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I. Field of the Invention

The invention relates to producing shish kebab skewers where ingredients in the form of pieces of meat or pieces of vegetables like, e.g., pieces of peppers and onions are sequentially placed on skewer, typically a disposable skewer made of wood, advantageously in a predetermined sequence.

A standard shish kebab skewer is made from five pieces of meat today and four pepper and onion pieces which shall be provided on the skewer in a predetermined sequence.

II. Background of the Invention

Due to the following problems pronging on the skewer has been typically performed by hand so far:

- the individual ingredients differ in shape and size
- the individual ingredients differ in hardness and toughness
- the skewers are not always straight
- the skewers are instable in transversal direction

Even a partial automation of the production process has only taken place in as far as pronging the individual ingredients along a conveyor belt was distributed between different manual laborers so that each laborer prongs a particular ingredient in a particular position in the sequence of the ingredients on to the skewer.

Besides that, solutions are known in which a robot supports a skewer and prongs the ingredients one after another that are provided on a conveyor belt out of sequence, and/or the ingredients are conveyed in channels and pronged by hand.

However, the complexity is much too high in relation to the output actually achieved.

Furthermore, a machine for producing shish kebab skewers is known from
5 WO 2009 0250982 A1 wherein the individual pieces to be pronged are respectively received in an upward open bowl and a plurality of bowls in rows and columns form a movable bowl band or bowl pattern.

The pronging is performed by pushing skewers transversally to a possible
10 movement direction of the bowl pattern horizontally through pieces resting in a row of bowls that sit adjacent to each other in a row wherein the bowls have corresponding upward open recesses in walls that are transversal to the pushing direction.

15 Thereafter the pierced ingredients with the skewers are initially left in the bowl row.

In order to prevent the pieces to be pushed upwards out of the bowl during piercing, the respective piece has to be kept in the bowl during the piercing
20 using a lid or down holder which closes the upper open side of the respective bowl.

III. Detailed Description of the Invention

25 a) Technical Task

Thus, it is an object of the invention to provide a method and a device which achieves maximum output with limited technical complexity and a low failure rate.

30 b) Solution

The object is achieved by the features of claims 1 and 11. Advantageous embodiments can be derived from the dependent claims.

The object is achieved by a method where plural skewers are supported on a holder adjacent to one another and ingredients are pronged on all skewers of the holder simultaneously in the required sequence of the ingredients on the individual skewers.

For this purpose the ingredients are individually provided in a bowl which has a pass-through opening in a center of its base so that the skewer coming from above can be inserted through the ingredient and through the hole. A set of bowls is provided for each individual skewer, wherein the ingredients which shall be subsequently placed on the skewer are disposed in the set of bowls.

According to the number of skewers in a holder several of these sets of bowls.

The skewers are received in a movable skewer holder parallel adjacent to one another with an offset and are supported in the skewer holder with their rear ends.

This facilitates lowering the skewer holder with all skewers included therein relative to respectively identical bowls of the different sets of bowls while pronging an ingredient onto every skewer and performing this step in sequence along all bowls of all bowl sets until all skewers in the skewer holder are simultaneously filled with ingredients.

Advantageously the sets of bowls include rows of bowls, in particular straight rows of bowls. Plural such rows of bowls are arranged at a distance which corresponds to a distance of the skewers in the skewer holder.

This bowl arrangement including parallel rows of bowls is movable transversal to an extension of the rows of bowls and forms a conveyor belt for the ingredients.

An elongated skewer holder is arranged transversal over plural rows of bowls for pronging, thus over as many rows of bowls as there are skewers in the skewer holder.

5

For this pronging the arrangement of bowls is stopped until the entire row of bowls which is associated with every skewer in the skewer holder has been worked through.

- 10 Then the skewer arrangement moves forward in its movement direction by the same number of rows of bowls and the skewer holder that is provided with empty skewers recommences pronging.

- 15 In order for the skewers not to prong out laterally during pronging they are laterally supported in a front portion, at least during pronging of the ingredients.

- 20 Filling the bowls of the bowl arrangement is advantageously performed in an automated manner in that storage containers for the ingredients are arranged at a beginning of the bowl arrangement in rows transversal to the movement direction of the bowl arrangement, wherein the ingredients fall individually into the bowls of the bowl arrangement arranged thereunder from outlets of the storage container.

- 25 In order to assure that only one individual ingredient is arranged in a bowl the bowls have a recess with a respective depth which can only receive one ingredient. When a second ingredient is placed there above it is removed in different ways.

- 30 The simplest solution is a scraper advantageously configured as a scraper shaft that rotates against a running direction of the bowl arrangement, wherein the scraper extends transversal to the moving direction above the bowl

arrangement and retains additional ingredients until they fall into an empty bowl.

A more complex version includes an upward slope of the bowl arrangement in movement direction and making the bowl arrangement vibrate in order to have ingredients that are not nested in an indentation of a bowl slide downward along the slant of the bowl arrangement until they fall into an empty bowl.

10 When required both methods can also be combined.

Feeding the skewer holder with empty skewers can also be automated.

Thus, the skewers are provided on a skewer support parallel to each other with offsets that correspond to skewer receivers in the skewer support. Additionally also rear ends of the skewers have to be freely accessible in order to be engaged by the skewer receivers of the skewer holder.

20 The skewers, however, are received in bulk and have to be separated first.

For this purpose the skewers are poured parallel to each other into a skewer magazine with an outlet opening and are individually removed from the outlet opening and placed on a skewer conveyor with correct spacing.

25 This process can also be automated by an individualizer which will be described in a subsequent embodiment.

Finished shish kebab skewers are then placed by the skewer holder into packages, typically dishes. The dishes are typically arranged directly behind one another in a storage portion, for example on an extraction conveyor for the dishes and typically not with an offset that corresponds to the offset of the skewers in the skewer holder.

Therefore, the skewers have to be placed in packages individually or in groups. Therefore the skewer receivers of the skewer holder can be opened and closed individually and independently from one another so that the skewer receivers can support or release the skewers individually.

5

The skewer holder is being moved in cycles:

- initially from the skewer station for loading with new, empty skewers

10 - from there to the bowl arrangement for pronging the ingredients

- from there to the storage area with the packages, in particular dishes into which the finished shish kebab skewers are placed.

15 The bowls may have to be individualized as well since they are often delivered stacked into each other. For this, however, solutions are known and available.

20 The machine includes various functional modules, namely at least an ingredient module and a movable skewer holder.

25 In the skewer holder plural skewers are received parallel to each other with a defined distance from each other at a rear end in order to be able to prong accordingly positioned ingredients simultaneously using the skewer holder and the skewers protruding therefrom.

30 Providing the ingredients in a predetermined arrangement is provided by the ingredient module which includes a plurality of bowls in which a piece of an ingredient is respectively provided.

30

For pronging the skewer holder can be lowered so that the respective skewer is thrust through the ingredient in the bowl and the skewer can protrude by any amount through the pass through hole in the base of the bowl.

Sets of bowls with identical ingredients as contents are provided in the spatial arrangement relative to each other that corresponds to the spatial arrangement of the skewers in the skewer support. Advantageously the skewers are
5 arranged in the skewer holder in a straight line.

Therefore, the bowls in the bowl rows should be arranged so that a number of bowls of a bowl arrangement corresponds to a number of ingredients on a completed shish kebab skewer, advantageously, however, a sequence of the
10 ingredients within the bowl row of bowls does not correspond to a sequence of ingredients on the subsequent shish kebab skewer in order to facilitate filling the bowls.

Such bowl rows of filled bowls are arranged behind one another, thus with
15 individual bowl rows parallel and offset from one another in a sufficient number as a two dimensional approximately horizontal bowl arrangement, so that the number of bowls in extension direction of the bowl arrangement, thus transversal to the extension of the bowl rows is greater than the number of the skewers of the skewer holder.

20

The distance between the bowl rows corresponds to a distance of the skewers in the skewer holder.

Thus, the skewer holder with its longitudinal direction in extension of the bowl
25 arrangement can prong a first ingredient in each bowl row, subsequently prong the second ingredient in the bowl row until the bowl rows that are currently being processed are empty and the skewers supported in the skewer holder are filled.

30 Then the bowl arrangement moves forward in its direction of extension by the length of the skewer holder, thus by the number of the skewers supported in the skewer holder and the next cycle commences with empty skewers in the skewer holder.

In any case, the machine also includes a control in order to control the movement of the movable components relative to each other.

- 5 The machine can include additional components to provide further automation.

Thus, a skewer delivery module can be provided into which the skewers are filled and individualized, checked for straightness and then arranged relative
10 to one another with an offset that corresponds to the offset of the skewer receivers in the skewer support, wherein the rear end is freely accessible to be engaged by the skewer holder.

Furthermore, a depositing group can be provided which includes a depositing
15 surface for packages for receiving the completed shish kebab skewers and an extraction conveying device for the filled packages.

The ingredient module can additionally include a filling device for automated
20 filling of the bowls of the bowl arrangement with a respectively defined ingredient.

For this purpose storage containers with a respective type of ingredient are arranged adjacent to one another in the direction of extension of the bowl rows, typically with a width of plural bowl lines, respectively with an outlet,
25 e.g., configured as an open side over the bowl rows which run along below in the movement direction of the bowl arrangement. Following gravity the ingredients fall in to the bowls, possibly more than one ingredient falls onto or into a bowl.

30 Excess ingredients resting on the bowl arrangement can be removed manually.

A more automated solution for the removal includes a bowl arrangement that slopes upward from the ingredient outlets, wherein the bowls are put into vibration by a vibrator. Thus the ingredients that are not arranged in a recess of a bowl slide downward along the slope of the bowl arrangement until they
5 find an empty bowl and fall into it.

Instead of using vibration, excessive ingredients can also be pushed into the bowls by a scraper, advantageously a scraper shaft, rotating against the running direction of the bowl arrangement wherein plural scrapers protrude from
10 the scraper shaft and are distributed over a circumference of the scraper shaft.

In case storing the ingredients in simple upward protruding funnel-shaped storage containers does not suffice for uniform dispensing to the bowl arrangement, effective individualizers that are adapted to the properties of the
15 ingredient can be used for the respective ingredients between the storage containers and the bowl arrangement. Thus pieces of meat adhere to each other much more strongly than pieces of onion or pepper.

20 In order for a respective ingredient to be centered in a respective bowl above a hole in the base of the bowl, the bowls have flanks that slope upward in outward direction and bowls there, for example, are configured rectangular.

The individual bowl rows are advantageously configured in one piece in bar-shape. The advantageously bar-shaped bowl rows are connected with their
25 ends between two parallel running annular endless circumferential bar conveyors which cause the movement of the bowl arrangement.

The small load bearing capability of the skewers transversal to their longitudinal direction and thus a risk of excessively long skewers kinking out, for
30 example, when they hit the base of the bowl adjacent to the pass-through hole, for example, because the skewer received too much lateral deflection from an eccentric ingredient is problematic.

5 The skewer holder is typically made from a base element in which the skewer receivers for the individual skewers are arranged in a row wherein the skewers are supported in the skewer receivers at rear ends of the skewers that are typically dull.

10 Advantageously the skewer holder includes a support device for laterally supporting the skewers when pronging the ingredients in their center portions.

15 The support device is made for example from a support device for the skewers above the bowl arrangement including conical vertical guides for each skewer which are supported closely above the bowls and which are typically only provided in one row below the skewer support and wherein the support device is moved together with the skewer holder in a direction of the bowl row and can be formed for example from two support bars that are movable relative to one another like pincers.

20 Alternatively, the support device is made from two guide bars which are movable relative to one another like pincers wherein the guide bars are arranged along a respective side of the row of skewers in the skewer holder and laterally support the skewers approximately in a center of their length. Through respective notches in the guide bars the skewers are also supported in longitudinal direction of the skewer holder.

25 The skewer support can also be variable with respect to its distance from the skewer receiver.

30 The skewer storage module with skewer magazine and individualizer can include a test unit for the skewers. A lack of quality of the skewers that are typically made from wood which are typically not straight, or which become non-straight due to high humidity in the production facilities, and which kink

very easily under load due to excessive curvature for example because they do not hit the pass through hole in the cut anymore.

Furthermore, the skewers are delivered in large packets and still have to be individualized. Individualizing is performed for example by two or three circular discs that are arranged at a distance from one another and which jointly rotate about a horizontal axis, wherein aligned recesses for receiving a skewer that extends over all discs are provided in an outer circumference of the discs.

The discs rotate with their outer circumference closely adjacent to the open side of a storage container for the skewers which operates as an outlet so that a skewer drops into each set of recesses and so that the skewer is moved upward by the rotating circular discs as long as it is sufficiently straight. If the skewer is not moved along it can already be removed from the individualizer at this location using a scraper.

After surmounting the highest point of the circular disc, the skewers are placed on a skewer conveyor by the circular discs on another side, wherein the skewer conveyor moves relative to the speed of rotation of the circular discs, so that the skewers are at a distance on the skewer conveyor which corresponds to the distance of the individual skewer supports in the skewer holder.

Since the rear ends of the skewers are exposed on the skewer conveyor, the skewer holder can simultaneously grip a respective number of skewers on the skewer holder and hold them in its skewer receivers and take them off the skewer conveyor.

In addition to an individualizer, a testing unit, advantageously a touch-free optical testing unit, is provided which checks straightness of the skewers and sorts out non-straight skewers at the latest on the skewer conveyor, better already on the individualizer.

Also testing for sufficient length of the skewer can be integrated.

5 The skewer holder is advantageously attached at a robotic arm and pivotable in particular by at least 90 degrees and moveable so that the skewer holder can reach the skewer conveyor and also the bowl arrangement and also the depositing area for completed skewers.

10 The depositing area can be part of a depositing module which includes for example a dish conveyor which can form the depositing area.

Empty packages, in particular dishes, are arranged in the depositing area for inserting the completed shish kabob skewers using the skewer holder.

15 In the depositing area, the packages, in particular the shells, adjoin advantageously without any offset. The skewers are deposited therein by the skewer support in that the individual skewer receivers are opened individually, and the skewer supported therein is deposited in a dish before the at least one next skewer receiver is opened optionally after moving the skewer holder in
20 the direction of extension of the row of dishes.

The depositing module can also include a dish dispenser in order to individualize the dishes that are delivered in stacks and to store them on the storage area, in particular the dish conveyor.

25

c) Embodiments

Embodiments of the invention are subsequently described in more detail with reference to drawing figures, wherein:

30

Fig. 1a - e: illustrates the shish kabob machine in various views,

Fig. 2a – c: illustrates the shish kabob machine in different operating conditions from above,

Fig. 3a - c: illustrates the skewer holder,

5

Fig. 4a – c: illustrates the individualizer for the skewers; and

Fig. 5: illustrates the support device for the skewers during pronging.

10 In FIG. 1, FIGs. 1a – c illustrate the shish kabob machine in a prospective view, thus in FIG. 1a with laterally closed housing elements and in FIGs. 1b, c in different prospective views with open housing elements

FIG. 1d illustrates a vertical longitudinal view through the machine in the
15 condition of FIG. 2b and FIG. 1e illustrates a view of the machine in longitudinal direction from the front end.

As apparent from FIG. 1 and also FIG. 2, one of the essential components of the machine is a bowl arrangement 7 configured as an endless revolving
20 band including individual bowls 6.

The bowl arrangement 7 moves in a controlled manner in its running direction, the longitudinal direction of the machine. In the present application, also designated as “second direction” from a left front end 7a of the bowl arrangement 7 to the rear end 7b wherein the front end is arranged on a left
25 side in FIG.s 1 and 2.

As evident from FIG. 3b, the bowl arrangement 7 is made from a plurality of bowls 6 which include downward tapering recesses, thus beveled flanks 16
30 and a pass through borehole 32 in the base 17 which is barely large enough to let a skewer 99 penetrate.

In an enlarged view in FIG. 2a, the bowls 6 are arranged parallel to one another in bowl rows a, b arranged with a defined offset wherein the bowl rows extend in a transversal direction 10 relative to the running direction 11 of the bowl arrangement 7 and are configured as bowl bars 34 whose ends are attached at a bar feeder 35 best evident in FIG. 1d wherein the bowl feeder feeds the bowl bars 34 and thus the entire bowl arrangement 7 in feed direction 11. The bar feeder 35 runs over two deflection rollers 37 in an endless manner wherein at least one of the deflection rollers is driven.

- 10 Corresponding bowls 6 of the adjacent bowl rows 8a, b thus form bowl lines 12a, b extending in running direction 11 of the bowl arrangement 7.

At the beginning of the bowl arrangement 7, the left end in FIG. 1, there is a filling device 9 for the bowl 6 which causes exactly one of the ingredients 98 to rest in the indentation of each bowl 6, wherein the ingredients are to be pronged on the skewer 99.

As illustrated in FIG. 1d, the upper main element of the endless revolving bowl arrangement 7 slopes upward at a beginning 7a of the bowl arrangement. Through this upward sloping portion of the bowl arrangement 7, the filling device 9 including plural storage containers 14a, b arranged adjacent to one another in transversal direction 10 is arranged, (c.f., FIG. 1a-c) wherein the storage containers sometimes extend over plural bowl rows 12a, b in transversal direction and wherein the storage containers have an open side towards the bowl arrangement that is arranged directly above the bowl arrangement 7 and wherein the open sides act as outlets 15a, b.

Each storage container 14a, b respectively includes a predetermined ingredient 98. Typically a shish kebab skewer 100 only includes 3 or 4 different ingredients, namely pieces of onions, pieces of pepper and pieces of meat of one or two different types of meat.

However, more than these three or four storage containers 14a, b can be provided so that there are storage containers which include the same ingredient 98 which helps optimizing the movement path of the skewer holder 3 during subsequent pronging.

5

Since the ingredients 98 only drop into the bowl 6, it can happen that more than one ingredient 98 comes to rest in or on a bowl 6 which is to be avoided. For this purpose, a scraper shaft 41 is arranged at an end of the filling device 9 from which scraper device plural scrapers 36 that are advantageously elastic extend distributed over the circumference and wherein the scraper shaft
10 rotates so that the scrapers 36 scrape over the bowl arrangement 7 against a running direction. the scrapers 36 extend over the entire width 10 of the bowl arrangement 7 and their scraper edges protrude downward directly above the top side of the bowl arrangement 7 which has the effect when plural ingredi-
15 ents 98 sitting on top of one another in a bowl 6, a second or a third ingredient 98 that are arranged higher up is pushed back and falls into a subsequent empty bowl 6.

The bowl arrangement 7 filled with a respective ingredient 98 in each bowl 6
20 then runs into the pronging portion 38 in which for example at an end 7b of the bowl arrangement 7 (c.f. FIG. 1d) a robot arm 40 or a suitable other handling device for the bowl holder 3 is approximately arranged in a center of the transversal extension of the bowl arrangement 7, wherein a skewer holder 3 is attached at a free end of the robotic arm, wherein the skewer holders 3 do
25 not yet include skewers 99 in FIG. 1.

In FIG. 3a, a skewer holder of this type is illustrated by itself in a perspective view, in FIG. 3b in a front view and in FIG. 3c in the side view, respectively loaded with skewers 99.

30

The skewer holder 3 includes a bar shaped base element 19, at whose top side there is the coupling device for attachment at the robot arm 40.

At a bottom side of the base element 19, there are individual skewer receivers 13a, b, c that are exactly offset in the extension of the base element 19, wherein the skewer receivers can receive and fixate a respective rear end 99b of a skewer 99 so that the skewers 99 supported in the individual skewer receivers 13a, b, c protrude from the skewer holder 3 parallel to one another and their forward pointed ends 99a are respectively arranged on a straight line.

The skewer holder 3 is controllable by the robotic arm 40 so that the individual skewer receivers 14a, b, c can be opened and closed separately and independently from each other.

As apparent from FIG. 3b, the skewer receivers 13a, b, c are offset from one another so that the skewers 99 supported therein are at identical distances 33 from one another, wherein the bowls 6 are arranged in bowl rows 8a, b that have the same distance from each other as illustrated in FIG. 2a.

Furthermore, there is the skewer storage module 2 adjacent to the end portion of the bowl arrangement 7, wherein the skewer storage module is used for offering new empty skewers to the robot arm 40 with the skewer holder 3 for receiving.

Behind a rear end 7b of the bowl arrangement 7, there is the depositing module 4 in which completely filled shish kebab skewers 100 are placed in dishes 101 in a depositing area 29 by the skewer holder 3 (c.f. FIG. 2c). Thus typically plural dishes 101 are arranged adjacent to one another in the storage area 29, advantageously at least over an extension which corresponds to an extension of the skewer holder 3 and they are arranged in transversal direction 10 of the skewer arrangement 7 slightly offset relative to its width, typically on a first dish conveyor 31a.

Dishes 101 filled with shish kebab skewers 100 can then be moved in extension 11 of the bowl arrangement 7, advantageously by the empty skewer

holder 3 onto a dish conveyor 31b extending there behind in transversal direction 11 wherein the dish conveyor extracts the filled dishes 101 for further packaging.

- 5 Advantageously also the deposition area is configured as a dish conveyor 31a since the dishes 101 are initially individualized by a dish individualizer 41 which is not described in more detail since solutions are available in the art, wherein the individualizing is done from a stack 42 of dishes 101 stacked into one another and placed onto the beginning of the dish conveyor 31a which
10 transports the individualized dishes 101 into the storage portion for the shish kebab skewers 100.

In this sense, FIGs. 2a, b, and c illustrate the different functional conditions of the robotic arm 40 and thus of the skewer holder 3.

15

The robotic arm 40 can pivot the skewer holder 3 about a vertical axis and also about at least one, advantageously two horizontal axes that are perpendicular to each other and can thus manipulate the skewer holder 3 into any desired position in space.

20

- FIG. 2a illustrates the skewer holder 3 in a horizontal position with its longitudinal direction in running direction of a skewer conveyor 28 arranged adjacent to the bowl arrangement 7, wherein the skewers 99 are deposited on the skewer conveyor in distances 33 corresponding to the skewer receivers 13a, b of the skewer holder 3 parallel and adjacent to one another so that they
25 extend transversally over the skewer conveyor 28 and so that they protrude with their rear free ends 99b over the skewer conveyor 28.

- Thus, the skewer holder can receive a respective number of skewers 99, advantageously when the skewer conveyor 28 is stopped, wherein the skewer holder 3 with open skewer receivers 13a, b, c approaches rear ends 99b of the skewers 99 that are adjacent to one another so that the skewers protrude into the skewer receivers 13a, b, c up to a stop that is provided at this loca-
30

tion and then all skewer receivers 13a, b, c are closed together, thus the skewer holder 3 is loaded with new empty skewers 99.

5 It is subsequently described with reference to FIG.s 4a through c how the skewers 99 are individualized and deposited on the skewer conveyor 28.

Thereafter the robot aligns the skewer holder with its extension in running direction 11 of the bowl arrangement 7 for pronging (c.f., FIG. 2b) and lowers the skewer holder in the pronging portion 38 respectively from above into a
10 dish set 39 which extends over a number of skewers 99 that are supported in a number of skewer rows 8a, b in the skewer holder 3 and receives the next required ingredient 98.

This way, the skewer holder 3 moves over a width of the bowl arrangement 7
15 in the pronging portion 38, wherein the number of bowls 6 in a row of skewers 8 corresponds to the number of ingredients 98 that are to be received on a shish kebab skewer 100 but the number of bowls does not necessarily correspond to the sequence in transversal direction of the bowl arrangement 7 in order to minimize the number of storage containers.

20 When the skewers 99 in the skewer holder 3 are completely filled with ingredients 98 in this manner so that they form completely loaded shish kebab skewers 100, the robot arm 40 pivots the skewer holder 3 (c.f. FIG. 2c) to the storage portion 29 with its extension parallel to the running direction of the
25 dish conveyor 31a, so that the shish kebab skewers 100 are supported above the dishes 101. Then the skewer receivers 13a, b are opened either jointly or individually separately, optionally while moving the skewer holder in extension direction of the dish conveyor 31a until a desired number of shish kebab skewers 100 is arranged in each dish 101.

30 Shish kebab skewers 100 of plural skewer holder 3 may be required until all dishes 101 in the depositing area 29 are filled completely.

When the dishes 101 are completely filled, the filled dishes 101 can either be moved by the empty skewer holder 3 or by a separate slide 101 onto an additional dish conveyor 31b running parallel thereto further behind, wherein the additional dish conveyor is used as an extraction conveyor for the filled dishes 101 for further processing.

FIGs. 4a through c illustrate individualizing of the skewers which are stored as bulk material in a skewer magazine 23.

10 The function is evident from FIG. 4a.

The individualizer 22 essentially includes plural circular discs 25 that are arranged axially offset on a disc axis 45 in whose outer circumference axially aligned recesses 26 are arranged distributed over the circumference at defined positions so that a cross-section of a skewer 99 can respectively be received therein at least partially.

Thus one respective skewer can drop into the aligned recesses 26 of the plural discs 25.

20 The disc axis 45 extends essentially horizontal and thus the circular discs 25 are respectively arranged in a vertical plane.

25 The skewer magazine 23 is arranged on one side viewed in a direction of the disc axis 45 of the disc unit made from plural discs 25, wherein the skewers 99 are loosely stacked parallel to one another and with respectively aligned front and rear ends.

30 The magazine is open on one side so that the skewers 99 contact circumferences of the circular discs 25 at a level of their disc axes 45 or slightly above. Rotating all discs 25 together and synchronously about the disc axis 25, clockwise in FIG. 4a, thus so that the circumference of the circular discs 25 moves up from below along the loosely stacked skewers 99, one skewer 99

slides into one respective recess 26 of the circular discs 25, wherein the recesses 26 are in alignment with one another and is carried upward along the circumference of the circular discs 25.

- 5 Above a highest point of the circular discs 25, a test unit 24 is arranged which optically measures straightness of a skewer 99 arranged at this location.

When rotating the circular discs 25 further, the respective skewer 99 moves downward along the circumference of the circular discs 25 and would fall out
10 of the aligned recesses 26 starting at a particular point in time. In order to be able to move the skewers further downward beyond this circumferential point, a respective plate shaped opposite guide 52 is respectively arranged outside the circular discs 25 at a distance so that the skewer 99 arranged there between in a recess 26 can be moved further downward in a defined manner.

15

The skewers 99 however should be deposited on a horizontal skewer conveyor 28 that is arranged on an opposite side relative to the skewer magazine with respect to the disc axis 45 at a defined distance 33, the distance of the skewer receivers 13a, b in the skewer holder 3.

20

For this purpose, grooves 46 can be provided in the skewer conveyor 28 that is provided as an endless conveyor over two deflection rollers wherein the grooves extend at the distance 33 transversal over the skewer conveyor 28 and are advantageously configured self-centering wherein a respective
25 skewer 99 falls into the grooves, wherein a skewer 99 that respective also extends transversally to the skewer conveyor 28 also falls into the grooves.

This is facilitated in that the skewers 99 are transported further downward between the circular discs 25 and the opposite guides 52 up to the open end
30 of an approximately vertically arranged slot shaped skewer buffer 51 arranged there below, wherein the slot shaped skewer buffer is so tight that the skewers can only be stacked therein on top of each other. The skewers 99

fall into the skewer buffer 51 and fill the skewer buffer up to a predetermined level of a filling level sensor, then the individualizer stops.

5 Slightly below a lower open outlet end of the skewer buffer 51, the skewer conveyor 28 runs through, wherein the distance there between is so small so that only a skewer falling into one of the grooves 46 is moved along by the skewer conveyor 28.

10 In order to sort out curved skewers, U-shaped extractors 43 are arranged on a dispensing side of the circular discs 21, thus above the skewer conveyor 28 on a pivot shaft 27 which extends parallel to the disc axis 45 slightly outside the circumferential portion of the circular disc 25 axially offset on the pivot shaft 47 between the circular discs 25. The U-shaped extractors can be pivoted into a circumferential portion of the circular discs 25 synchronously by
15 pivoting the pivot shaft 47 with the free end of its arm oriented towards the circular discs 25 so that the next skewer that moves downward driven by the circular discs 25 and determined to be curved by the testing unit 24 falls into the U-shaped recesses of the aligned extractors 43 so that the skewer can be disposed of later on.

20

Advantageously, the skewer conveyor 28 is only made from narrow endless circumferential bands, belts, chains or similar that are offset in extension of the skewer, wherein one of the bands, belts or chain is proximal to a front end 99a of the skewers 99 and the other is offset backward from the rear
25 aligned ends 99b of the skewers 99 so that the overhang of the rear end 99b of the skewers 99 that rest on the skewer conveyor 28 suffices relative to the skewer conveyor 28 for engaging the rear ends with the skewer receivers 13a, b, c of the skewer holder 3 as described supra.

30 The skewers 99 which are typically made from wood and which are typically thin can easily kink out sideways and fracture.

In order to prevent kinking and fracturing of the skewers 99 during pronging, a support device 20 is being used.

FIG. 5 illustrates a detail of the pronging portion 38 of the bowl arrangement 7 according to FIG. 2b and the bottom of FIG. 3c illustrates a first embodiment of the support device 20.

The robotic arm 40 supports the bar shaped skewer holder 3 which is illustrated without inserted skewers 99 for reasons of clarity. Above a bowl set 39 provided for pronging that is arranged parallel to the running direction 11 of the bowl arrangement 7 wherein the bowl set is advantageously stopped for pronging the ingredients 98 from the bowl 6 of the bowl arrangement 7, otherwise the robotic arm 40 would have to be moved synchronously with the bowl arrangement 7.

Slightly above the bowl set 39 provided for pronging, a respective support bar 21a, b is arranged parallel to the bowl set 39 on both sides, wherein the support bars can be individually moved in a controlled manner along guides 48 transversally extending over the bowl arrangement 7, wherein the movement is performed by support blocks 53 in which the guides 48 are attached with their ends, in particular pivotably supported and can be moved from both sides above and towards the pass through boreholes 32 in this bowl set 39 so that the skewers 99 which are received in the skewer holder 3 and not illustrated herein can just be run through in between.

Optionally vertically extending grooves can be arranged at surfaces of the support bars 21a, b that are oriented towards each other, so that vertical pass through openings are created when the support bars 21a, b are moved in contact with each other, wherein the skewers 99 can just be run through the pass through openings when the skewer holder 3 is lowered. These pass through openings then have to be in alignment with the pass through openings 32 in the bases 17 of the bowl set 39. The pass through openings 32 can be conically expanded for inserting the skewers at its upper end.

The bearing blocks 53 that are movable transversally over the bowl arrangement along guides 48 can be used to move the support bars 21a, b with the skewer holder 3 from one bowl set 39 to another. The support position of the support bars 21a, b is advantageously reached in that the support bar can be pivoted about a longitudinally oriented pivot axis relative to the support blocks 53 towards the skewer row in the skewer holder 3. For complete lowering and raising of the skewers 99 they are pivoted into an idle position away from the skewer row in which they cannot collide with the already pronged ingredients 98 on the partially loaded skewer 99.

Alternatively the support bars 21a, b can be fixated at the bearing blocks 53 so they are not pivotable and can only be moved between support position and idle position by a linear movement of the bearing blocks 53.

This way the skewers are laterally supported and the support device 20 moves together with the skewer holder during pronging from one bowl set provided for pronging to the next in transversal direction 10 over the bowl arrangement 7 which advantageously stands still.

A support device 20 for the skewers can also be arranged at the skewer support 3 itself instead of being arranged at the machine frame above the skewer arrangement 7 as illustrated in an alternative embodiment in FIG. 3c. This however increases the weight of the skewer holder 3.

Thus, two prong shaped support bars 21'a, b extending parallel to the row of skewers 99 are pivotable about a pivot axis 49 which also extends parallel to the longitudinal extension of the row of skewers 99 of the skewer holder 3 and thus parallel to the base element 19 of the skewer holder 3 so that the two support bars 21'a, b in a condition pivoted towards the row of skewers 99 laterally support the skewers, advantageously in that recesses for receiving the skewer cross-sections are provided in a front edge of the support bar 21'a, b oriented towards the skewers 99.

The pivot axis 49 is thus attached at a lower end of a support element 50 which is attached along the base element 19 of the skewer holder in extension direction of the skewers 99 and movable in a controlled manner as a function of the extent of being filled with skewers 99.

A control which is advantageously movably attached at a free arm of the operator console 44 controls individual movements of the machine relative to each other with respect to time and space.

REFERENCE NUMERALS AND DESIGNATIONS

	1	ingredient module
	2	skewer module
5	3	skewer holder
	4	depositing module
	5	control
	6	bowl
	7	bowl arrangement
10	7a	beginning
	7b	end
	8a, b	bowl row
	9	filling device
	10	first direction, transversal direction bowl arrangement
15	11	second direction, running direction bowl arrangement
	12a, b	bowl line
	13a, b	skewer receiver
	14a, b	storage container
	15a, b	outlet
20	16	flank
	17	base
	18	bowl conveyor
	19	base element
	20	support device
25	21a, b	support bar
	22	individualizer
	23	skewer magazine
	24	test unit
	25	circular disc
30	26	recess
	27	axis
	28	skewer conveyor
	29	depositing area

	30	dish dispenser
	31a, b	dish conveyor
	32	pass through opening
	33	distance
5	34	bowl bar
	35	bar conveyor
	36	scraper
	37	deflection roller
	38	pronging portion
10	39	bowl set
	40	robotic arm
	41	scraper shaft
	42	stack
	43	receiver
15	44	operating console
	45	disc axis
	46	groove
	47	pivot shaft
	48	guide
20	49	pivot axes
	50	support element
	51	skewer buffer
	52	opposite guide
	53	bearing block
25		
	98	ingredient
	99	skewer
	99a	front end
	99b	rear end
30	100	shish kebab skewer
	101	packaging, dish

P a t e n t k r a v

1. Sjasjlykmaskine til fremstilling af sjasjlykspyd (**100**) med et defineret antal og rækkefølge af ingredienser (**98**) på et spyd (**99**), med

- 5 - et ingrediensmodul (**1**), i hvilket
- et respektivt stykke af en ingrediens (**98**) stilles til rådighed i en skål (**6**) med et gennemgangshul (**32**) i bunden,
- skålene (**6**) er anbragt i skållinjer (**12a, b**),
- en spydholder (**3**), i hvilken flere spyd (**99**)
- 10 - parallelt med hinanden med en defineret afstand (**33**) fra hinanden kan optages af spydleveringsmodulet (**2**),
- ved hjælp af spydholderen (**3**) kan stikkes ind i de respektive med afstand fra hinanden anbragte ens ingredienser (**98**) i en skållinje (**12a, b**) i de tilsvarende skåle (**6**) af de tilstødende skålrækker (**8a, b**), der forløber på tværs af skållin-
- 15 jerne (**12a, b**),
- en styreenhed (**5**), som styrer de bevægelige komponenters bevægelser i forhold til hinanden,

kendetegnet ved, at

- gennemgangshullet (**32**) er udformet således, at spydet (**99**) kan stikkes ind
- 20 igennem ingrediensen og gennemgangshullet (**32**) oppefra.

2. Sjasjlykmaskine til fremstilling af sjasjlykspyd (**100**) med et defineret antal og rækkefølge af ingredienser (**98**) på spydet (**99**), med

- et ingrediensmodul (**1**),
- 25 - mindst en spydholder (**3**),
- en styreenhed (**5**),
- ifølge krav 1,

kendetegnet ved, at

ingrediensmodulet (**1**)

- 30 - har en omtrent horisontalt anbragt endeløs eller endelig skållindretning (**7**) i en del eller i flere dele, hvilken består af parallelt med hinanden anbragte, i en første retning (**10**) forløbende skålrækker (**8a, b**) og vinkelret på disse anbragte skållinjer (**12a, b**), hvor hver skålrække (**8a, b**) omfatter et antal skåle (**6**) svarende til det ønskede antal ingredienser (**98**) på det færdige sjasjlykspyd (**100**),
- 35 - skålrækkerne (**8a, b**) er anbragt i en defineret afstand (**33**) fra hinanden og

- skållindretningen (7) er bevægelig i en retning af skållrækkernes (8a, b) rækkefølge i en anden, især horisontal retning (11),
og/eller

den aflange spydholder (3)

5 - i sin udstrækningsretning har spydoptagelser (13), der er anbragt i en defineret afstand (33) i forhold til hinanden, i hvilke spyd (99) kan holdes i deres bagerste ender (99b) parallelt i forhold til hinanden,

10 - med sin udstrækningsretning kan placeres på tværs hen over flere skållrækker (8a, b) og med hver sit spyd (99) over en skåll (6) og de spyd (99), der holdes i denne, ved nedsækning kan stikke ind igennem ingredienserne (98) i skållene (6), og

- kan aflægge de færdigfremstillede sjasjlykspyd (100).

3. Sjasjlykmaskine ifølge krav 2, **kendetegnet ved, at** ingrediensmodulet

15 - i skållindretningens (7) bevægelsesretning (11) ved dennes begyndelse har en påfyldningsindretning (9) til påfyldning af skållene (6) fra lagerbeholdere (14a, b), der er anbragt ved siden af hinanden i den første retning (10), altså i skållrækkernes (8a, b) forløbsretning, fra hvis respektive udgang (15a, b) ingredienserne falder ned i altid præcis den tilsvarende skåll (6) i den ene eller
20 de flere skållrækker (8a, b), og/eller

- skållindretningen (7) stiger fra udgangene (15 a, b) og omfatter en vibrator, som sætter skållene (6) i skållindretningen (7) i vibrationer, eller en afstryger (36), som skubber overflødige ingredienser (98) videre til en tom skåll (6).

25 4. Sjasjlykmaskine ifølge et af de foregående krav,

kendetegnet ved, at

skållene (6) har især runde fordybninger med skråt udad opad stigende flanker (16)

og/eller

30 de enkelte skållrækker (8a, b) er udformet ud i et og især på endesiden er fastgjort i en skålltransportør (18), som bevæger skållrækkerne (8a, b) i den anden retning (11).

5. Sjasjlykmaskine ifølge et af de foregående krav,

35 **kendetegnet ved, at**

spydholderen (3) kan svinges omkring en vertikal akse med mindst 90 grader

og/eller

spydholderen (3) har spydoptagelser (13), som kan åbnes og lukkes enkeltvis.

5 6. Sjasjlykmaskine ifølge krav 2, **kendetegnet ved, at** spydholderen (3) har et basiselement (19) med spydoptagelserne (13) samt især en støtteindretning (20) for spydene (99), der kan køres i forhold til basiselementet (19) langs med spydenes (99) udstrækning, hvor støtteindretningen (20) har især to støttelister (21'a, b), der kan bevæges mod hinanden på en sakselignende måde og er anbragt langs med hver respektiv side af rækken af spyd (99)

10 og/eller

der ved sjasjlykmaskinens bund er anbragt en støtteindretning (20), der kan køres i skållindretningens (7) tværreretning langs med føringer (48), med støttelister (21a, b), som kan lægges sideværts an mod spydholderens (3) række af spyd (99).

15

7. Sjasjlykmaskine ifølge et af de foregående krav,

kendetegnet ved, at

20 skålene (6) med hensyn til deres rækkefølge i skålrækkerne (8a, b) ikke har den tilsvarende ingrediens (98) i den ønskede rækkefølge af ingredienserne (98) på det senere sjasjlykspyd (100), men især de samme ingredienser (98) derimod ligger i tilstødende skållinjer (12a, b)

og/eller

maskinen omfatter et spydmodul (2), med

- et spydmagasin (23),
- 25 - en findelingsindretning (22), og
- en kontrolenhed (24).

8. Sjasjlykmaskine ifølge krav 7, **kendetegnet ved, at**

30 - findelingsindretningen (22) har mindst to cirkelskiver (25 a, b, c), der er placeret i afstand fra hinanden og forløber rundt omkring en fælles horisontal akse (27), med udbugtninger (26) på steder langs med omkredsen, der flugter med hinanden, i hvilke der kan indlægges et spyd (99), hvor spydmagasinets (23) udgang oven over cirkelskivernes (25 a, b, c) akse (27), er anbragt nær ved deres udvendige omkreds på den side af cirkelskiverne (25a, b, c), på hvilken

35 udbugtningerne (26) bevæger sig opad, og/eller

- der på den overfor liggende aflægningsside er anbragt en spydtransportør (28), der fører radialt bort fra cirkelskiverne (25a, b, c) af findelingsindretningen (22), til aflægning af spydene (99).

5 **9.** Sjasjlykmaskine ifølge krav 7, **kendetegnet ved, at** kontrolenheden (24) er en fortrinsvis berøringsfrit arbejdende, optisk kontrolenhed, som kontrollerer, at spydene (99) i det mindste er lige, især også at de er tilstrækkeligt lange, og kontrolenheden (24) er anbragt enten i området ved cirkelskiverne (25 a, b, c) eller i området ved spydtransportøren (28)

10 og/eller maskinen omfatter et aflægningsmodul (4), med et aflægningsområde (29) til placering af emballager, især bakker (101), ved siden af hinanden til optagelse af sjasjlykspydene (100), og aflægningsområdet (29) er udformet fortrinsvis i form af mindst en skåltransportør (31a, b).

15 **10.** Sjasjlykmaskine ifølge krav 9, **kendetegnet ved, at** aflægningsmodulet (4) omfatter en skålafgiver (30) til spredning af de stablede afgivne skåle (101) og aflægning i aflægningsområdet (29), især på skåltransportøren (31a).

20 **11. Fremgangsmåde** til fremstilling af sjasjlykspyd (100) med et defineret antal og rækkefølge af ingredienser (98) på spydet (99), hvor
- ingredienserne (98) i form af kødstykker og grøntsagsstykker sættes på spyd efter hinanden på den forreste, spidse ende (99a) at spydet (99) og skubbes i retning mod den bagerste ende (99b) af spydet (99),

25 **kendetegnet ved, at**

- der stilles flere skåle (6) med hver sit gennemgangshul (32) i bunden (17) af sin fordybning til rådighed,

- hvert respektive stykke af en ingrediens (98) stilles til rådighed i en skål (6),

30 - der tilvejebringes et respektivt skålsæt (39) med skåle (6) med de samme ingredienser (98) i en defineret placering svarende til spydene (99) i spydholderen (3),

- der optages flere spyd (99) i den definerede placering parallelt med hinanden ved deres bagerste ender (99b) i en bevægelig spydholder (3),

35 - ved hjælp af spydholderen (3) alle spyd, der holdes i denne (99), stikkes samtidigt ind igennem ingredienserne (98) i skålene (6) af skålsættet (39),

og

- denne proces med flere skålsæt (39), som indeholder ingredienserne (98), der skal optages efter hinanden på spydet (99), udføres flere gange efter hinanden.

5 **12. Fremgangsmåde ifølge krav 11,**

kendetegnet ved, at

- hver respektiv skålrække (8a, b) af skåle (6) forløbende i en første horisontal retning (10) indeholder alle ingredienser til et sjasjlykspyd (100),

10 - der i en anden, især horisontal retning (11) stilles flere skålrækker (8a, b) med afstand (33) efter hinanden og bevægelige i den anden retning (11) til rådighed,

- der i spydholderen (3) er optaget flere spyd (99) i en række med en afstand (33) svarende til skålrækkernes (8a, b) afstand fra hinanden,

15 - den aflange spydholder (3) med henblik på spidningen anbringes med sin udstrækningsretning vinkelret på skålrækkernes (8a, b) udstrækningsretning (10).

13. Fremgangsmåde ifølge krav 12, kendetegnet ved, at

20 skållindretningen (7) bestående af skålrækkerne (8a, b) og vinkelret derpå forløbende skållinjer (12a, b) står stille under spidningen.

14. Fremgangsmåde ifølge et af de foregående fremgangsmådekrav 11 til 13, kendetegnet ved, at

25 spydene (99), der med deres bagerste ende (99b) er optaget i hver deres spydoptagelse (13 a, b) af spydholderen (3), i det mindste under spidningen af ingredienserne (98) støttes sideværts længere fremme i spydenes (99) tværretning

og/eller

30 ved spidningen af ingredienserne (98) spydene (99) støttes umiddelbart foran positionen af den sidst spiddede ingrediens (98) og dennes position efter spidningen, og især støtteindretningen (20) samtidig anvendes som anslag for den først spiddede ingrediens (98).

15. Fremgangsmåde ifølge et af de foregående fremgangsmådekrav 11 til 14,

35 **kendetegnet ved, at**

skålene (6) fyldes automatisk ved, at ingredienser (98) falder ned fra lagerbeholdere (14a, b) fra disses udgange (15a, b) i skålene (6) af en eller flere skålrækker (8a, b)

og/eller

- 5 spydoptagelserne (13a, b) i spydholderen (3) kan åbnes og lukkes individuelt og uafhængigt af hinanden.

16. Fremgangsmåde ifølge et af de foregående fremgangsmådekrav 11 til 15, **kendetegnet ved, at**

- 10 skålene (6) efter påfyldningen transporteres skråt opad og i den forbindelse overskydende ingredienser (98), som ikke ligger i fordybningerne af en skål (6), transporteres nedad langs med skråningen til en tom skål (6)
- enten ved at skubbe de overskydende ingredienser (98) tilbage ved hjælp af en afstryger (36), især ved afstrygere (36), der er monteret på en roterende afstrygervalse,
- 15 - og/eller ved påvirkning med vibrationer.

17. Fremgangsmåde ifølge et af de foregående fremgangsmådekrav 11 til 16, **kendetegnet ved, at**

- 20 - spydene (99) anbringes på en spydaflægning i afstande (33) svarende til afstandene (33) mellem spydoptagelserne (13a, b) i spydholderen (3) med henblik på at blive grebet af spydholderen (3), og især
- spydene (99) tages enkeltvis ud af et spydmagasin (23) og aflægges i de rigtige afstande (33) på spydaflægningen, især en spydtransportør (28).

25

18. Fremgangsmåde ifølge et af de foregående fremgangsmådekrav 11 til 17, **kendetegnet ved, at**

- de færdige sjasjlikspyd (100) aflægges af spydholderen (3) efter deres fremstilling i emballager, især skåle (101), og især efter en fuldstændig påfyldning af skålene (101) disse skubbes ned på et transportbånd ved hjælp af spydholderen
- 30 og/eller
- de stablede skåle (101) tages enkeltvis fra stablen og anbringes ved siden af hinanden i et aflægningsområde (29) med henblik på optagelse af de færdige sjasjlykspyd (100).
- 35

Fig. 1a

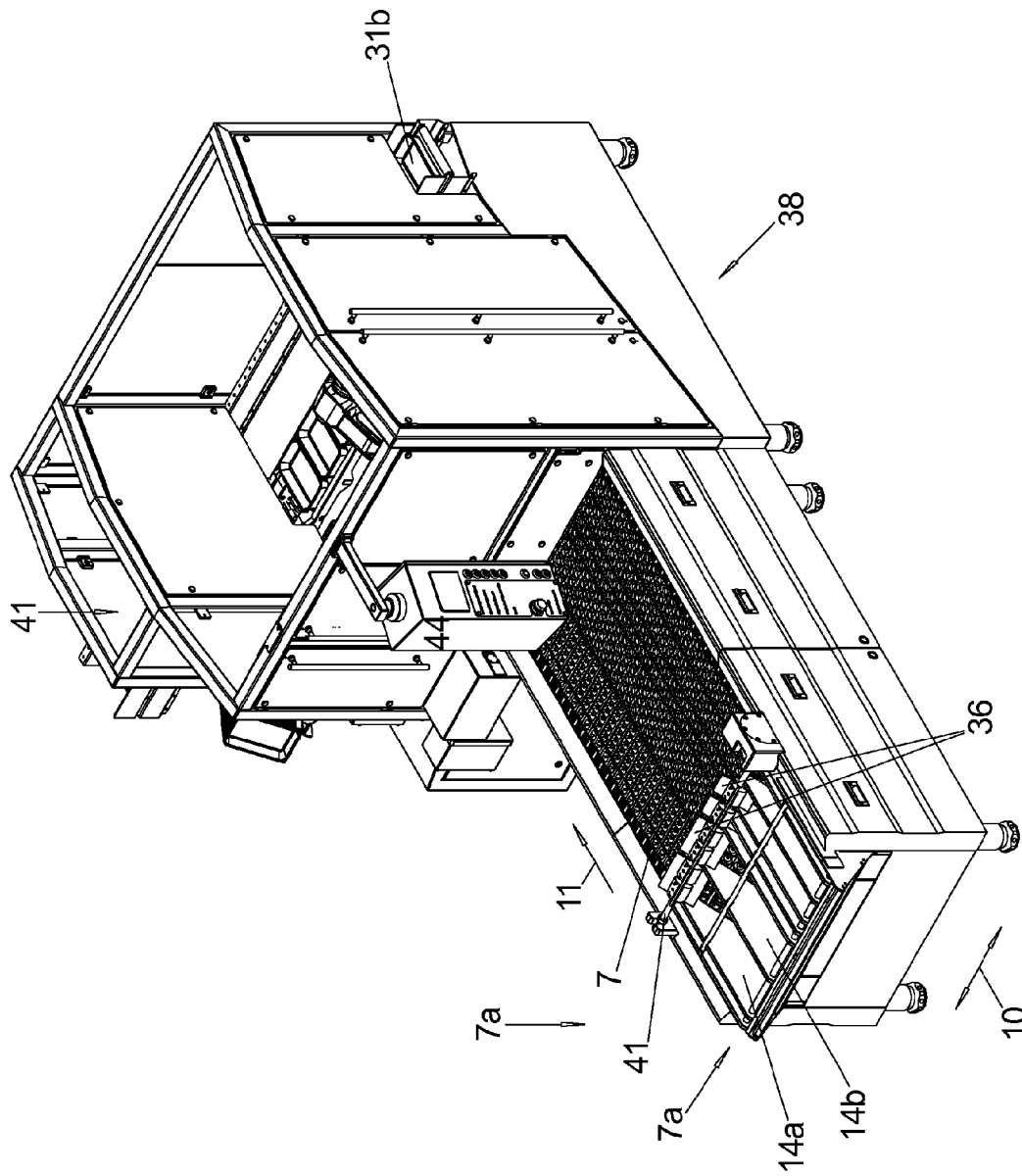
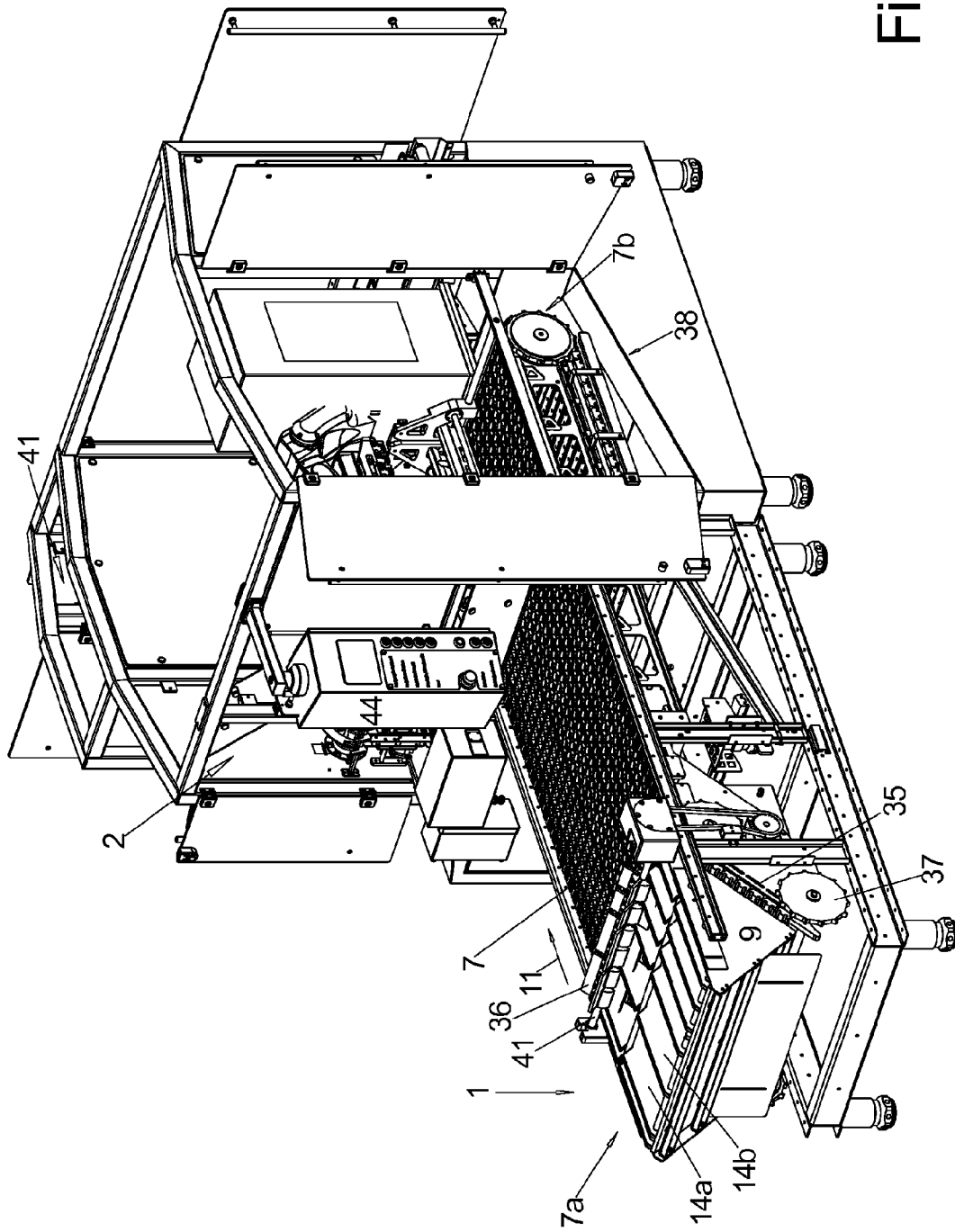


Fig. 1b



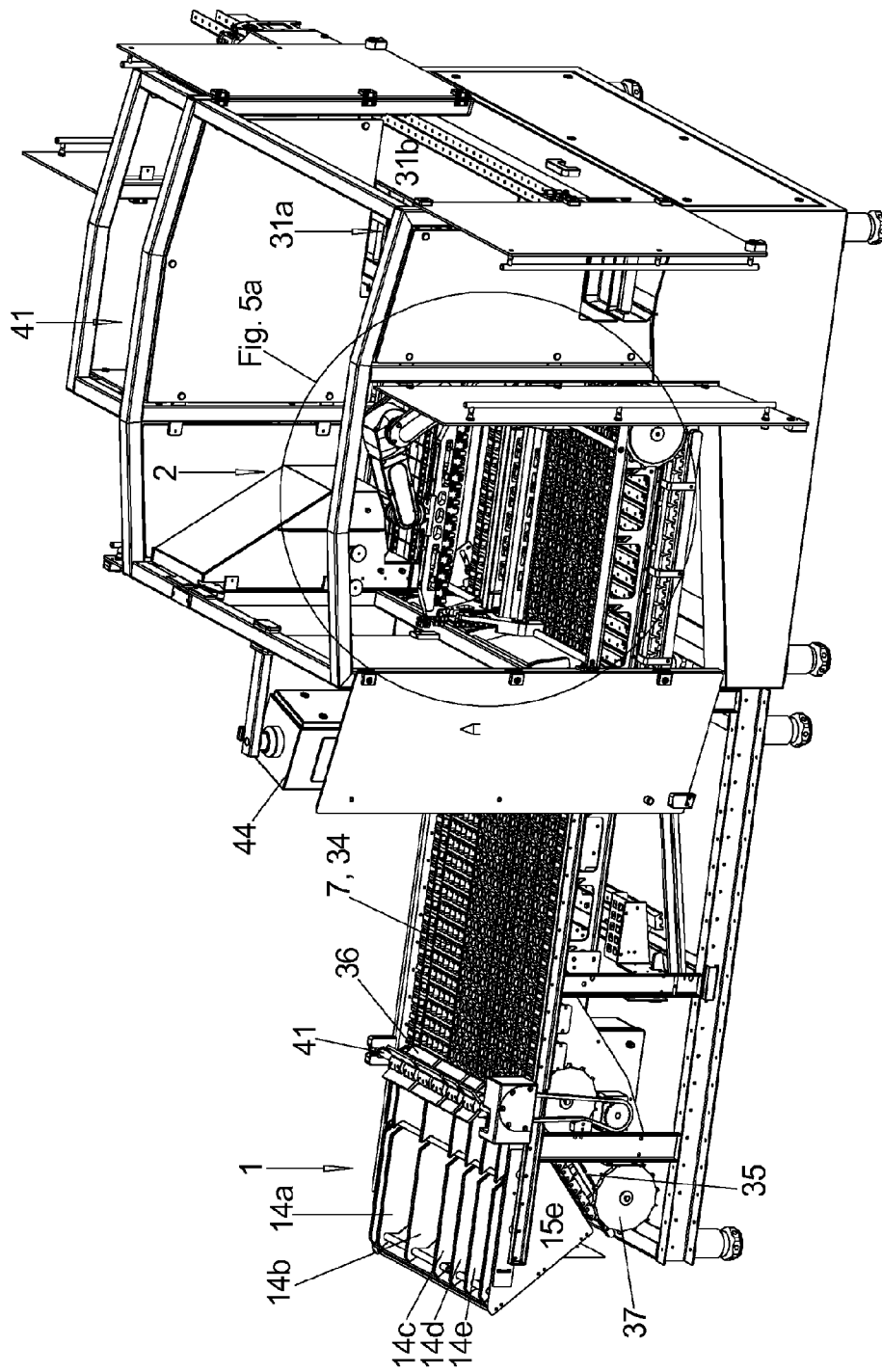
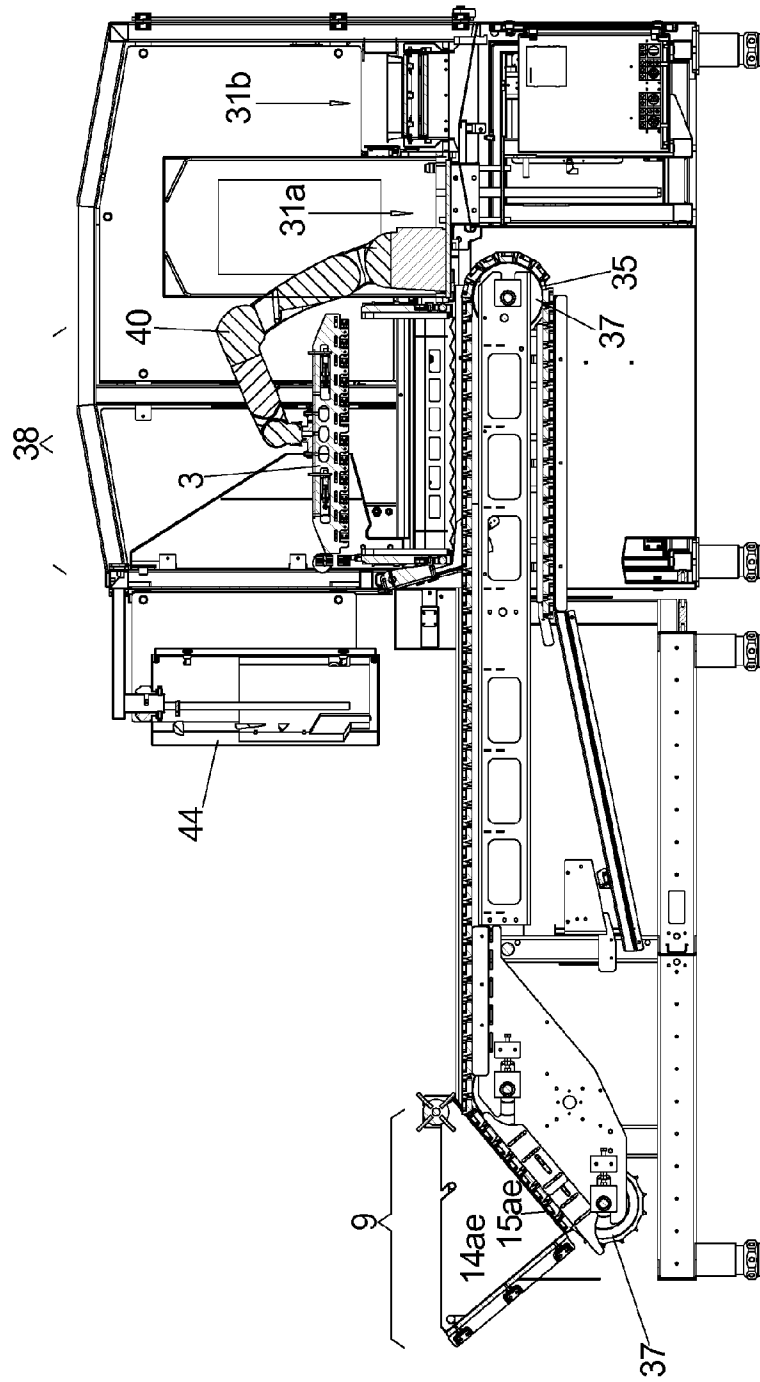


Fig. 1c

Fig. 1d



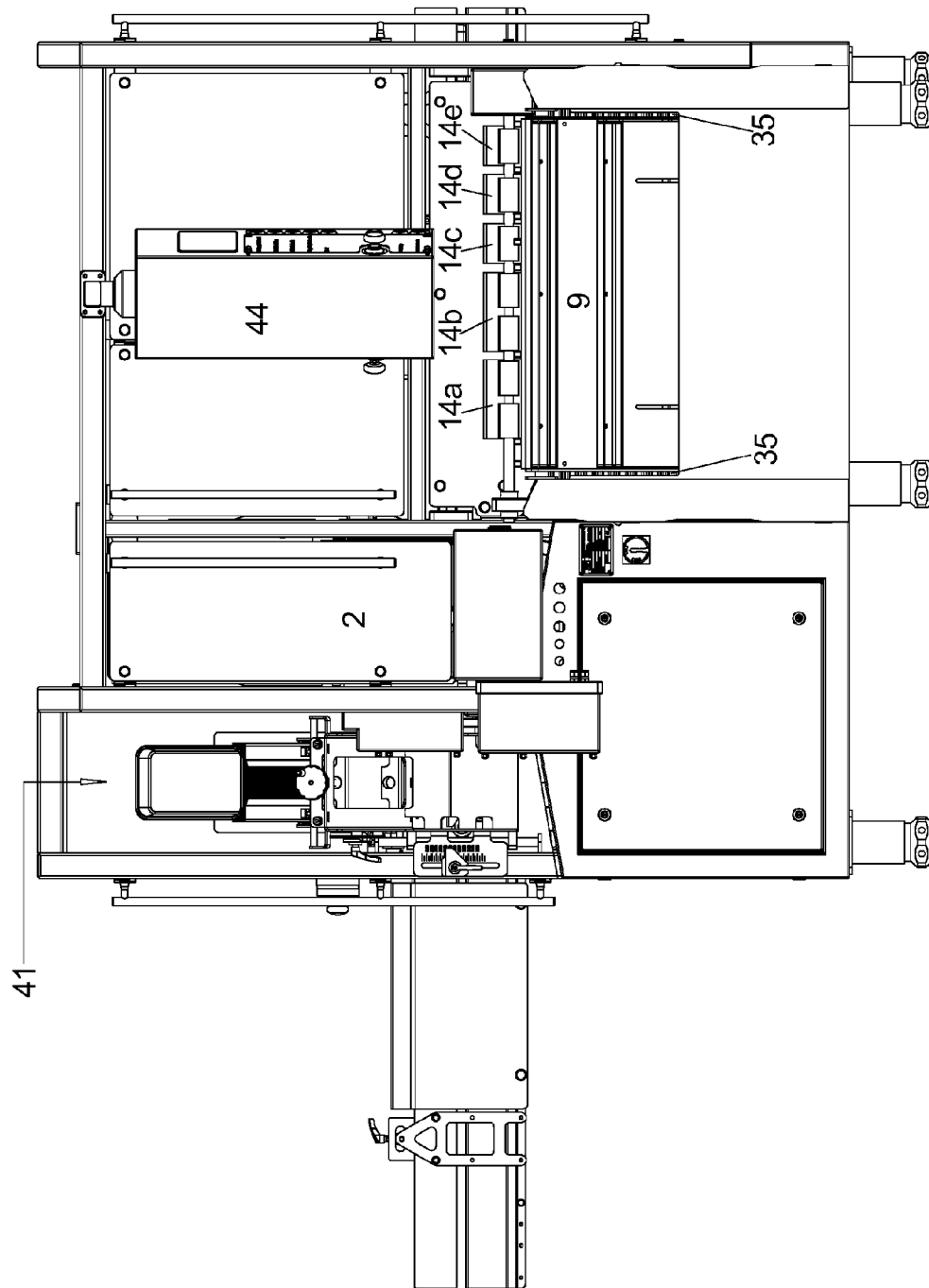


Fig. 1e

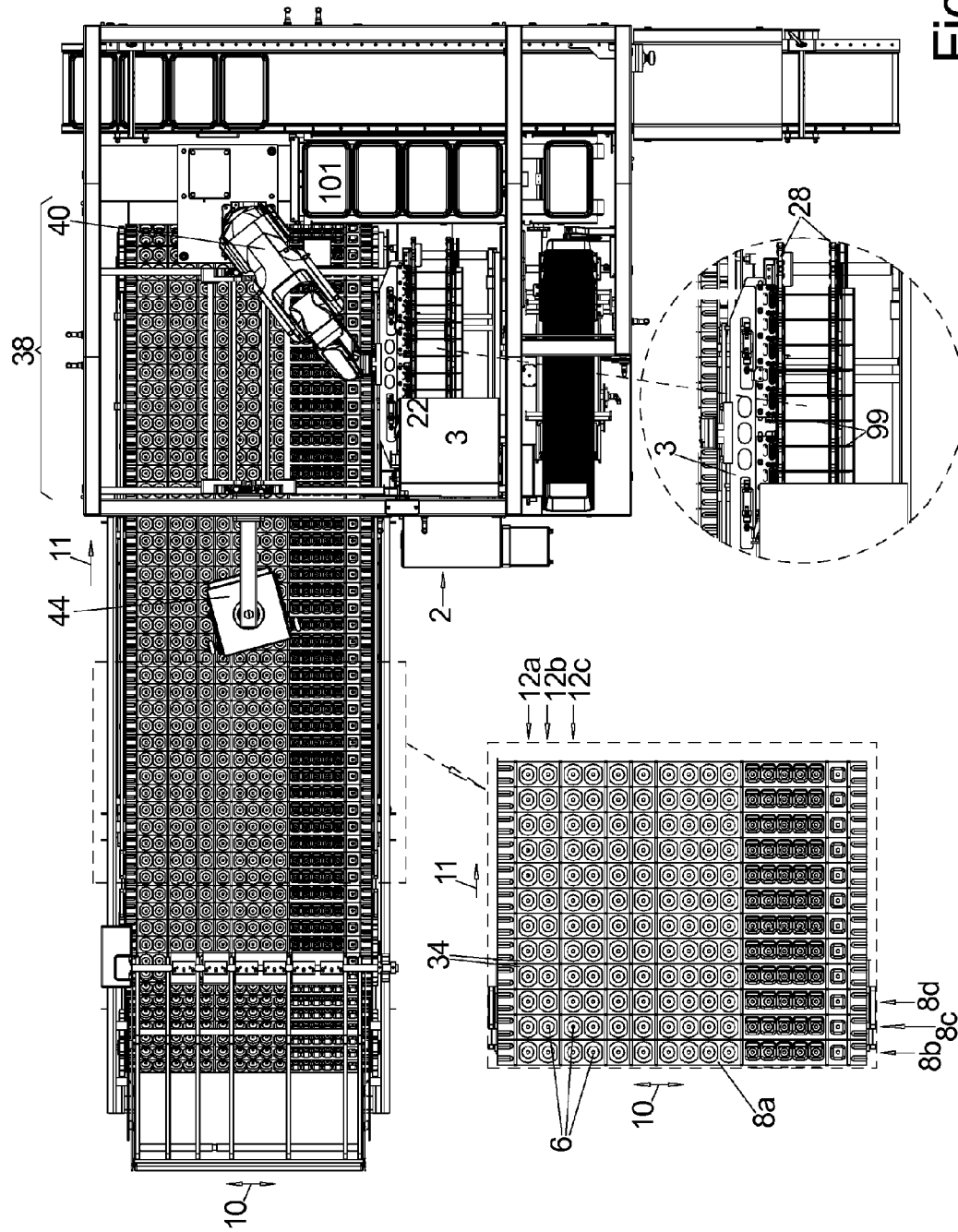


Fig. 2a

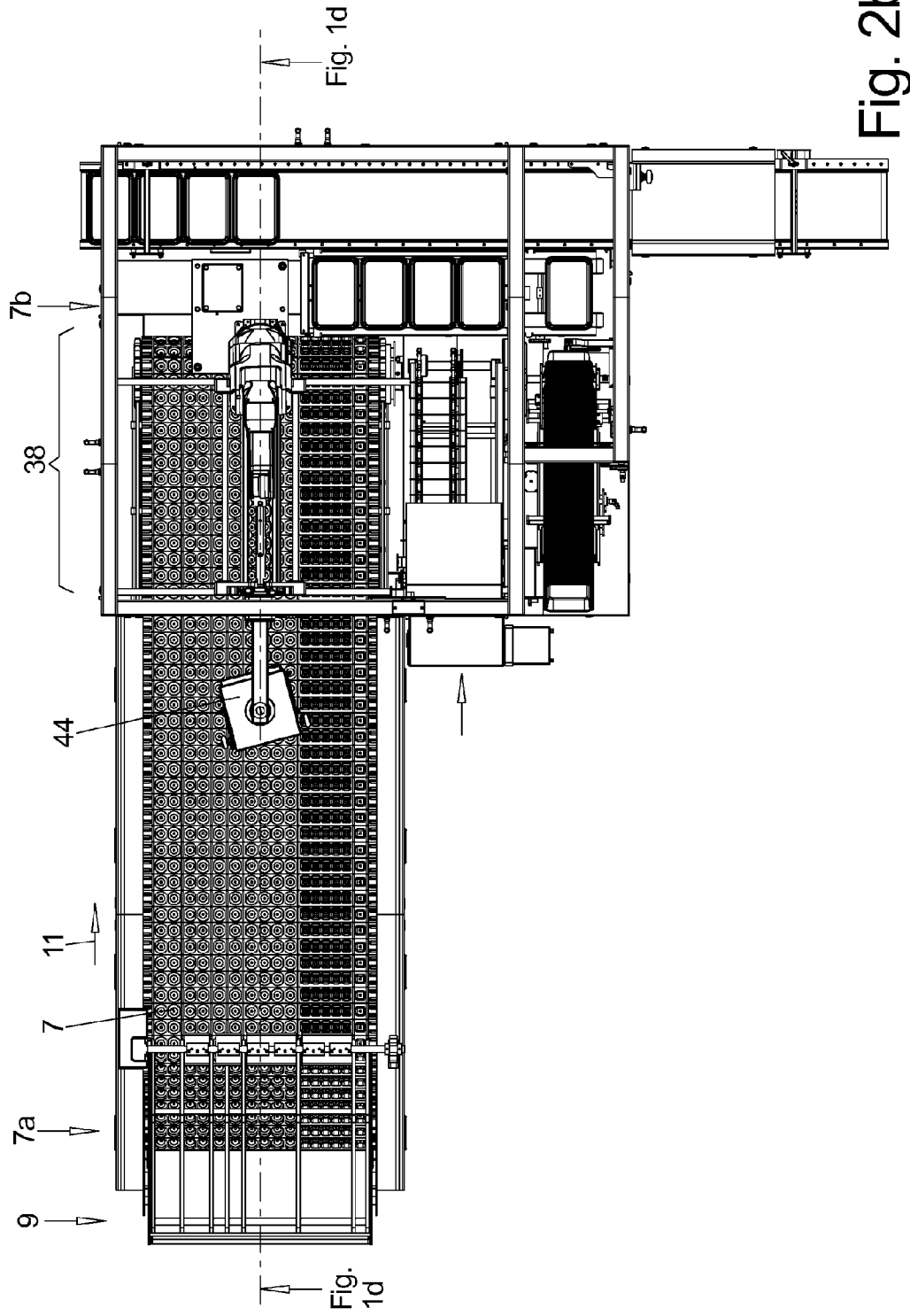


Fig. 2c

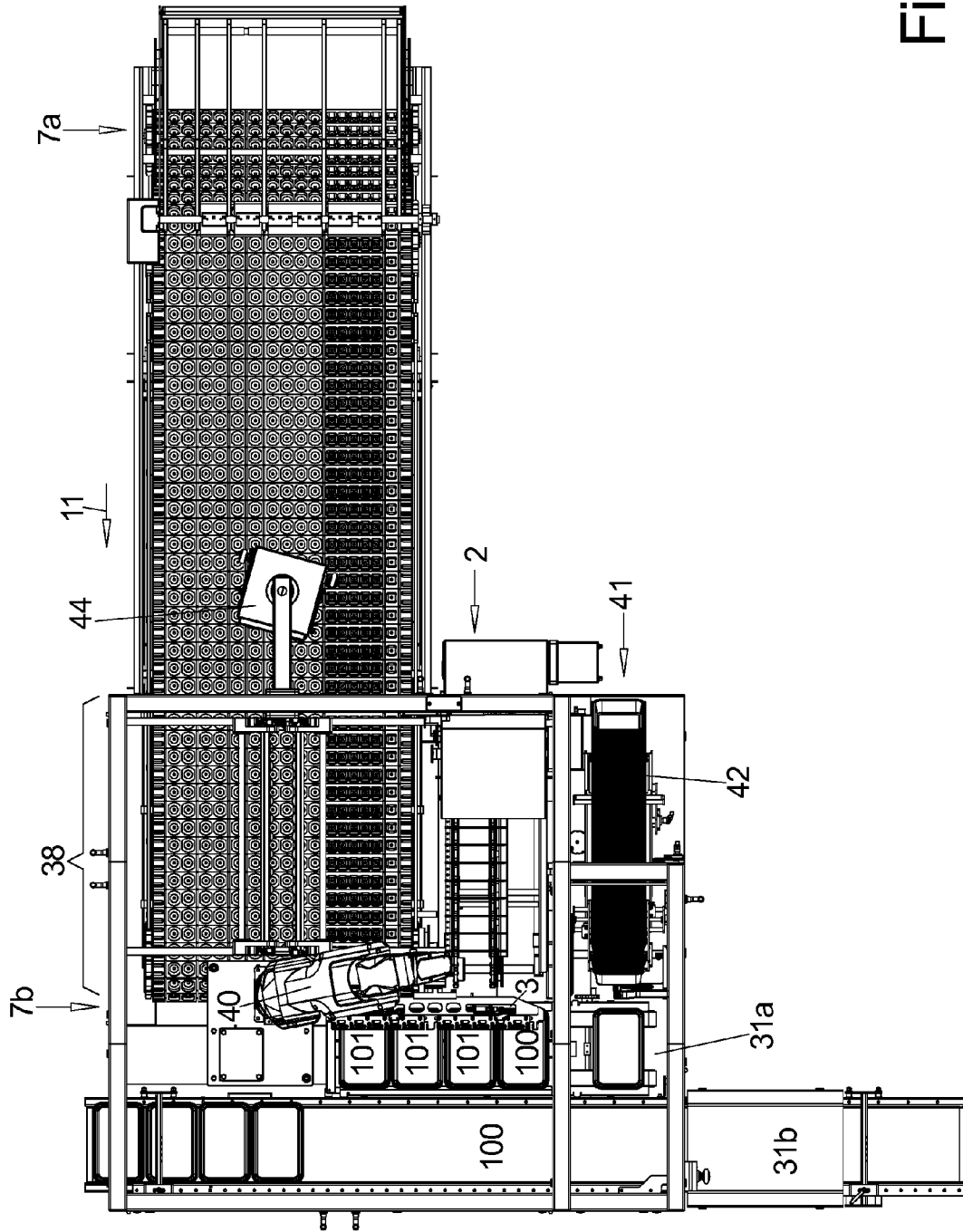
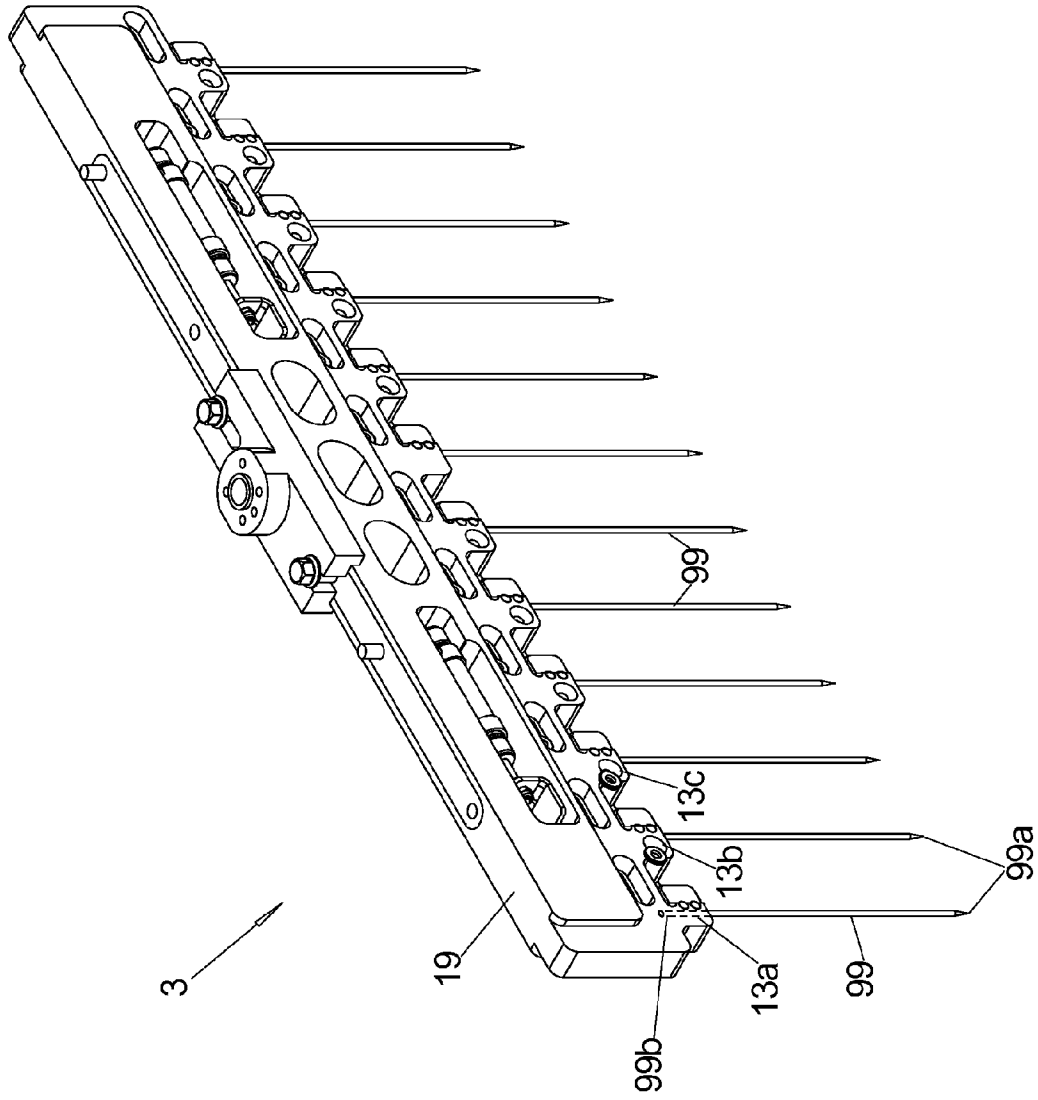


Fig. 3a



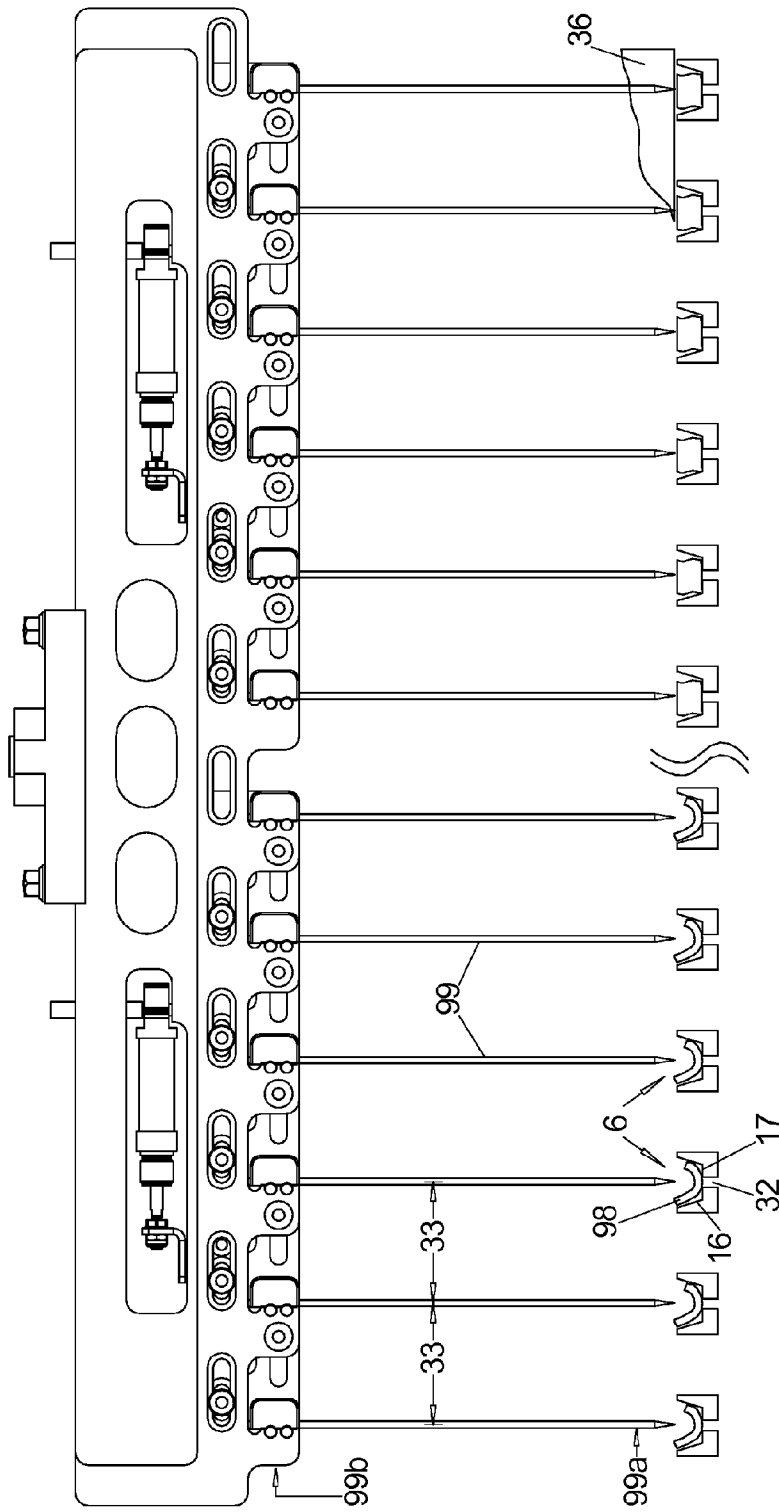


Fig. 3b

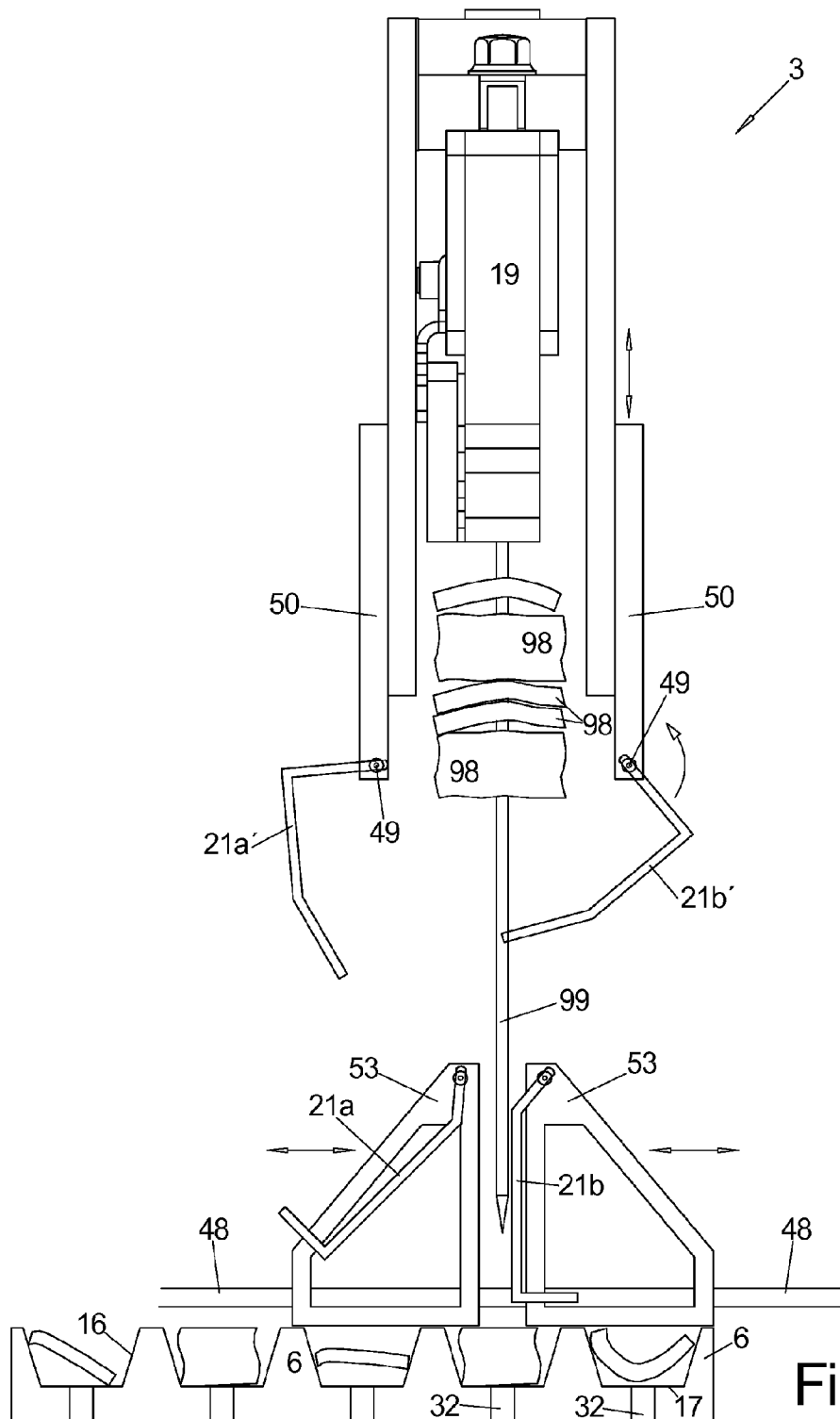
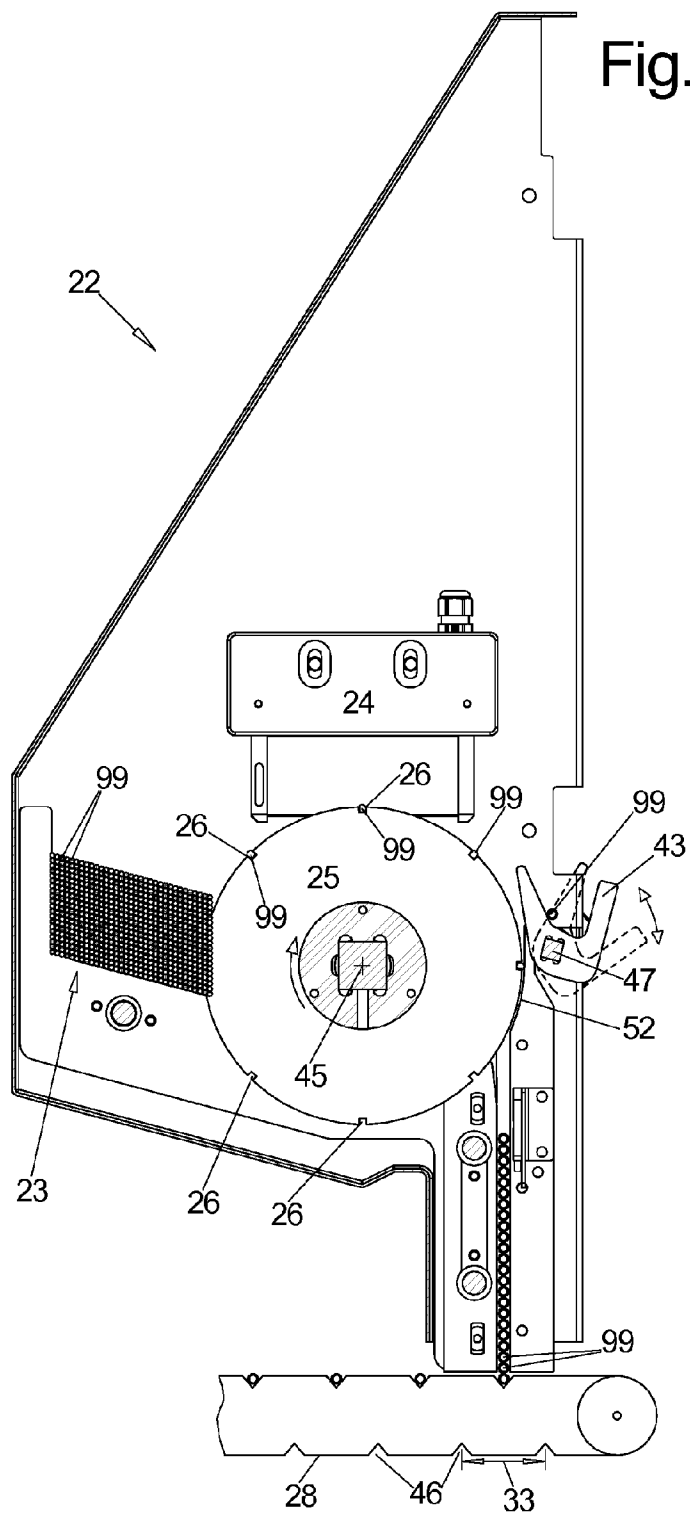


Fig. 4a



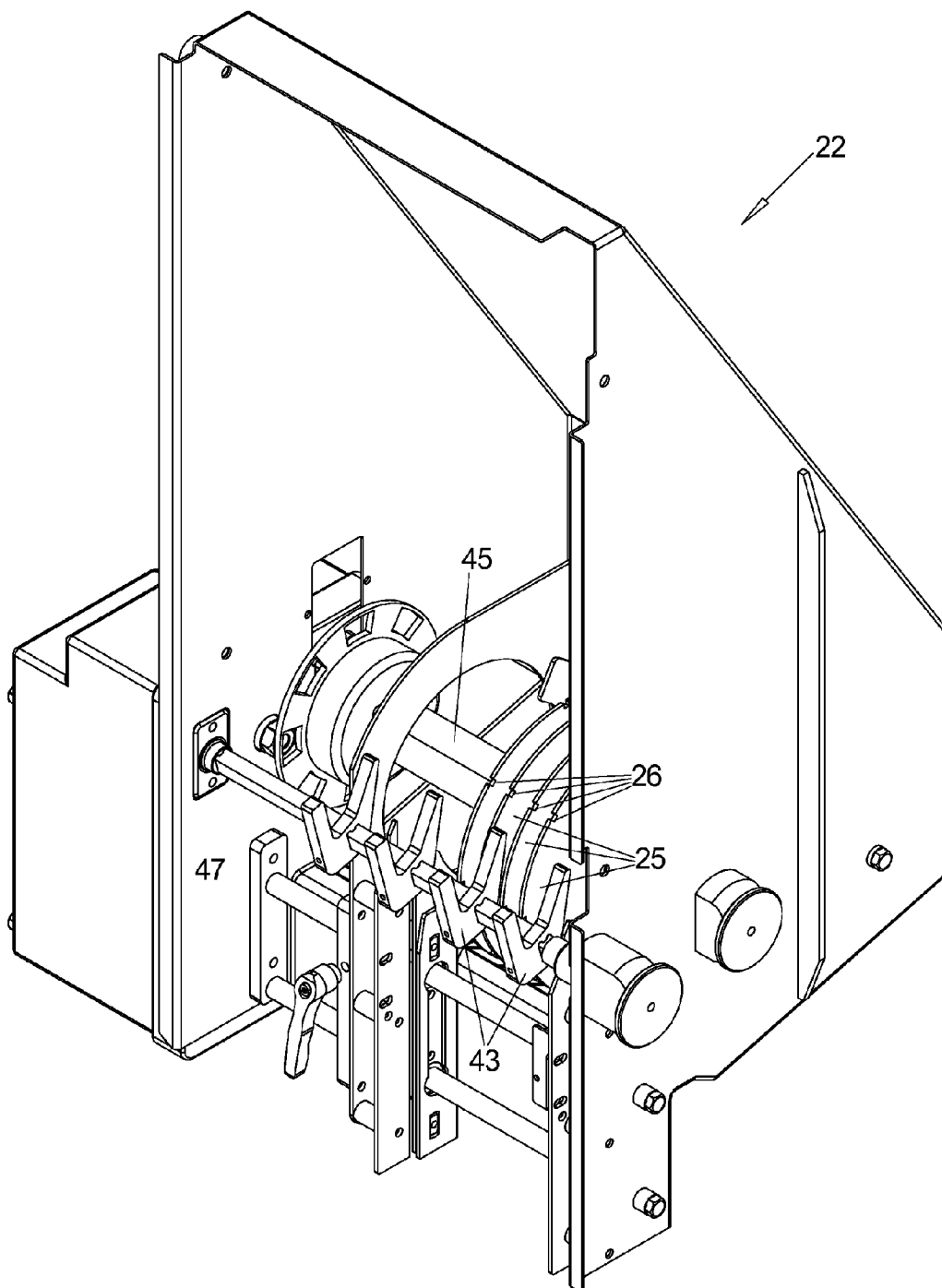


Fig. 4b

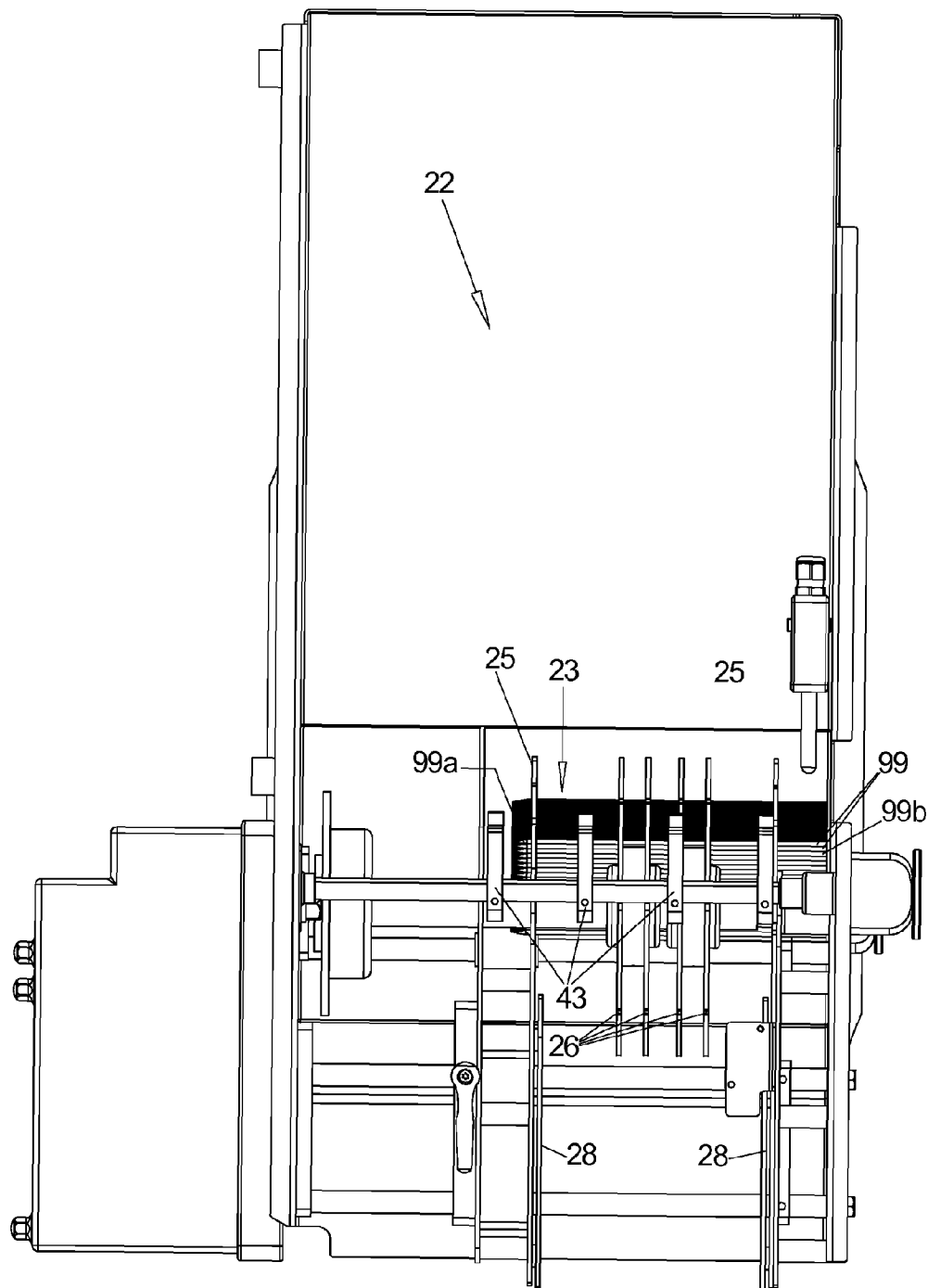


Fig. 4c

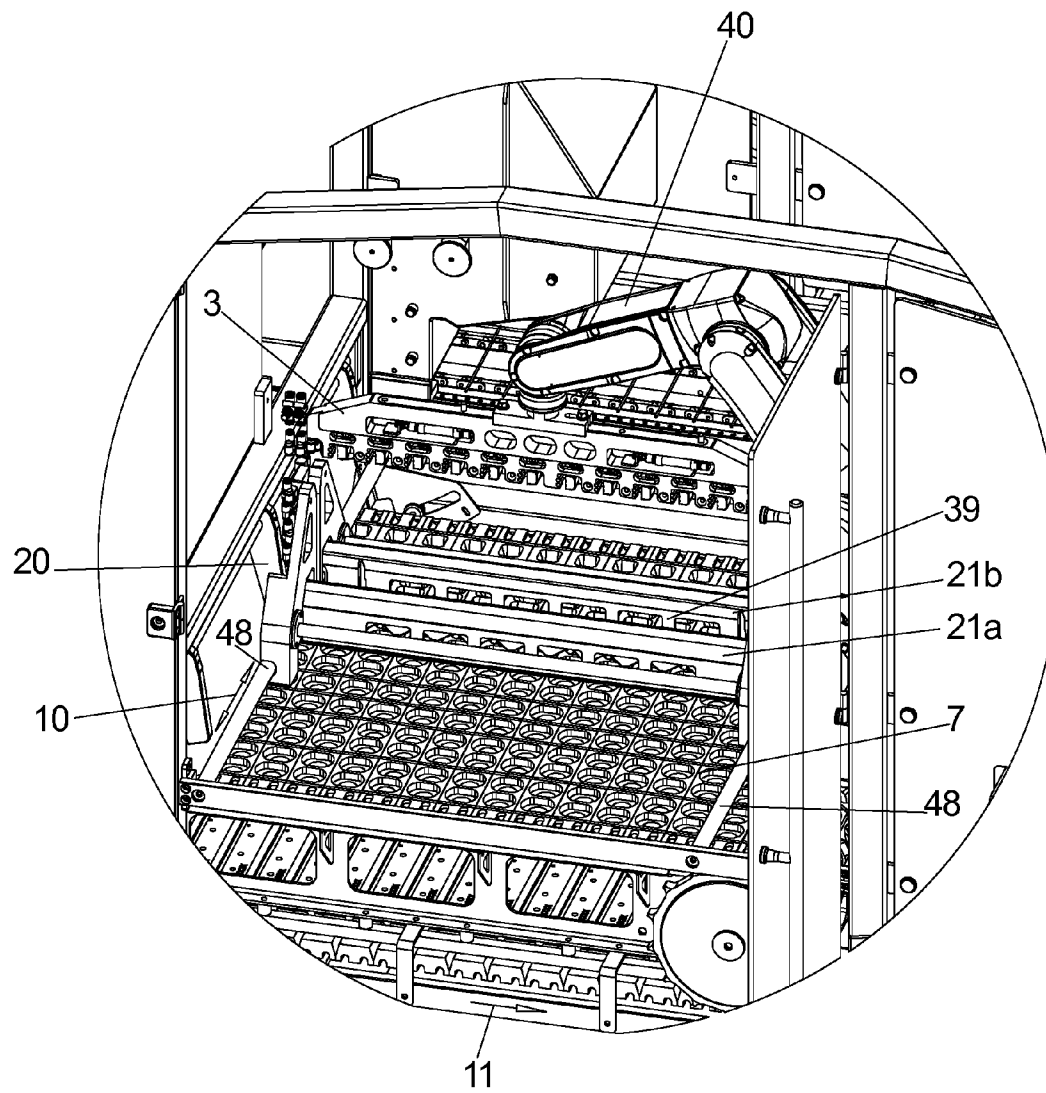


Fig. 5