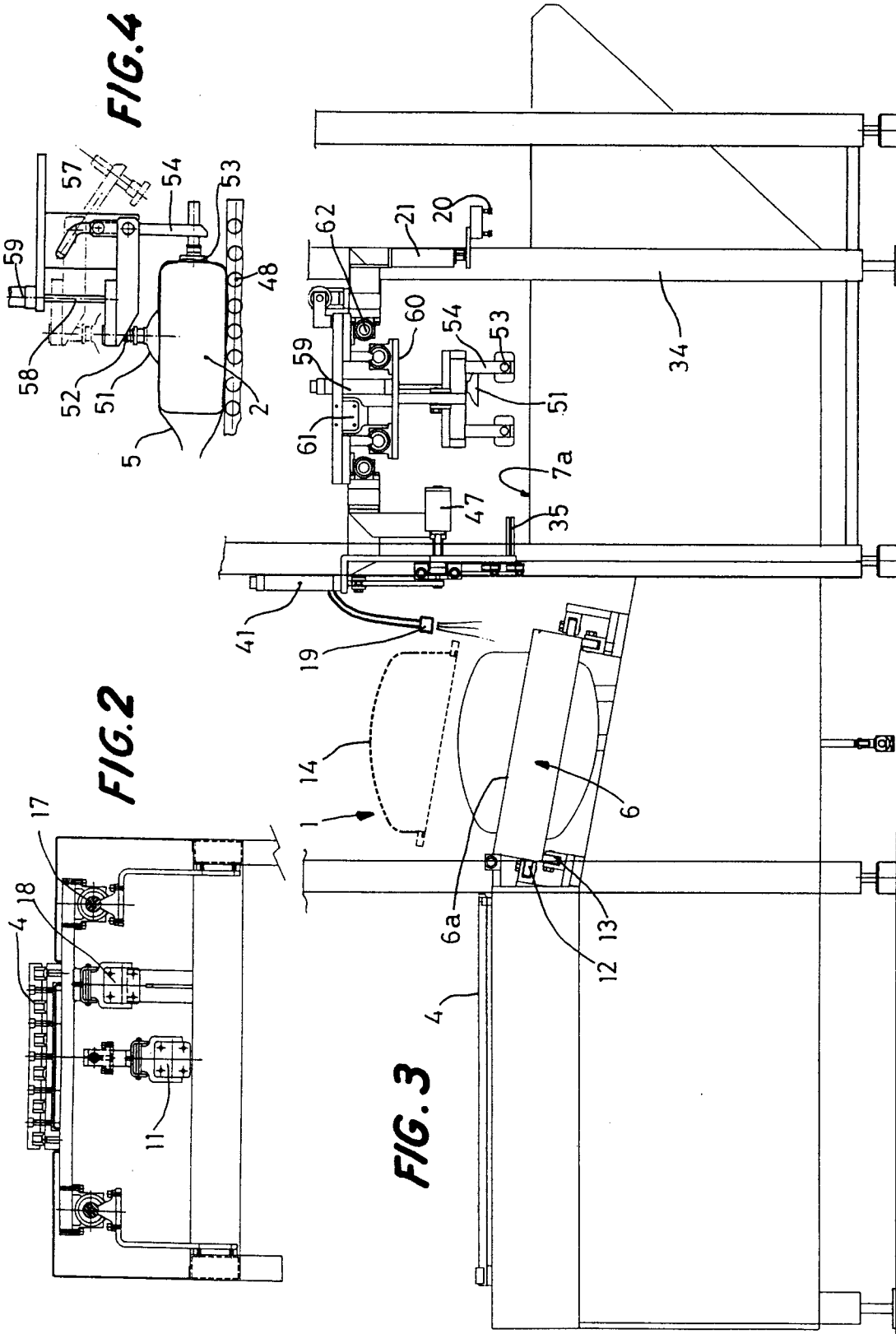
ble to get in contact with the inner face of said sheet (5a) when the latter descends upon the member (23a) through the actuation of the cylinder (21) there being a tube (24) ending in said opening to apply a vacuum through it in order to grip said top sheet (5a) from the inside and said lever (23) integrating a gripper jaw (25) provided to be applied against the edge of the bottom sheet (5b) of said bag (5) and to thereupon grip it when closing on said jaw (25) another lower jaw (26) actuated by a fluid-operated cylinder (26a) for tightly gripping said edge of the bottom sheet (5b), all these elements being assembled on a block (22).

9. Improvements as claimed in claim 8, characterized in that said block (22) is associated to a fluid-operated cylinder (28) of longitudinal travel operable to shift said block (22) along said second station (7) thus pulling said first bag (5) and separating it from the rest of the bags stored in the magazine (8) till arranging it in a position where it is presented in a partially open condition in a packing area of said second station (7) and penetrated by four rods (35) situated two at each side of said lever (23), extending parallelly to the direction of said travel and linked to a spreading mechanism, and in that the bottom (7a) of said second station (7) has an opening (36) to allow the tilting passage of the lever (23) in order to grab the first free bag (5) of the magazine (8), and a longitudinal opening (37) to facilitate its longitudinal travel up to said packing area.
10. Improvements as claimed in claim 9, characterized in that the said rods (35) are bent at their end that is not introduced into the bag (5), and are associated to the ends of first kind levers (38) linked on lateral supports (39) mounted in a sliding arrangement on transversal guides (40) so as to be mutually approached or spaced through the actuation of a fluid-operated cylinder (41) of vertical travel whose rod is attached to a cross member (42) from which derive in a hinged connection two diverging arms (43a, 43b) which are link-coupled with said two supports (39), the opposite end of said levers (38) being linked in a sliding arrangement along guiding slots (44) of vertical plates (45), said slots (44) having lengths which are conveniently inclined so that the shifting of the supports (39) determines when pivoting the levers (38) the mutual spreading of said rods (35) and thereby the full opening of the bag (5) in whose opening the free ends of said rods (35) are introduced.
11. Improvements as per claim 10, characterized in that the whole assembly of the supports (39) to which are linked the levers (38) carrying said rods (35) and the plates (45) and cylinder (41) are associated to the rod (46) of a fluid-operated cylinder (47) whose travel is coaligned with the direction in which

the packings (5) are shifted, so as to produce once the packing (5) has been filled with the meat piece (2) a shifting motion which takes place in a forward direction, combined with a retracting of the rods (35) in order to release the bag (5) filled with the meat piece onto a roller deck (48) of said second station (7).

12. Improvements as per claim 10, characterized in that associated to the plates (45) there are at both sides photoelectric detectors (49) for detecting a packing (5) with the rods (35) introduced in its opening.
13. Improvements as per claim in claim 1, characterized in that they include in said second station (7) means for transporting the meat piece (2) up to a vacuum sealing station (10), comprising a free-turning roller (48) deck in said second station, and an assembly consisting of a suction pad (51) which is resiliently loaded by a spring (52) and is applied against the top face of the bag (5) filled with the meat piece (2), and a tilting pusher (53) which is applied against a lateral face of the bag (5) filled with the meat piece (2), associated to a carriage (60) which travels transversally to a direction for positioning the bag (5) to be filled said carriage sliding, slides on transversal guides (62) and is actuated by a fluid-operated cylinder (61).
14. Improvements as per claim 1, characterized in that the third vacuum (10) sealing station (10) includes a free-turning roller deck (63) which is coplanar with the roller deck (48) of said second station (7), said roller deck (63) being tiltable, hinged at one of its lateral sides and linked with its other edge to a fluid-operated cylinder (64) of vertical travel, a rotating actuator (65) having been provided to which a twice bent lever (66) is attached which is operable to pick and remove from said station (10) a bag (5) waste having been left over after having been cut by a vacuum sealing unit.





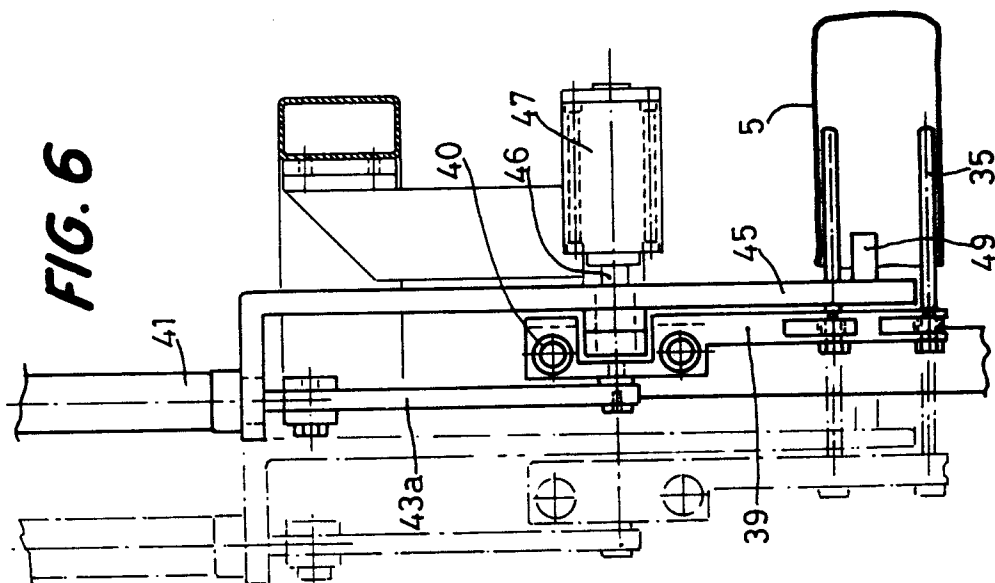
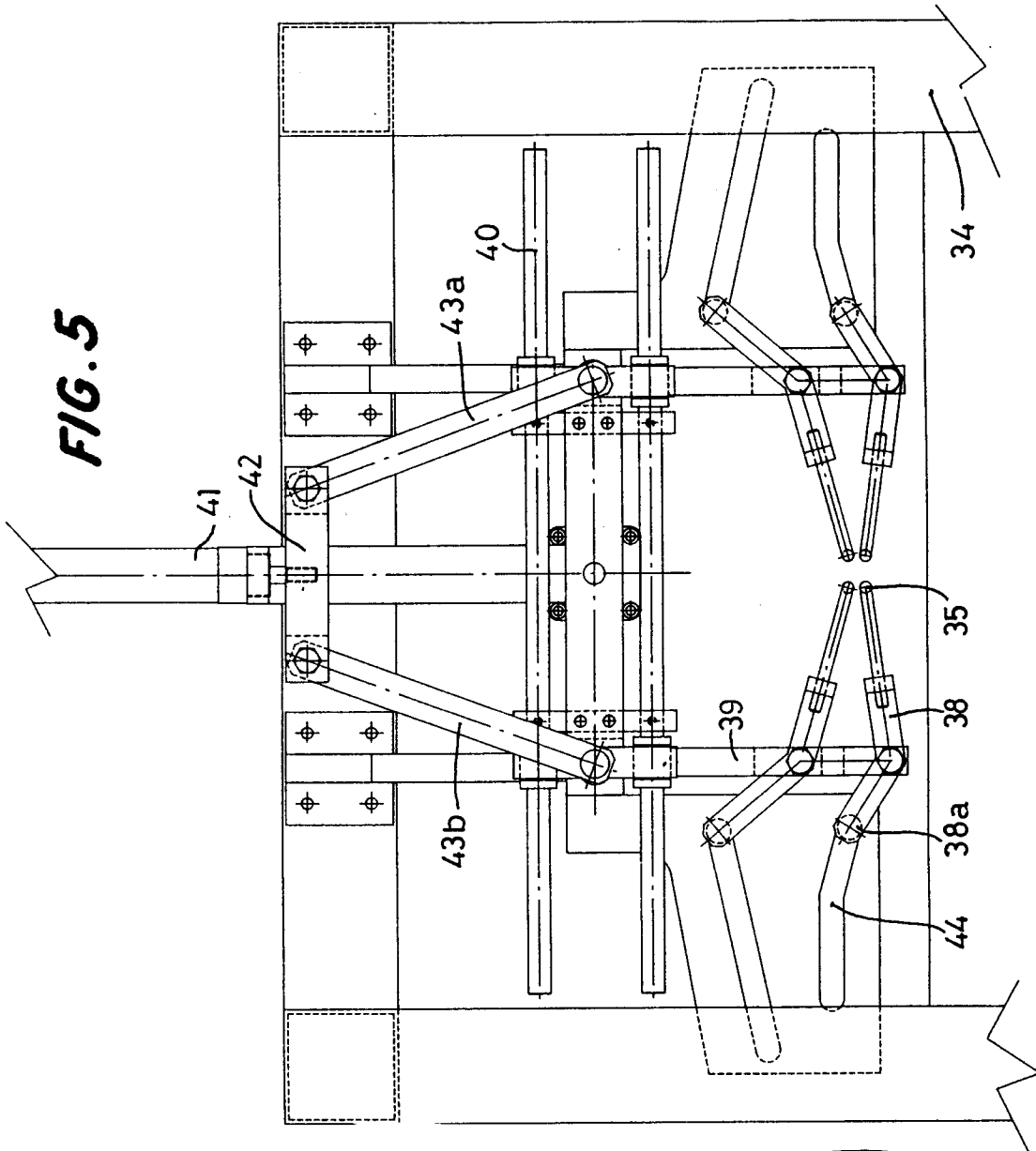


FIG. 8

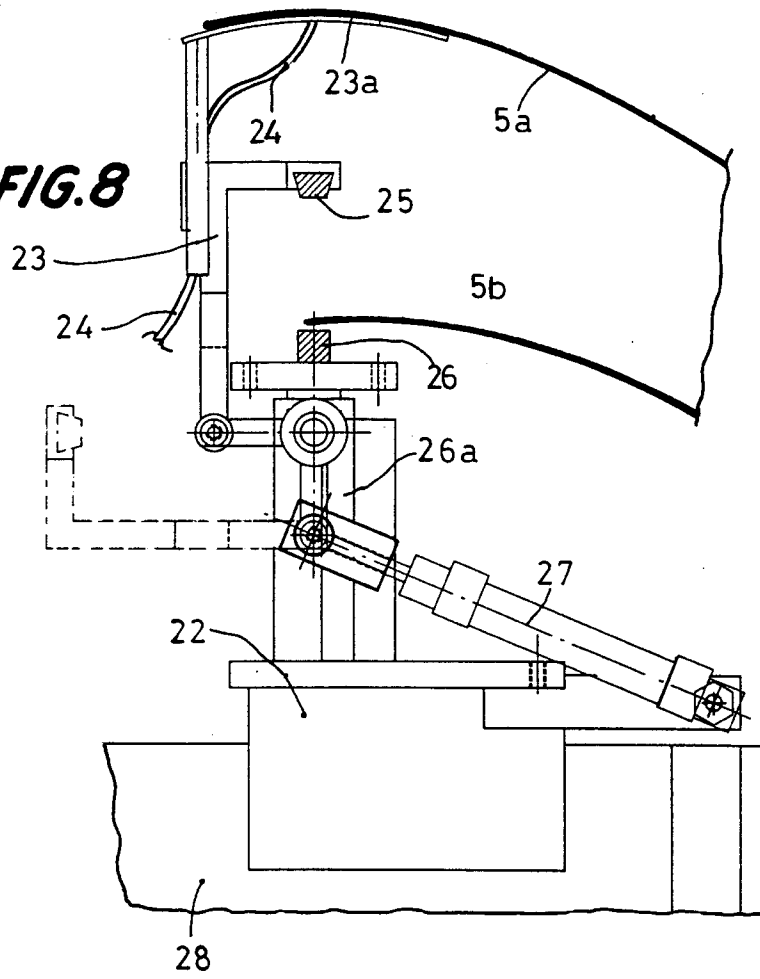


FIG. 7

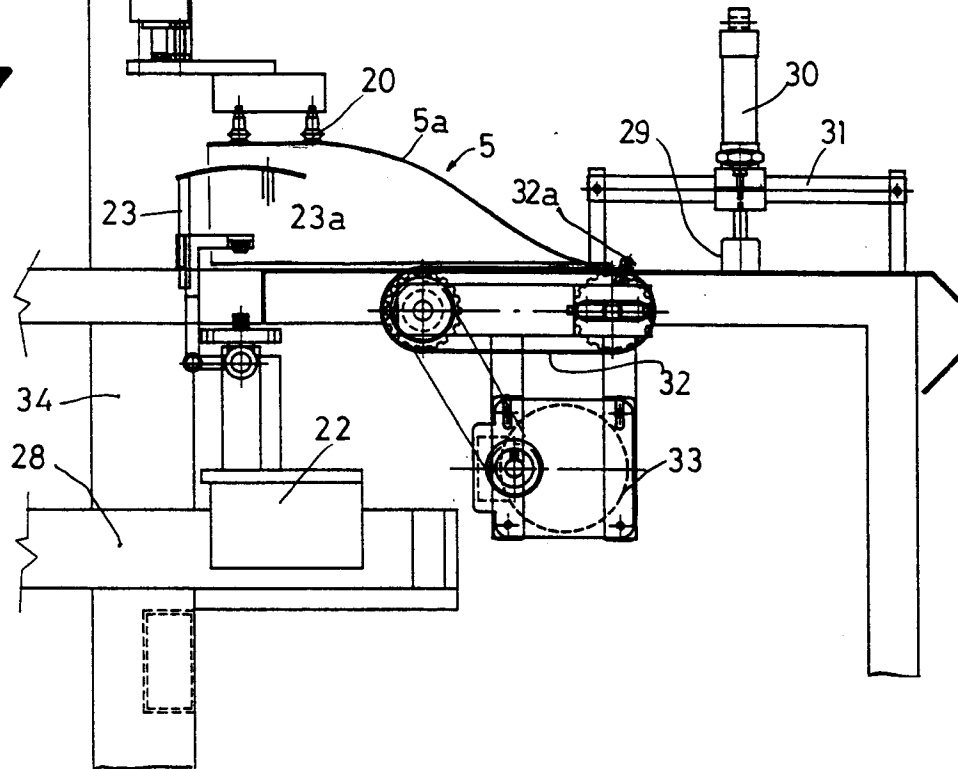


FIG. 9

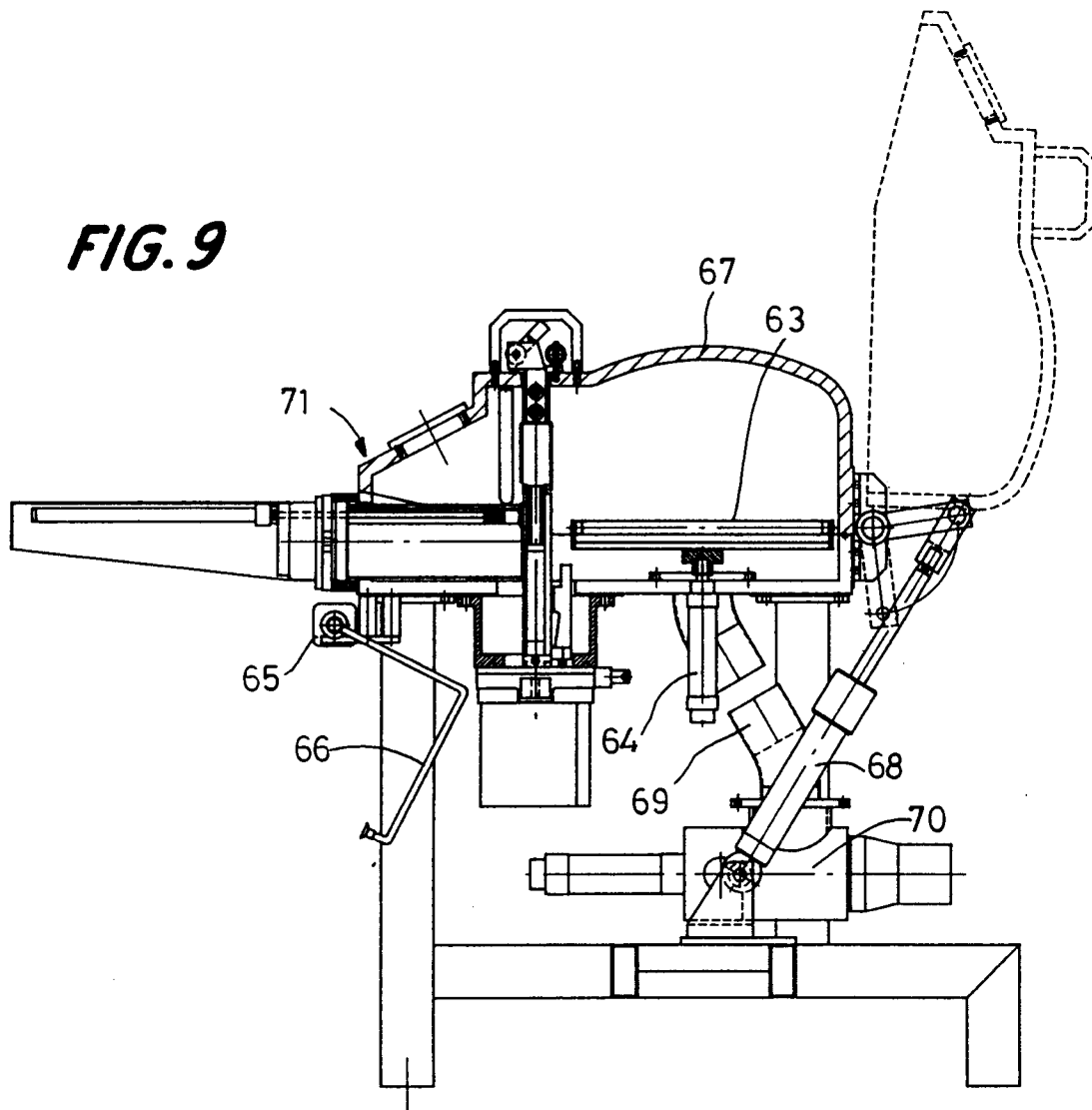
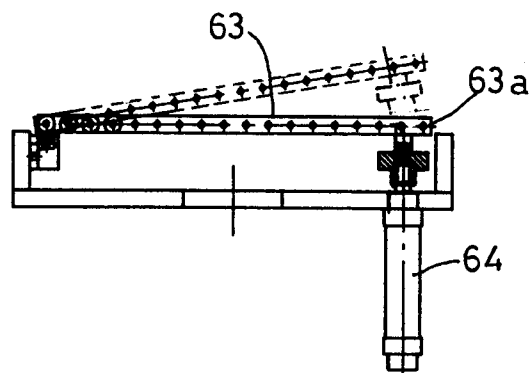


FIG. 10





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 50 0076

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)
A,D	EP-A-0 506 599 (METALQUIMIA) * column 5, line 53 - column 9, line 7; figures 2-21 *	1	B65B25/06 B65B43/34 B65B31/02
A	US-A-3 990 214 (BELL) * the whole document *	1	
A	DE-A-21 22 648 (NIEDECKER) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B A23B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		10 November 1995	Claeys, H
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