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Plates and layers forming a soil-less plant cultivation container

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Abstract:

The invention relates to a soilless culture container which is formed by plates/layers which are allowing for the cultivation of plants.

DescriptionTitle:

Soilless culture container-forming plates

Field of invention:

It is a very narrow and very diverse plant-able container for the soilless cultivation of plants.

State of the art:

A wide variety of soilless cultivation containers are known, including containers that allow plants to grow out of slits, while the roots in the container are supplied with nutrient solutions. However, the state of the art and the market have so far shown a prejudice as to whether a series/series of individual plates on top of each other can form a required root space (cavity), which also offers advantages for a machine or automated composition during assembly. Furthermore, no automated processes or devices are known, through which, combined with the plates, a container with planting material can be loaded more quickly by means of a belt that can be unloaded for loading. Furthermore, no processes or machines are known in which containers can be printed in an automated or computer-controlled manner with plant signs, patterns, etc. that continue to grow.

The invention offers an advantage through simpler, more uniform usability. It is also the first soilless with signs/patterns "printable", living lightweight wall.

Main part:

A container is (re-detachable) composed of individual flat plates or plates or discs. These plates basically form a form that makes it possible to stack them directly on top of each other, so that they do not wobble as much as possible and, if possible, result in a common form as a whole (the latter, however, can be geometrically very diverse). The plates can have all imaginable colors and be made of any relatively waterproof and relatively stable and chemically relatively unresponsive material with its environment (the latter property above all with regard to oxygen, water, nutrients, in nutrient solution, etc.).

Basically, the plates have a rather flat shape, in order to allow a planting between several plates quite dense and close to each other. As a whole, the plates can take a wide variety of shapes (total plate stacks). The individual plates

itself can even be shaped in terms of the horizontal (curled, jagged, etc.) as long as they are relatively densely stackable. Shape variations of the total stack can occur due to plate widths and lengths that vary slightly to the next plate, pre-stack-ability. The plate heights should be relatively thin and even. Furthermore, all plates have a recess to their interior (seen from above). This is arranged in the series of plates in each case in such a way that when laying the plates on top of each other in the intended manner from the series of plates not only a total body with an outer shell (interrupted by thin gaps between the plates = slits) arises, but also from the sum of the recesses a communicating cavity arises, which can be filled with root mass of different plants, with nutrient solution, air and, among other things, distribution devices for nutrient solution. Similarly, substrate could be placed between the roots, which may allow helpful settlements of bacterial cultures and possibly supports of the roots. The formed cavity is completed from above by a final plate (without this recess) of environmental influences, possibly nutrient solution supply lines can be integrated in this termination plate, so that nutrient solution can be supplied from the outside or inside. A drip or spray pipe can be guided through the cavity. The power source/cause of movement of the nutrient solution (pump, stiffener, fogger, ...) can be inside or outside. The cavity is closed from below by a collecting plate, which can collect superfluous, inside dripping nutrient solution (by a recess, but not as large a recess in the size of the recess as in the other cavity). There, a drain to the outside (e.g. bottom, rear, ...) or a means/system that causes recirculation in the cavity can be attached (the latter: fogger, pump + line). Of course, a corresponding energy supply is also provided for possibly attached devices (pump, ...) (external/internal). The plates are connected in any way stable and relatively conclusively against splashing liquids as described. The stability of the connection can be held together or guaranteed, for example, by a (threaded) rod, which has been passed through all plates (or on which all plates have been attached along a relatively precise additional recess). In this case, threaded nuts could be screwed precisely to the above and below the plate stack, which temporarily fixes the plate stack. Similarly, instead of using a rod guided by a further recess, a sufficiently fixed bracket could be created for the plate stack (e.g. according to the type of a

screw force or through foldable grippers snapping into recesses on the stack) - but each with little covering of growth surface (= cracks between plates), but above all preferably not on the main growth side. The fixing of the stack in itself can be carried out including the top plate at the top and / or also the collecting plate at the bottom – or on the other hand without this first with itself and then precisely between these two otherwise fixed covers and collecting plates and are finally fixed with these.

Fixation may also be possible in the cavity itself. However, the cavity may be so uniformly open to the rear if necessary, so that it is closed again, for example, by attaching the container to a waterproof facade. For example, the later nutrient solution supply could be attached to this facade in addition to the brackets for the pre-fixed stack, which would thus later be in the cavity. Likewise, the deck and collecting plate could be already attached there at the appropriate distance. A suspension device, as well as recesses into which such a fixed could reach, can be attached to the stack or to individual plates outside, e.g. so that the total stack could be hung on a nail in the wall. The opening to the rear can also be designed in the form of a "8" halved by both curves, so that two cavities on the facade that do not communicate with each other or hardly communicate with each other can be formed with the stack. Likewise, with or without an open back, all geometries are imaginable outside as long as one or more closed cavities are formed from plate stacks.

Basically, before each other plate is placed on another or on the stack, it is positioned on the top edge of the previously top plate planting material growing, so that it is clamped as far as possible without damage between these plates and all subsequent plates placed on top of it. Plant material can be understood as non-germinated seeds, seedlings, cuttings or plants with developed root, trunk, leaf area. Beans, seedlings, developed plants, etc. should be positioned according to the growth, so that roots eventually come to lie inward, while others can develop outwards. It may be optionally appropriate recesses or notches on the plate tops and bottoms to stabilize plant material and provide protective support or orientation to the interior and /and exterior of the stack or to derive spray fluid both inside and outside downwards and to exploit the adhesion. Likewise, to grip or fix plates or stacks and transport them into machines. In an extended

execution form is inserted between the plates when the stack is created, each with an elastic strip (either under the planting material or as well as or planting material both above and below, possibly also offset). On the one hand, this strip is intended to dampen the hard clamping, as well as to seal the clearances between the respective planting material (in the slot between two plates) better. In particular, this strip may be continuously laid/attached to a piece starting from the first slot between the first plates placed on each other to all subsequent spaces (slot) between plates placed on it, wherein the strip – each time it is clamped between the top of a plate and the bottom of a plate attached to it – is at the side edges, at which the other end of the strip stands, in the opposite direction " at the top of the top of the plate placed on top of it, so that on the previous plates and the back-knuckled stripe part another plate can be placed, so that can be continued to the last plate. The strip may be rolled up or folded before insertion and should be sufficiently long for the number of plates and (by backward buckling) to be overcome plate heights. The strip should be fixed relatively precisely between 2 plates before it is clamped, in order not to slip, e.g. by means of aids, such as a protruding bump in a lower plate, on which it can be "skewered" and which fits into a possible recess in the adjacent plate. Such bumps and recesses in assignment to each other can also support the general fixation of the stack in itself. Similarly, aids for stabilization and orientation can be used when the planting material is placed on the plate. The inserted and clamped strip should cover the entire surface of the top of the respective plate under it evenly in each layer/position, above all. However, the surface of the strip, which comes above the inner recess of the plate, can be different. On the one hand, the strip could span both the edge of the plate and the inside. This should definitely be water-permeable, porous tape material, in particular good penetration by root growth should be possible. Furthermore, the recess in the respective plate in the strip can also be omitted, so as not to prevent root growth and flow of the nutrient solution. This can be done prefabricated or, for example, by punching out when fitting.

Furthermore, simple or varied incisions can be installed in the overstretched recess surface or prefabricated, instead of complete

equipment in the magazine, etc., but must be able to select from various controllable placement alternatives according to the files when picking tape and plates. Thus, data sets and control processes can be combined on assembly machines, so that, for example, an end customer can individually assemble a lettering or an image sample, e.g. via a webshop interface, and, if necessary, commission them online, so that his customer and order record combines an finally planted plate stack/container or a usable assembled tape for his own container in production and receives this, for example, with shipping. Advertising spaces can also be booked and configured in this way. The customer or a professional operator can design a facade that is such a stocked with plant advertising (signs, patterns). Overall, however, all simpler variants are conceivable, e.g. a simple disorderly scattering of planting material on plates or for fixing on a band. As a rule, the plates are stacked flat on top of each other, so the recess is located on the largest surface of the plate. A series of fitted plates, which were placed on the side, so that the slots run from top to bottom, could also be conceivable. But then horizontal cover and collecting plates would still make sense.

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- detachable, flat plates stacked, not wobbling, relatively close
 - together 1 form as a whole
 - relatively stable, chemically relatively stable
 - diff. (outer) shapes as stacks
 - jagged, corrugated plates
 - inside recess in plate
 - > Cavity possibly substrate
 - closing plates (deck + catch/...)
 - lines
 - variants
 -
 -
 -
 - stable (detachable) connections
 - threaded rods
 - by additional recess (fit)
 - ends fixed (no slipping of the plates)
 - nuts, pins, wire ring
 -
 - clutching, screw clamp, snap perch - sewing?
 - knots/ kad
 - rubber band - glue (-knobs/groove + tongue) - (own) weight
 - fixation by inserting between Plates on wall
 - fixed with cover plate / collecting plate
 - without cover plate / collecting plate + later inserted between these + fixed
 - fixation in the cavity of the stack itself
 - open cavity to the rear, closed by facade
 - e.g. also 2 semicircles or more, from top to bottom halved "8"
 - several cavities
 - supply elements already on facade
 - suspension
 - variant recess/recess on rear / nail / hook / handle on wall
 - hook top / or rear of container / loop
- general is several cavities, if necessary.
planting material between all plate layers / in slots
- correctly oriented / positioned - (root inside, rest outside)
 - first develop / germinate
 - Notches for plant
 - Notches for (spray) water (inside / outside)
 - Notches for transport in machine, for handling

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The invention offers an advantage through simpler, more uniform usability. It is also the first soilless with signs/patterns "printable", living lightweight wall.

Main part:

A container is (re-detachable) composed of individual flat plates or plates or discs. These plates basically form a form that makes it possible to stack them directly on top of each other, so that they do not wobble, slip and, if possible, result in a common form as a whole (the latter, however, can be geometrically very diverse). The plates can have all imaginable colors and be made of any relatively waterproof and relatively stable and chemically relatively unresponsive material with its environment (the latter property above all with regard to oxygen, water, nutrients, in nutrient solution, etc.).

Basically, the plates have a rather flat shape, in order to allow between several plates quite dense and close to each other a planting between plates. As a whole, the plates can take a wide variety of shapes (total plate stacks). The individual plates

itself can even be shaped in terms of the horizontal (curled, jagged, etc.) as long as they are relatively tightly stackable and cannot wobble or be fastened as much as possible. Shape variations of the total stack can occur due to easily varying plate widths and lengths to the next plate - (dense) stack-ability required. The plate heights should be relatively thin and even.

Furthermore, all plates have a recess to their interior (seen from above). This is too much for the series of plates? arranged that when laying the plates on top of each other in the intended manner, the series of plates not only creates a total body with an outer shell (interrupted by thin gaps between the plates = slits), but also arises from the sum of the recesses inside the plate a communicating cavity that is consistent ? can be filled with root mass of various plants, with nutrient solution, air and, if necessary, distribution devices for nutrient solution, etc. Similarly, substrate could be placed between the roots, which may improve helpful bacterial cultures and possibly support of the roots. The formed cavity is completed from above by a final plate (without this usual recess) of environmental influences (/evaporation), possibly nutrient solution supply lines can be integrated in this termination plate, so that nutrient solution can be supplied from the outside or inside (as coming from above). A drip or spray pipe can be guided through the cavity.

The power source/movement cause of the distributed nutrient solution (pump, stiffener, fogger, ...) can lie inside or outside – e.g. no base plate + base container. The cavity is closed from below by a collecting plate, which can collect superfluous, inside dripping nutrient solution (by a mere recess, but not such a (large) down continuous recess in the size of the recess as in the other cavity). There, a drain to the outside (e.g. bottom, rear ... into a system or a means/system that causes recirculation upwards in the cavity (the latter: fogger, pump + line). Of course, a corresponding waterproof power supply (external or internal) is also provided for possibly attached devices (pump, ...). The plates are in any way stable but again detachable and relatively finally connected to each other against splashing liquids as described.

The stability of the connection can be held together or guaranteed, for example, by a threaded rod, which has been passed through all plates (or on which all plates have been attached along a relatively precise additional recess). In this case, threaded nuts that provisionally fix the plate stack could be precisely screwed to the above and below the plate stack outstanding ends of the threaded rods threaded nuts. Likewise, instead of using a rod guided by a further recess, a sufficiently fixed clamp from the outside could be created for the plate stack (- rubber band + - other methods - glue - pimples/groove+ spring + (own) weight) e.g. according to the type of a

rubber band -- +
further methods

- glue .- knobs/groove+tongue + (own) Weight

screw-force or through foldable grippers snapping into recesses on the stack) - (but each with little covering of growth surface (= cracks between plates), but above all preferably not on the main vegetation side.) The fixing of the stack in itself can be made either including the top plate at the top and / or also the collecting plate at the bottom - or on the other hand without these first fixed with itself and then precisely between these two otherwise fixed covers and collecting plates and are finally fixed with these.

Similarly, fixations of the plate stack may also be possible in the cavity itself.

On the other hand, the cavity can be open to the rear, however, if necessary (evenly) so that it is closed again, for example, by fixing the container with on a water-resistant facade, by attaching the opening of the plate stack to this facade. For example, the later nutrient solution supply could be attached to this facade in addition to possible brackets for the possibly pre-fixed stack of the plate, which would thus later be in the cavity.

Likewise, optionally, the deck and collecting plates could be already attached there at the appropriate distance directly without the rest of the plates. (A suspension device, as well as recesses in which such a fixed could reach, can be attached to the stack or to individual plates outside, e.g. so that the total stack on a nail-hook "handle" could be hung in the wall.

The opening to the rear can also take the form of a "8" halved by both rounds. be carried out halved from top to bottom, so that two cavities on the facade with the stack that do not communicate or hardly communicate with each other can be formed. Likewise, with or without an open back, all geometries are imaginable outside as long as one or more closed cavities are formed from plate stacks inside.

Basically, before each other plate is placed on another or on the stack, it is positioned on the top edge of the previously top plate planting material growing, so that it is clamped as far as possible without damage between these plates and all subsequent plates placed on top of it. Plant material can be understood as non-germinated seeds, seedlings, cuttings or plants with developed root, trunk, leaf area.

Beans, seedlings, developed plants, etc. should be positioned according to the growth, so that roots finally come inward, while others can develop outwards.

It may be optionally attached to the plate tops and bottoms appropriate recesses or notches to stabilize plant material and provide protective support or also orientation to the interior and / and exterior of the stack or to derive spray fluid in each case inside and /or outside down on the inner side surfaces of the plates and to exploit the adhesion.

Similarly, notches/recesses can be attached to grip or fix plates or stacks and transport them into machines, e.g. + for handling. In an extended

embodiment is inserted between the plates when the stack is created, each with an elastic strip (either under the planting material or both below it and above it or planting material both above and below, possibly also offset). On the one hand, this strip is intended to dampen the hard clamping of the planting material, as well as to seal the clearances between the respective planting material (in the slot between two plates) better. In particular, this strip may be continuously laid/attached to a piece starting from the first slot between the first plates placed on each other to all subsequent spaces (slot) between plates placed on it, wherein the strip - each time it is clamped between the top of a plate and the bottom of a plate attached to it - at the side edges, at which the other end of the strip stands out, in the opposite direction, Strips come to lie on the top of the top of the plate placed on top, so that on the previous plates and the bent strip part a further plate can be placed, so that can be continued to the last plate. The strip may be rolled up or folded before insertion and should also be sufficiently long for the number of plates and (plate heights to be overcome by backward buckling). Before it is clamped relatively precisely between 2 plates, the strip should first be fixed temporarily, so as not to slip, e.g. by means of aids, such as a protruding bump. In a lower plate on which it can become "impaled"/+ hole in string and which fits into a possible recess in the plate to lie on it.

Such knobs and recesses in assignment to each other can also support the general fixation of the stack in itself. Similarly, aids for stabilization and orientation can be used when the planting material is placed on the plate (baking, gripper, sheets, ...). The inserted and clamped strip should cover the entire surface of the top of the respective plate under it in each layer/position above all around it evenly.

However, the surface of the strip, which comes above the inner recess of the plate, can be different. On the one hand, the strip could span both the edge of the plate and the inside of the recess. This should definitely be water-permeable, porous tape material, in particular, good penetration by root growth should be possible if necessary to the edge, if necessary sealed, e.g. by scorching or coating. Furthermore, the recess in the respective plate can also be omitted in the strip, so as not to prevent root growth and flow of the nutrient solution in the cavity. This can be done prefabricated or e.g. by punching with clamping/holding when fitting. Furthermore, simple or varied incisions can be installed in the overstretched recess surface or prefabricated, instead of complete

removal of the inner part of the strip. This can cause increased colonization with desired bacteria and better temperature stability and certain water retention. Furthermore, mixed forms of these variants of the strip may be given, i.e. combinations.

A further extended version (+ others) offers a tape already permanently/in advance, which has already been permanently fitted with certain planting material at fixed intervals, according to the above descriptions. This can be done both by sewing in seeds (e.g. between 2 layers of tape; seam around seeds included) as well as by attaching a usual seed band to the pressure-absorbing band, or in parallel to outstanding seedlings/plants as well as by sticking plant material or other fastenings (foams that stick to, ...). If necessary, the tape can already be stocked as well-known seed belts for the customer. It is important that plates (stack) shape and plate height are taken into account in relation to the tape, in order to be precise + sufficient, in addition to biological factors (desired final adult plant, size of original planting material + later, growth phases, germination, colors, plant needs, ... – separate topic).

The placement of the tape or the bare plate on site /in stock can already aim at a later pattern or sign or plurality to be recognized by plant growth and color. All relevant biological parameters must already be taken into account when selecting + arrangement of the assembly.

Another extended version concerns a machine that which, on the one hand, provides suitable plate sets and can be equipped with these, then these plates are then individually supplied for assembly with a section of the described unstocked or equipped tape -> and or possibly for simultaneous assembly with planting material, this is repeated with all plates of the set and associated assembly (plant material, possibly tape or no tape, tape already equipped or not) until completeness of the desired set.

In concrete terms, this may be that a plate set is filled into a fitting shaft (details) of a corresponding machine, whereby further down into the plate set a transport screw rotates e.g. individually into the plate set, so that the plates get an even distance from each other (as a whole with screw raised by process between two screws or gears or flaps or grippers| shearing) and can be dispensed individually by turning the transport or conveying screw downwards, where they are fixed at short notice or are already fixed in a stable manner (e.g. by output of the plates to a corresponding, described threaded rod (alternatives "glue") (during or later (semiautoapplicable.?)) and precisely equipped with planting material/seed belt/band (among others) before another plate is output and, if necessary, the tape is bent on the back. If the tape is used, this can be delivered on a roller or coil on a movable coil carrier (holder) (or movable pins) which can move back and forth, rolling onto the output plates together with planting material. Similarly, a (movable) tape magazine (or movable pins) could be used, in which e.g. folded tape is located. Both would be reflected in forward and backward movements (linear back/forth) above the newly issued

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plate perform in alternation (detailed) with plate outputs and possibly parallel to plant matter placements. If the belt is promptly assembled and sewn (not upstream?) or plant material is attached to it, a back and forth of the tape over the respective plate (with bends at the end) is still necessary, but the coil or the tape magazine would be located before the tape assembly process (a sewing machine e.g.) while the laying of the tape on the plate would be placed on the plates. However, it must be ensured that the tape (magazine / roll)?? would not be in the way of the output of a new plate on the stack, e.g. by a rod, which pushes the tape far beyond the output path in the necessary case. Likewise, rods ... cause the buckling process. If the tape is not yet assembled, planting material can be applied to the plate (or, if available on the tape on the plate) or to plant material or combinations instead, at specified intervals. For this purpose, common seeding and/or assembly machines or automatic machines can be used. Furthermore, grippers or supporting jaws or supports can be used to keep the planting material and/or band stable in position at short notice until it is clamped.

In the case of pre-produced tape, the planting material assembly material combined with the belt is carried out separately, whereby a permanent fastening ((on) sewing (2 layers all around | 1 layer, over-sewing), (on/on) gluing (not waterproof but no harmful leaking), etc.) is carried out on the belt after application of the planting material and, if necessary, a rolling or folding and possibly a folding and loading. A possible punching of cuts or recesses on the plate of the belt/on the recess surface can be carried out during the pre-production of the belt or on the just-equipped plate set in the machine.

The steps of the machine in each case are precisely matched and calibrated to precisely position the belt, planting material + plates. The operation can be designed purely mechanically to fully automated. The entire plate assembly process incl. possibly belt assembly can be done manually, fully automatically or mixed without a machine. Machine processes can be mechanically controlled, fully initiated by hand, based on punch card-like processes, BUS-controlled processes or computer-aided processes. The latter can be pre-set, pre-programmed or determined at short notice by input devices. The composition of the plate stacks incl. their respective placement can be done e.g. in the machine with stable fixating (but solvable) elements (threaded) or can only be fixed at short notice (e.g. without deck and collecting plate) and then brought to the stable fixing final state (e.g. by inserting the stack between fixed deck and snapping plates, which can hold the stack stable between them. Means (threaded tact or wire), possibly incl. additional fixations to each other).

For example, one or more fixing rods can also be guided by fitting additional recesses at the end of the machine

and these up and down? be fixed against the ends of the stack (possibly incl. deck and collecting plates) (e.g. by threads and nuts or other means, e.g. pins through holes in the end of the rods, ...). For this purpose, recesses may also be provided at the ends of the plate stack in the respective plates (e.g. the top of the top plate and / and the bottom of the collecting plate), so that the fixing agents (nuts, pins (variate. wire rings) etc.) can be sunk in it during fixation. During the assembly of the stack, all possible (nutrient solution) feedable elements (drip hoses, etc.) and all recirculating internal elements and all internal (nutrient solution) derive elements must also be installed functionally in the container resulting from plates (incl. functionally installed/connected connections to the outside). Either these parts are already part of a cover plate or a collecting plate or are attached functionally to these or other parts of the container (usually inside) during assembly.

Finally, possible energy and data supply must also be connected functionally + operationally (energy, liquid, aerosol, ...).

The container is also transported to its place of operation and, if necessary, fixed and put into operation with fasteners, e.g. by connecting it to a recirculation or other nutrient solution system and possibly to a dispersing collection system (if it is not operated autonomously or connected to electricity).

For example, it can be installed stable on a facade or can be freely hung as a planting tower in a greenhouse (series/single) and possibly connected.

There may be several operating phases according to the composition of the stack to the container: e.g.: storage (dry (separated/equipped and dist.), inactive), before/after assembly germination and / or growth phase under appropriate biologically necessary conditions and finally growth and operation at the final destination, furthermore it can be transported for harvesting and/or re- assembly or maintenance.

An extended embodiment and mode of operation of the invention includes, which is placed on defined, on successively on successive sections on the planted spaces (slot) between the plates plant material with certain color properties (in the developed phase) so that in the later fully developed (phase) desired growth and operation planned patterns and signs are later color distinguishable by the different colors of the plants growing there are / appear. This can be different leaf colors (or hues) or color of whole plant/color. Effect, as well as the presence or absence of possibly different but clearly perceptible flower colors or their dominant color fractions. Any section on which a plant or flower (or a certain number of them) is provided with its color properties can be defined as a "pixel".

This "plant pixel" is defined with a certain width on the separation slot between two plates of the container and at the same time is usually defined with a more precisely

"pixel height" if defined. For example, the "pixel height" can be set in such a way that it is composed of half the plate height above the slot and from the height of the slot itself and from half the height of the underlying plate. However, the pixel can also be defined a little lower or higher, for example, because vegetation may hang down or aspire to light. The expected growth properties of the determined plant groups give the possible pixel size (minimum e.g.) (height and width) that can be chosen, this results in the derived plate height (thickness) (rather maximum height (since more compulsion than expansion possible + rather small plate heights + slot heights desired) + rather several equal pixels better) with incl. slot height (plants can be compulged but rather not much expand) (depending on plant material diameter in the slot and further inserts, such as a band or spacer). The number of pixels required for a desired pattern or character (or group/sequence of characters/patterns) (total or per pattern/character line) results in the number of plates and spaces at least to be superimposed on top of each other (slots) + spaces + spaces (or area to be filled out + desired character size). Characters and patterns with fixed pixel groups can be defined and summarized depending on pixel size (and possibly by pixel color). These pixel groups can be assigned to specific defined plant varieties with corresponding color and biological properties, depending on the color specification and pixel size. This comes from an assignment of diff. "ink" as is the same for pixels in a printer, printer driver, or printer program. This mapping can be made at pixel level or on pixel group level (characters, patterns, (surface-side to summarized characters/patterns, combo from these + background + majority of all these) ...) (only for software surface) (machine side only pixels). The groups must be grouped together in terms of pixel size and color, if necessary, on similar pixel-filling growth properties, development time and hue (flowers, leaves).

This can be stored in data sheets + sample templates for assembly by hand (or at the push of a button, spontaneous computer selection, etc.) or stored in files that have access to machine operations in the assembly process. In a computer-supported procedure, a word processing surface or image processing or drawing software interface can be combined with software that influences the placement processes and controls a corresponding machine (detail. chain).

For example, an end customer can use keyboard input (- letter color/shape selection via menu, ... All in all, common text processing/image editing interface, which converts their pixels + dimension + their occupation into printer driver commands - assigned to plant pixel output) easily configure the load assembly. With and without an easy-to-use interface (word processing, drawing program, ...) software can be provided that creates data sets, if necessary, or issues control commands directly, which are based on the plant pixel files and initiate their use in the assembly process.

Beforehand, the machine sizes (more detailed (pixels, overall frame, shafts (+ aids + support) must be set/provided and possibly stored in the software as electable. Likewise, the available + machine compatible plant assembly must be stored in the software for selection including placement process. This is done, for example, in the form of alternatively electable plant pixel files. A corresponding machine must not only be adequately

equipment in the magazine, etc., but must be able to select from various controllable placement alternatives according to the files (both in pre-production assembly on the plate stack directly). Thus, data sets and control processes can be combined on assembly machines, so that, for example, an end customer (or the machine operator himself (insert later)) can individually assemble a lettering or an image pattern, e.g. via a webshop interface, and, if necessary, commission it online, so that his customer and order record combines a finally planted plate stack/container or a usable assembled tape for his own container in production. by shipping (also standardized pre-production -> mention later).

Advertising spaces can also be booked and configured in this way. The customer or a professional operator can design a facade that is equipped with plant advertising (signs, patterns) (e.g. via software interface).

Overall, however, all simpler variants are also conceivable, e.g. a simple scattering of planting material on plates or for fixing to a band (before/during). As a rule, the plates are stacked flat on top of each other, so the recess is located on the largest surface of the plate (usually also most of its surface).

It would also be possible to create a series of fitted plates, which have been placed on the side, so that the slots run from top to bottom (usually with tape) (or any angle in between (e.g. 45 °)). But then horizontal cover and collecting plates would still make sense.

wicking strips if necessary.

+ Inner cylinder

btw. assembly

- insert "later"

end customer ->webshop	-	-> there	-> subsection	-> combined -->
-surface in the browser		customer record	text/image-processing	data "set"
		+ contract	software in	(customer data
		+ possibly	customer interface	order + contract + invoice
		advertising space	of the webshop	+advertising space
				+ text /image

-> text/

image record -> machine/

assembling + aids controlled (preparation

(possibly combine with several)) -> equip

per pixel

+ distances

-> ... S

- pixel maximum width
 - height / per plant matter unit
(because of thinning danger)
- slit -> pixel-
 - minimum height /average/exact
/per plant matter diameter (lying)
- characters/pattern dimensions (e.g. line minimum width/line) can be
if necessary, at least one plant pixel
- however, in the event of dominance of leafy green or other
flower colors can have minimum pixel quantities per
character dashes/dimensions in data sheets, tables, stencils, files
pattern dashes / dimensions
deposited as a recommendation or default in order to
subtly given hue (e.g. small individual flowers per plant)
more extensively than pixels with
other flowers, flower colors or leaf colors or flowerless
plant pixels. The same applies to varying leaf colors.

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Reference list

- 1 container (soilless culture)
- 2 plate(s) (with recesses)
- 3 breakthrough / hole on plate (2)
- 4 top plate (2)
- 5 bottom plate (2)
- 6 closed top plate to container (1)
- 7 closed collection / drain plate of container (1)
- 8 cavity in container (1) formed by plates (2)
- 9 planting material parts with root cover
- 10 Planting material in all variants, as a whole if necessary.
- 11 non-root-related plant matter parts from (10)
- 12 Slot on the container (1) between plates (2)
- 13 Nutrient supply system / nutrient distribution system of any kind
- 14 plant shoots from (10)
- 15 volume, rel. elastic, a bit pressure absorbing, always permeable to water
- 16 inner surface of tape (15) = not side margins
- 17 plant pixels
- 18 plate height
- 19 plate length
- 20 plate slot height, between plates (2) in container (1)
- 21 machine for the assembly of containers (1)

cont'ed: Reference list

- 22 knob/elevation (to collect tape (15))
- 23 groove (counterpart to (22))
- 24 coil / belt carrier
- 25 snapper (snapping)
- 26 connection rod snap grabber (25) = fixation of (1)
- 27 screw clamp = fixation of (1)
- 28 threaded clamp (27)
- 29 handle clamp (27)
- 30 sling wire rope (31)
- 31 wire rope (aids fixing plate stack (1))
- 32 wire pin for snapping/fixing in (31)/(30)
- 33 fixing rod for plate stack
- 34 "push-out rod" / clamping rod (stretches band 15 for cutting)
- 35 cut/overstanding tape scrapers (15)
- 36 recess for fixing rod (33); threaded rod; (31)
- 37 fold
- 38 cross-shaped incision / punching
- 39 band without recess in the middle
- 40 lids
- 41 curing mass
- 42 film (moisture protection) not fully enclosed
- 43 nutrient solution fogger
- 44 foil ring for 42
- 45 film tape for 42
- 46 foil weld seam
- 47 nail board
- 48 substrate matrix
- 49 substrate eyelets
- 50 rope start
- 51 aids (claim 15) for substrate matrix creation
- 52 "nail"

cont'd: Reference list

- 53 nutrient solution
- 54 container wall
- 55 perforated wall (fit for nail board)
- 56 pump
- 57 power supply
- 58 sandbag
- 59 hose
- 60 "spoon" tray
- 61 grid for (60)
- 62 Zip-Grow-Tower-like
- 63 front piece
- 64 front slot
- 65 root vegetable hard foam
- 66 egg carton surface
- 67 frame around (65)
- 68 "nail"
- 69 sprinkler
- 70 nut
- 71 sinking
- 72 threaded rod

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Patent claims

1. Container (1) of various geometry suitable for the operation of soilless plant culture, signified by that, that it constitutes itself out of a multitude of single plates (2), which have a breakthrough (3) going through from their upper side (4) until their bottom side (5) so that they (when) laying above each other and fixed with each other (incl. a closed uppermost cover plate (6) and a lowest closed collection or outlet plate (7)) are forming a relatively closed container (1) around the shared hollow space (8) build by that, in which plant parts (roots, rhizomes, tubers, root shoots, ...) (9) can be supplied with nutrient solution (53), when according plant matter (seeds, sprouts, clippings, tubers, rhizomic plants, adult plants, etc.) (10) is given between the plates (2) in a sensible manner so that the plant matter (10) either can sprout, sprout forward or finally grow and operate metabolism or finally at the (operate) outside photosynthesis by that that root shoots (9) can develop in the hollow space (8) and other plant parts (11) of the same plant matter (10) can grow towards the outside and develop trough the slot (12) between the plates (2), between which they have been laid upon and clamped in, while the whole container (1) is held together by aides, if (in a stable and possibly again detachable manner) composed together and equipped with plant matter (10), while in its interior nutrient solution (53) can be distributed by fitting nutrient solution supply systems (13) (recirculating ones or externally supplying/disposing ones), so that the nutrients can be absorbed by the plant parts (roots, etc.) (9) or sprouting and sprouts (14) can be initiated.

2. Procedure for the operation of a container (1), signified by that, that a multitude of single plates (2) (with breakthrough (3)) are composed in that way, that they lay above each other and form a shared hollow space (8), which is possibly closed off with a cover plate (6) and collection or outlet plate (7) and during combining the plates (2) those are in a sensible way equipped with plant matter (10) and according nutrient distribution systems (13) are inserted and installed in a way suitable for functioning and for steering and the complete container (1) is mounted together and kept together stably (and possibly again in a detachable manner) by fitting aides.

3. Container (1) according to claim 1, signified by that, that a possibly pressure reducing, relatively elastic band (15) (e.g. hardened foam, pond filter tissue, ...), which is on the inner surface (16) at least water permeable, possibly penetrable by roots, is inserted between all plates (2) of the plate stack as a separating layer, while possibly also a sealing effect can occur by that.

4. Procedure for insertion of a band (15) according to claim 3, signified by that that the band (15) is positioned upon the upper side (4) of a first plate (2) relatively fittingly (possibly with free plant matter (10)) and is clamped between those two plates (2) by a further plate (2), which is positioned relatively fittingly above it, (and) afterwards the rest of the band (15) is again folded on the back (possibly with free plant matter (10)) is again coming to rest upon (the) upper plate (2) and is clamped in again by a further positioned above plate (2) and this procedure of alternatingly positioning above a plate (2), folding band (15) on (its) back and laying it upon above (possibly with plant matter (10)) is repeated so long, until the plate stack is equipped with band (15) and possibly with plant matter (10), while with "free plant matter" are meant loosely laid upon plant matter (10) or its laid upon parts.

5. Band (15) according to claim 3 and 4 signified by that, that it contained previous to the equipping of the container (1) already fixed plant matter (10), which can after insertion into the container (1) (between the plates (2)) sprout or grow, possibly in single cases pre-sprouted, when needed alternatively insertion of loose plant matter (10) is skipped.

6. Procedure for equipping the container (1) according to claims 1 to 5, signified by that, that into the container (1) onto the plates (2) plant matter (10) is inserted in that way that according to previously occurred planning together inc. sum a pattern, or sign or symbol or a colored surface or a multitude and/or combinations of those result in a planned manner in certain growth stages, effected by that, that plant matter (10) with certain color-related properties are filling out a predestined place in/at the container (1) (= plant pixel (17)), while each time plant pixel (17) and plate height (18) and plate length (19) can be predisposed in relation to each other, with taking into account of the slot height (20), while this can determine available patterns, colors, time frames of use and other parameters.

7. Machine (21) for the equipping of a container (1) according to claims 1 to 6, signified by that, that plant matter (10) and possibly band (15) (pre-equipped or empty) can be provided in this machine (21) together with plates (2) and there these plates (2) can be combined with plant matter (10) and/or band (15) (equip./unequip.) in a machine-related manner into a container (1), like the claims 1 to 6 described it, to effect an equipping able for growth and for operation.

8. Software, template, punch card or other data carrier or data processing process or mechanism, signified by that, that plant-originated symbols, signs, colored surfaces, patterns and sequences and groups and/or combinations or placeholders of those can be provided for support or steering of a procedure according to claim 6 and can systematically employed, also for semi- or fully automated steering of machines (21) according to claim 7, while also saved, processed combinations or combinations of above named values can be put to use as chosen on short notice as well by use of EDP as by other systems (mechanics, BUS, ...), the processed data categories can among others size of plant matter (10) at beginning, plant matter (10) category (seed, sprout, rhizome, clipping, ...), final size, , time frame of development (phases), color calculation of equipping breadth, of equipping quantity, correlating length and kind of a band (15), (equip./unequip.) and available or necessary summary surfaces, each time everything (available) for evaluation, processing and calculation, possibly also prepared in web-shop surfaces or mobile apps.

9. Business model according to claims 1 to 8, that offers customers products and services described there, while also besides equipping of containers (1), sale of supplementals, sale of band (15), facade design, container (1) sales, advertising surfaces can be offered in combination with exactly those and can be booked possibly by web-shop, possibly by mobile app, as well as licensing of claims 1 incl. to 9, (and) the utilization of those same.

10. Container (1) according to claim 3, signified by that, that the container (1) is solely composed from said band (15) and plant matter (10) (of random kind, pre-equip./ not pre-equip.) without use of rigid plates (2), while in the same way a hollow space (8) in container (1) and integrated nutrient supply system (13), and

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possibly aides for fixation of the stack are provided for, while also all band layers (15) come to rest above each other, to get fixated by random aides (e.g. by sewing, plastic welding, ...).

11. Container (1) according to claim 10, signified by that, that environmental influences and evaporation are reduced by a plastic / foil skin (non-rigid) which is surrounding it, which is perforated and is permeable by plant growth, also a harmless sealing can be put on and get perforated or be produced by melting or by other states and matter/stuff providing a skin can be employed here.

12. Container (1) according to claim 11 and 10, signified by that, that the container (1) is able to be installed alongside a slope, while rear openings towards the slope surface are given, to allow for a rooting-through out of the container (1), while contact to the slope is to be created and possibly mountings are provided, on which soil or granulates can gather, also necessary fixations can possibly be installed in or above the slope and be connected with the container (1).

13. Procedure according to claim 12, signified by the execution of the described states.

14. Container (1) according to claims 10 or 11, signified by that, that this construct can be hung again/though as a whole, (as a) finish construct (possibly without plant matter (10) at first) into other containers (1) or totally different soilless containers (e.g. PCT/EP2015/000132), at devices for hanging up, provided in/at the other container (e.g. hooks) with e.g. loops, to provide a substrate matrix (48) for this container prefabricated as a whole, while plant matter (10) can be equipped already inside the cont. of this claim or is placed later into the container, into which this matrix is inserted only later, and is later only rooting into the matrix (= container of this claim).

15. Container (1) according to claim 14, while also pertains that the substrate matrix (48) is braided, woven (into each other) or otherwise joined textile technologically from single, several fibers, strings; ropes (e.g. cocos (coir) in the form of a substrate matrix, joined into spatial substrate matrix (48) structure, so that they can be hanged into a container (1) (according to other claims) or (into) can be hung into other containers (PCT/EP2015/00132) at hanging points - alternatively can the structure of the present claim be pressed and compressed strongly, to be later again expanded spatially by water, and to be used as spatially again restored matrix (e.g. a knot matrix).

16. Procedure for the production of a substrate matrix (48) according to claim 15, while fibers are processed to spatial substrate matrices (48) in a textile technical way and possibly being strongly compressed by pressure for storage and transport and are expanded again after that by e.g. water or loss of pressure.

17. Container (1) according to claim 1, signified by that, that single plates (2) have one or several extensions into the notch ("spoon" tray (60)) coming from the plate edge, so that on those sprout- able potatoes, ginger tubers/balls, rhizomes, etc. can be laid down, e.g. on extensions (60) that are formed spoon-like, while also a

net-like or grid-like form of the same would be possible therefor – whilst while that possibly existing shoots can be positioned already at the equipping situation through the plate slots (12), away from the “spoon” tray (60), towards the outer, if shoots shall not seek the way by themselves, optionally the plate (2) / the extension of this claim can be inserted also into other containers (e.g. PCT/EP2015/000132) or with spacers and faceplates into plant towers like Nathaniel Storey (Bright Agrotech), alternatively containers (1), plate stacks, and other containers in the present claim can be equipped without a rear wall, but with overlapping foil doors (light proof) instead.

18. Container (1) according to claim 17, signified by that, that the tray (spoon, bowl, grid) (60) is made from a strip of band (15) or similar horizontally stretched textile, alternatively such textiles can be positioned also on top of the plant matter (10) for (transport) lock.

19. Container (1) according to claims 17 and 18 signified by that, that plates (2) fitting to the inner diameter of a hollow, vertical plant tower with front slot (vertical) with tray (according to claim 17 and 18) are connected with each other by spacers above and below the corners of (2), while possibly previously above the sprout at the front (slot) a light proof layer of band (15) is placed and above it until the next (potato) plate (2) a light blocking faceplate is placed close to the front slot of the hollow vertical tower (e.g. Nathaniel Storey, ...).

20. Container (1) according to claims 1-19, signified by that that the surface of e.g. the whole plate stack (e.g. part of container (1)) is resembles the surface of a sound absorbent “egg carton” (66) on the outside (or also inside), e.g. by applied hardened foam (e.g. for outside water repellent), also possibly as (outer) structure of other soilless containers (PCT/EP2015/000132; Nathaniel Storey, ...).

21. Container (1) according to claims 1-20, whilst it pertains that plates (2) provide so much height, that root vegetables can develop, whilst a dense, slightly hardened foam (65), which is inserted into the front of the plate (2), is giving in to the growth development, but which is still sealing the front of the plate (2) next to the root vegetable, which was placed below or above/on top of the root vegetables in an early state.

22. Container (1) according to claim 15, whilst it pertains, that the substrate matrix (48) is rigid, consists of parallel thorns/nail-like (52) stuff instead and those thorns/nails/pins (52) can be ... possibly in union with each other inserted from several perforated walls (55) through holes into the interior (8) and again be taken out, whilst several nail series coming from several perforated walls (55) can be interlocked into each other or be inserted separated into several levels, segments, groups, sprouting matter can be filled this way gradually into the complete space with fitting size, whilst nail levels can be inserted gradually, plant matter (plant matter or sprout matter not solely dedicated for sprouting) can be placed from outside as known (plate edges) and can use the matrix (e.g. before there is enough root matter for bacteria, ...), also can the nail matrix (47) be inserted into other containers (PCT/EP2015/000132; Storey N., ...), at removal a sealing plate (2) can be put over the holes.

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23. Container (1) according to claims 1 – 22, whilst it pertains, that stable and relatively dense plates (2) are stacked in angles differing from the horizontal (orientation), whilst also possibly cover (6) and collecting plates (7) are being put to use.

24. Container (1) according to claims 1 -23, whilst it pertains, that stacked “plates” (2) consist of at first non-rigid material, are possibly after some time generally hardening out (hardening out) and are alternatively 3D-printable.

25. Containers (1) according to claims 1 – 24, whilst it pertains, that these (1) can be inserted into a proof/sealed reception tub, inserted into a furniture, a wall, or a vehicle (interior) surface etc., and can be operated.

26. Container (1) according to claim 24, whilst it pertains, that the non-rigid material is not (necessarily) hardening out, but is solely separated from the moist inner space (8) and/or the environment, by e.g. a foil, possibly by a closed hose (e.g. gel hoses, sandbags (58), (partly open) foils, ...).

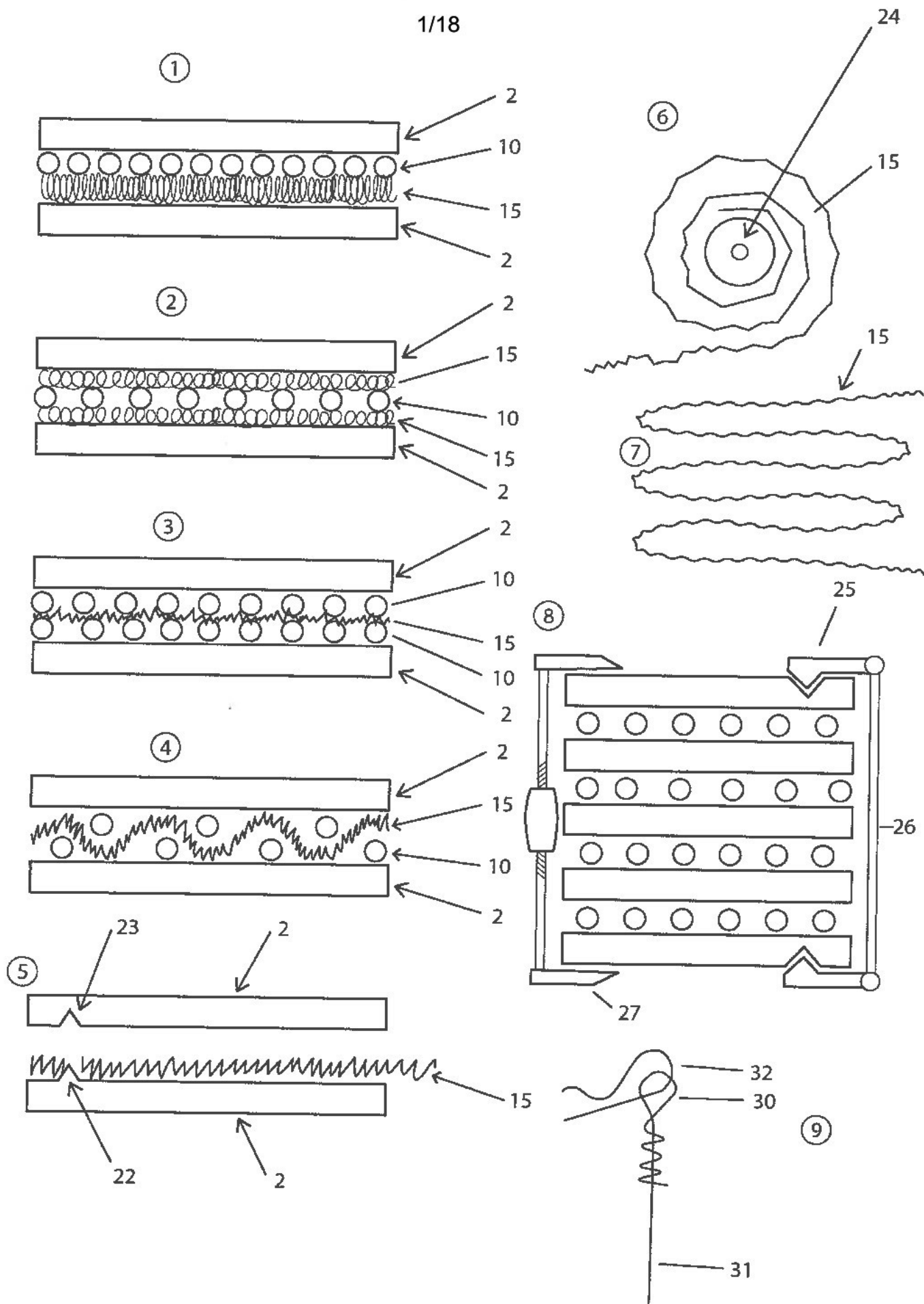
27. Container (1) according to claims 1 – 26, whilst it pertains, that not above each other, separately stacked, but spiral-like joined with each other layer segments are coming to rest above each other in one piece and are joined with plants to a container (1) whole.

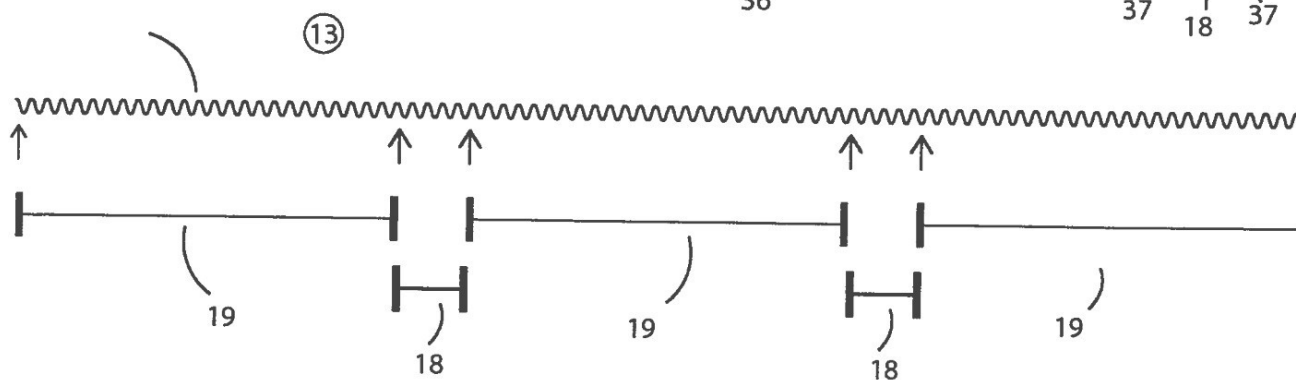
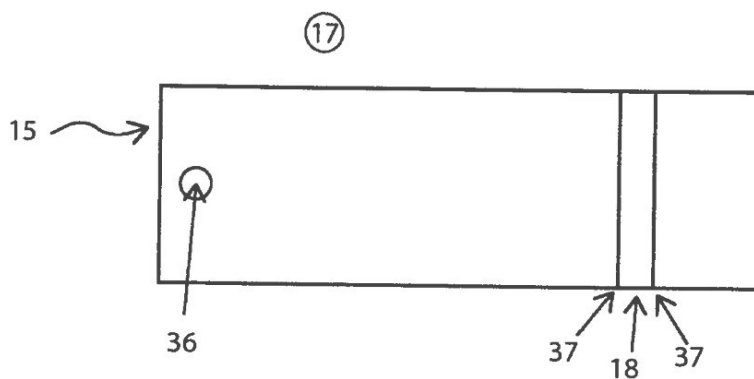
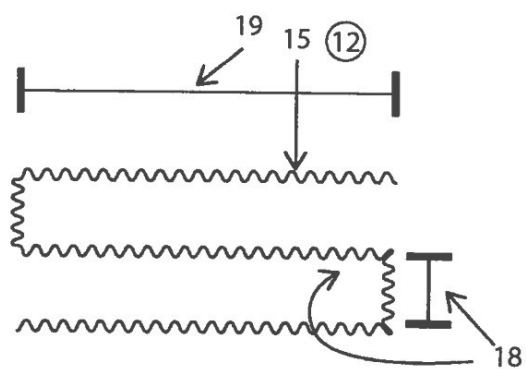
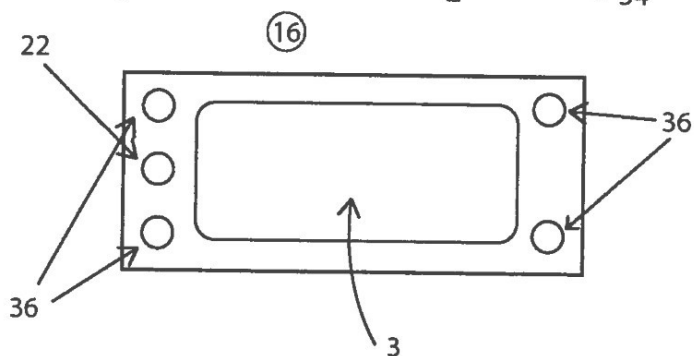
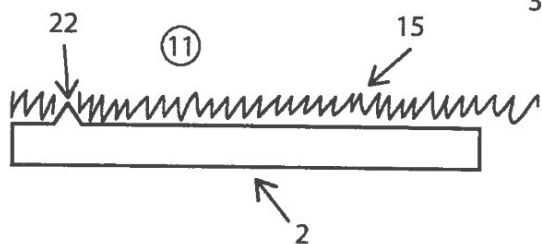
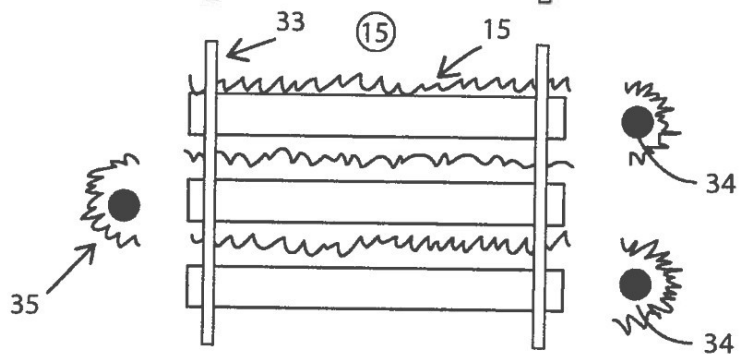
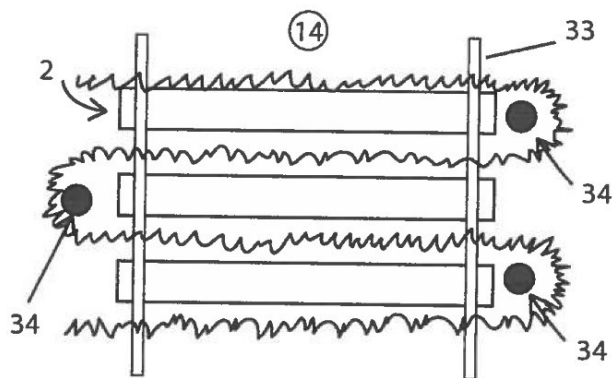
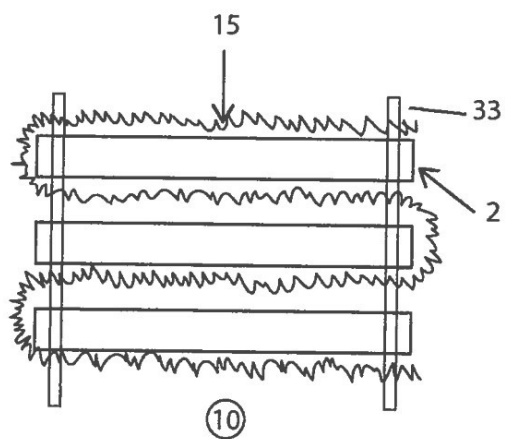
28. Container (1) according to claim 27, whilst by stretching the container (1), equipping is made possible, signifying the claim, also pertains that other self-compressing forms are made able to be equipped by stretching and forming a container (1).

29. Process according to claims 1 – 28, whilst it pertains, that their states, results and necessary and described / extrapolable actions are performed.

30. Business model according to claims 1 – 29, whilst it pertains that their subjects and actions are marketed as products and services.

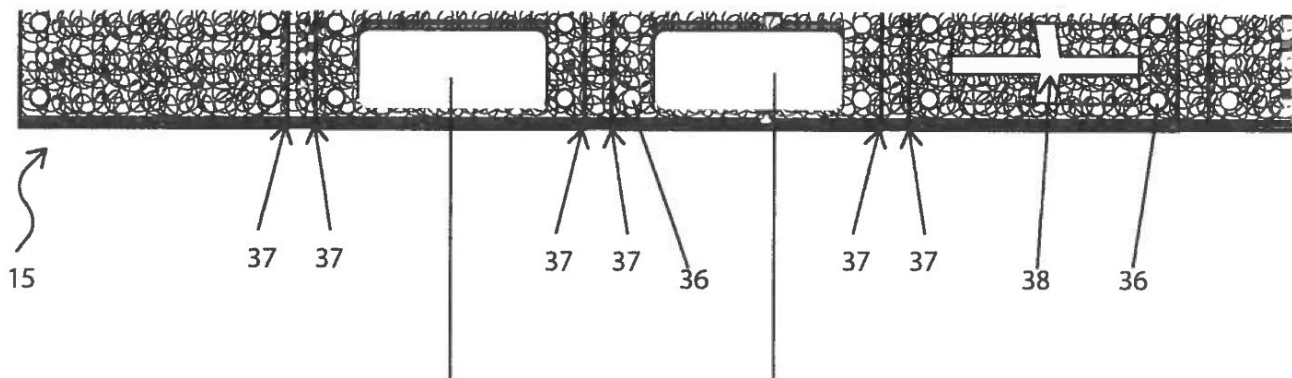
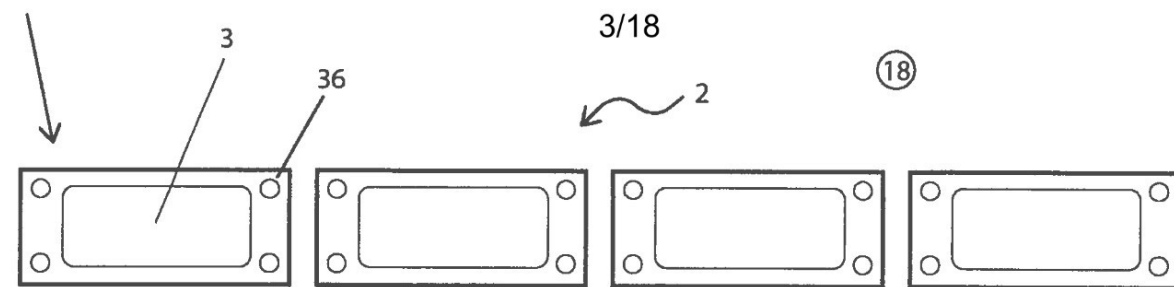
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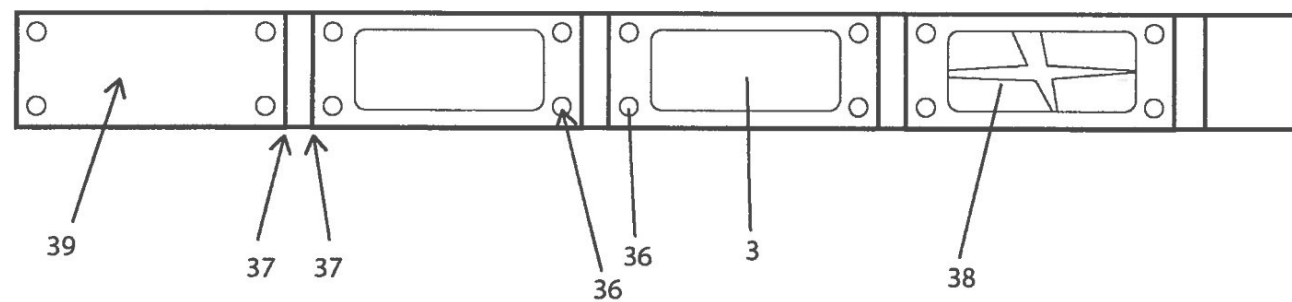


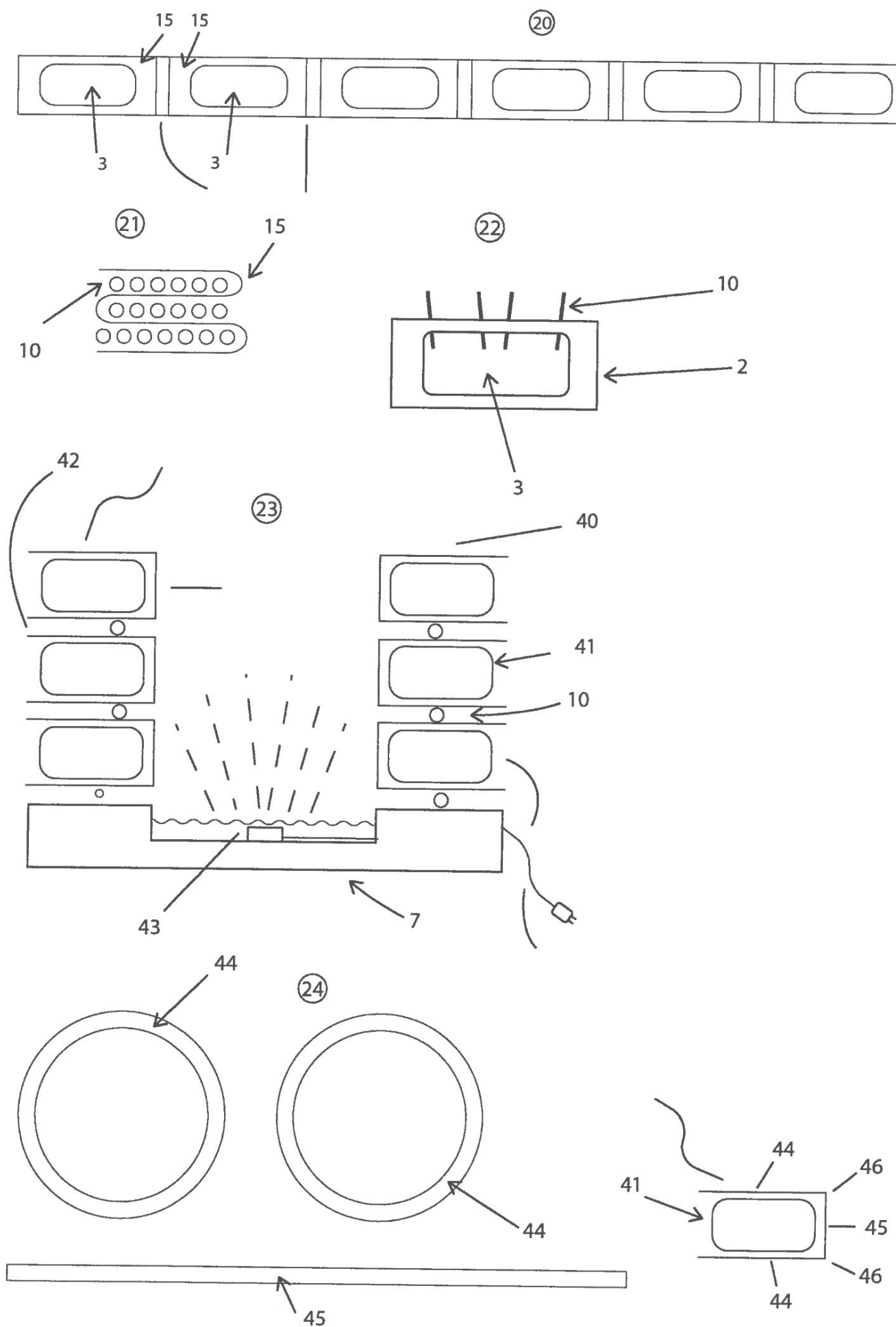
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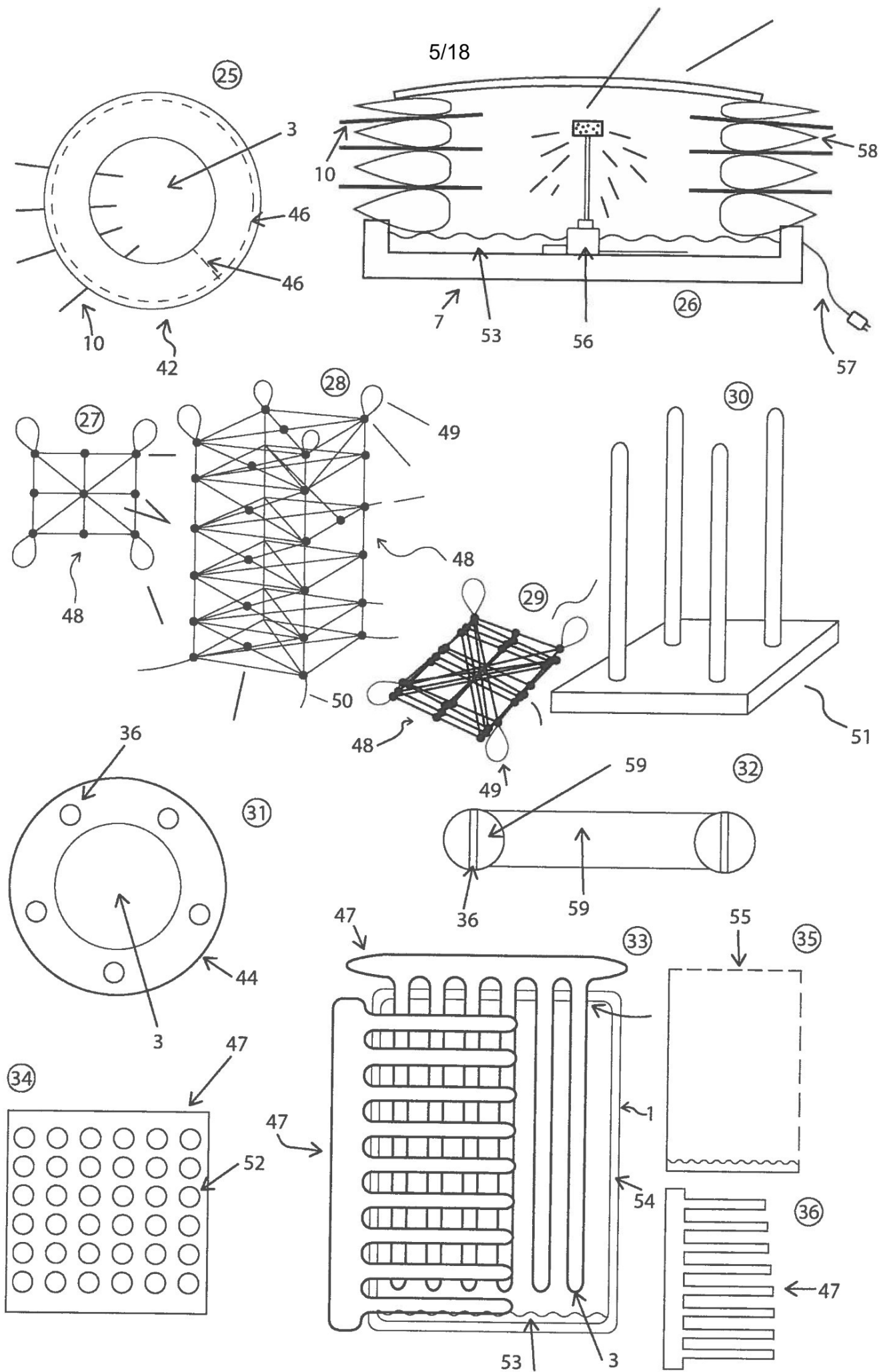
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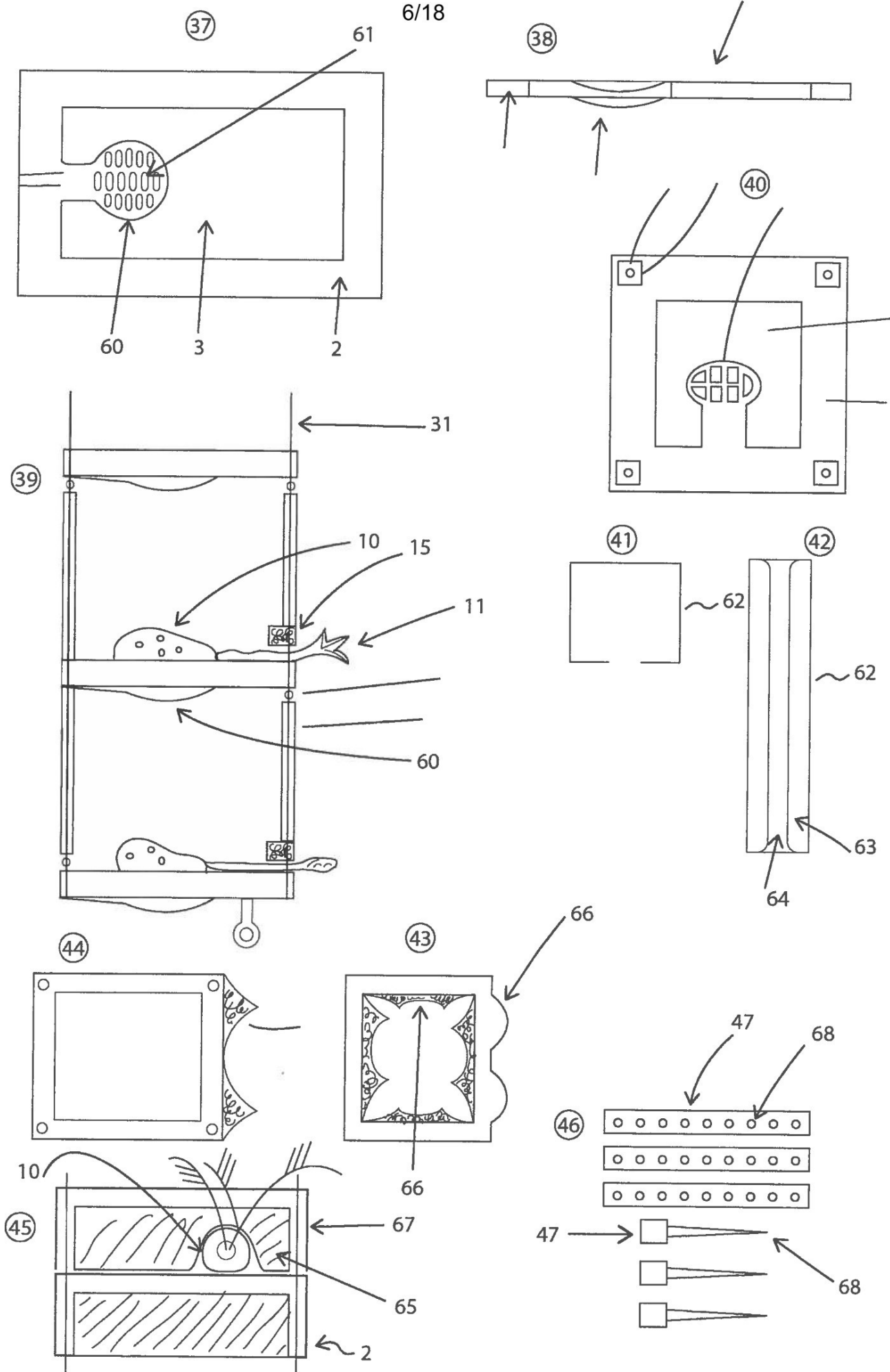


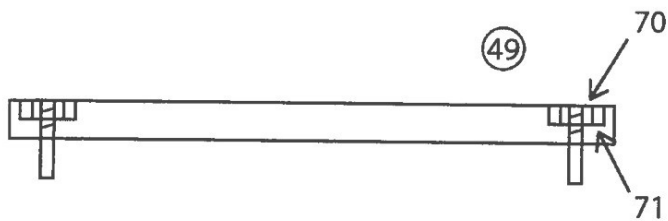
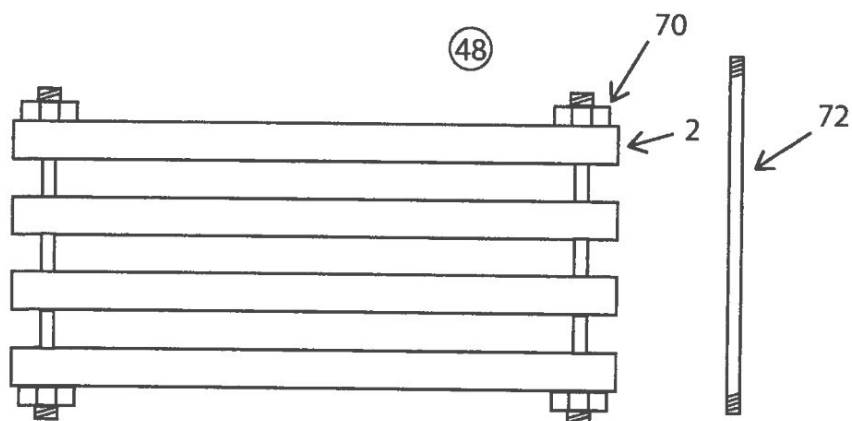
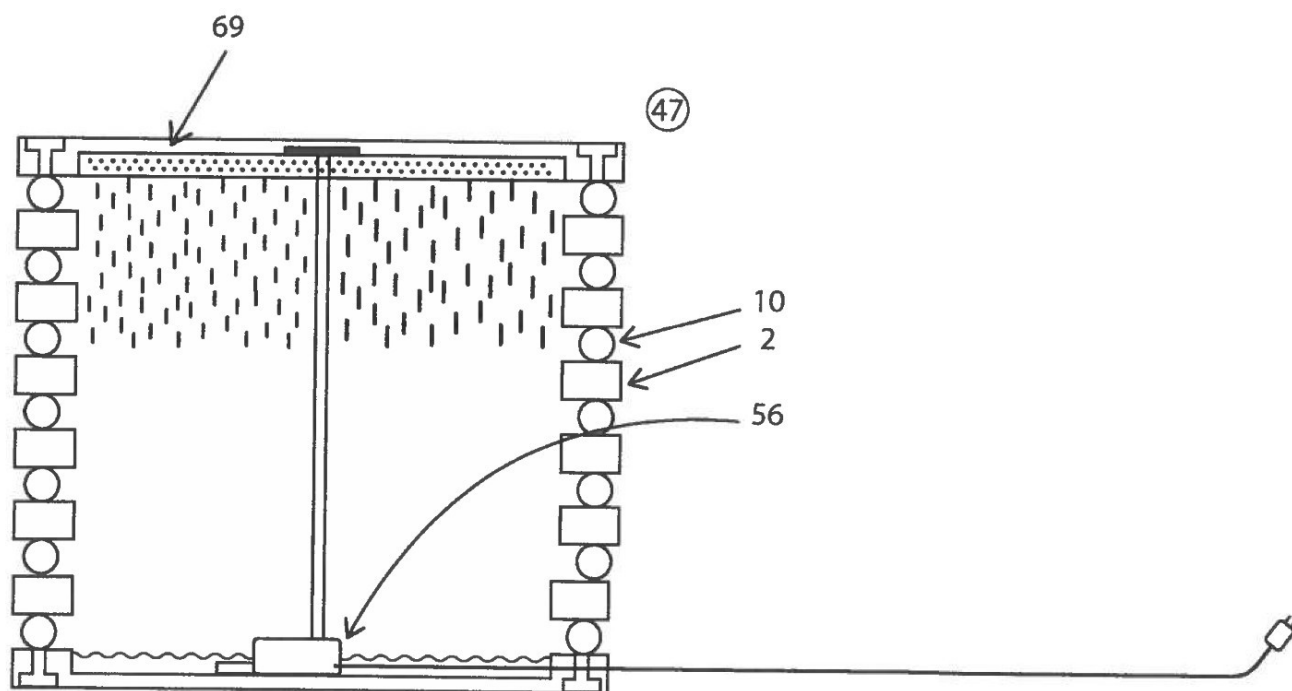
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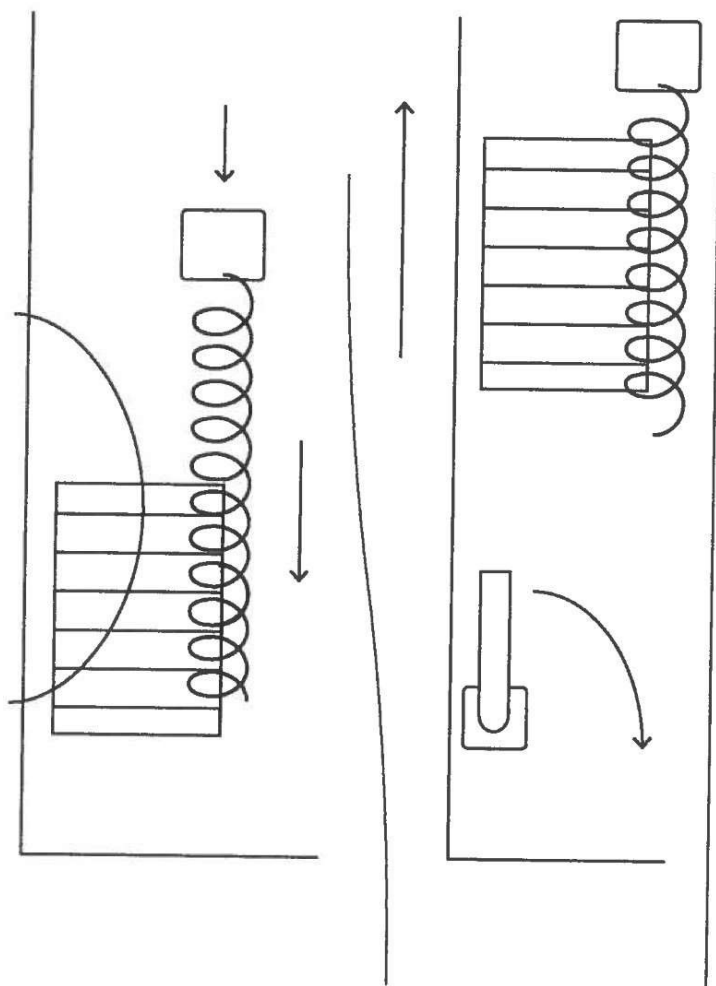




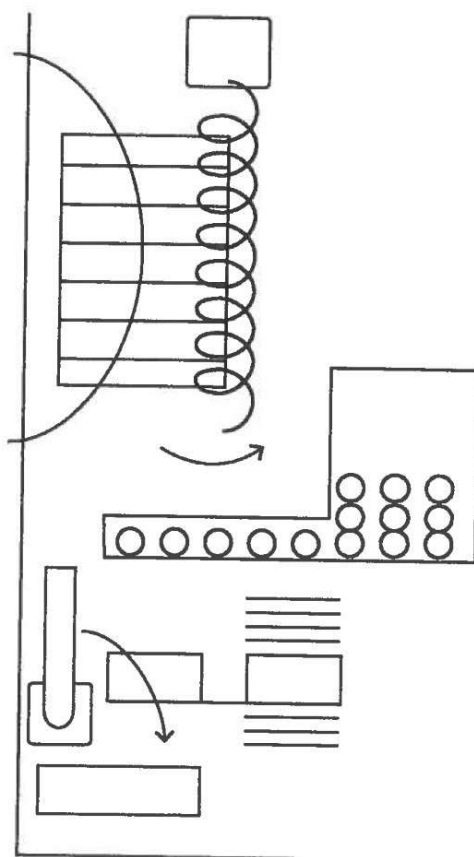




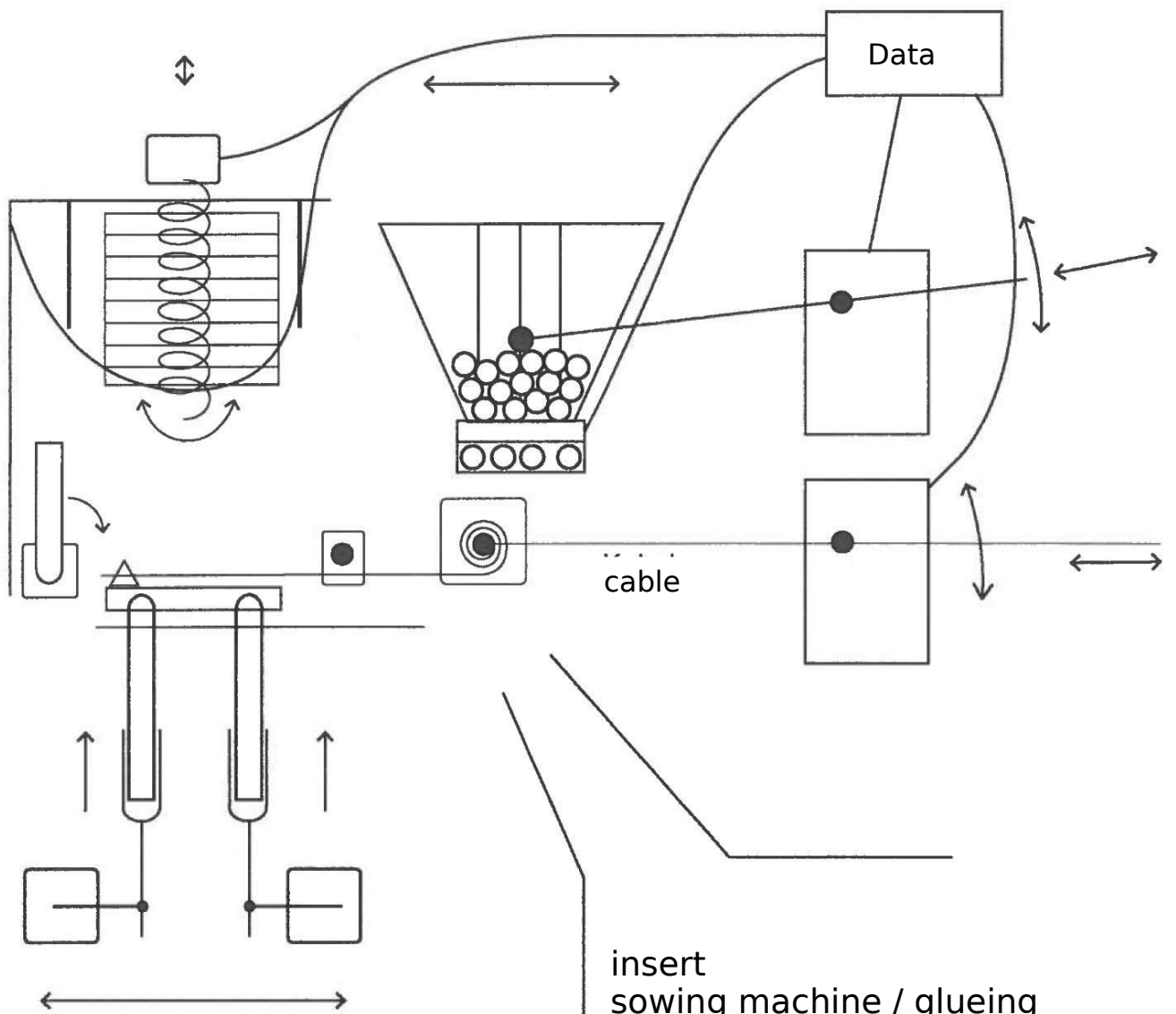




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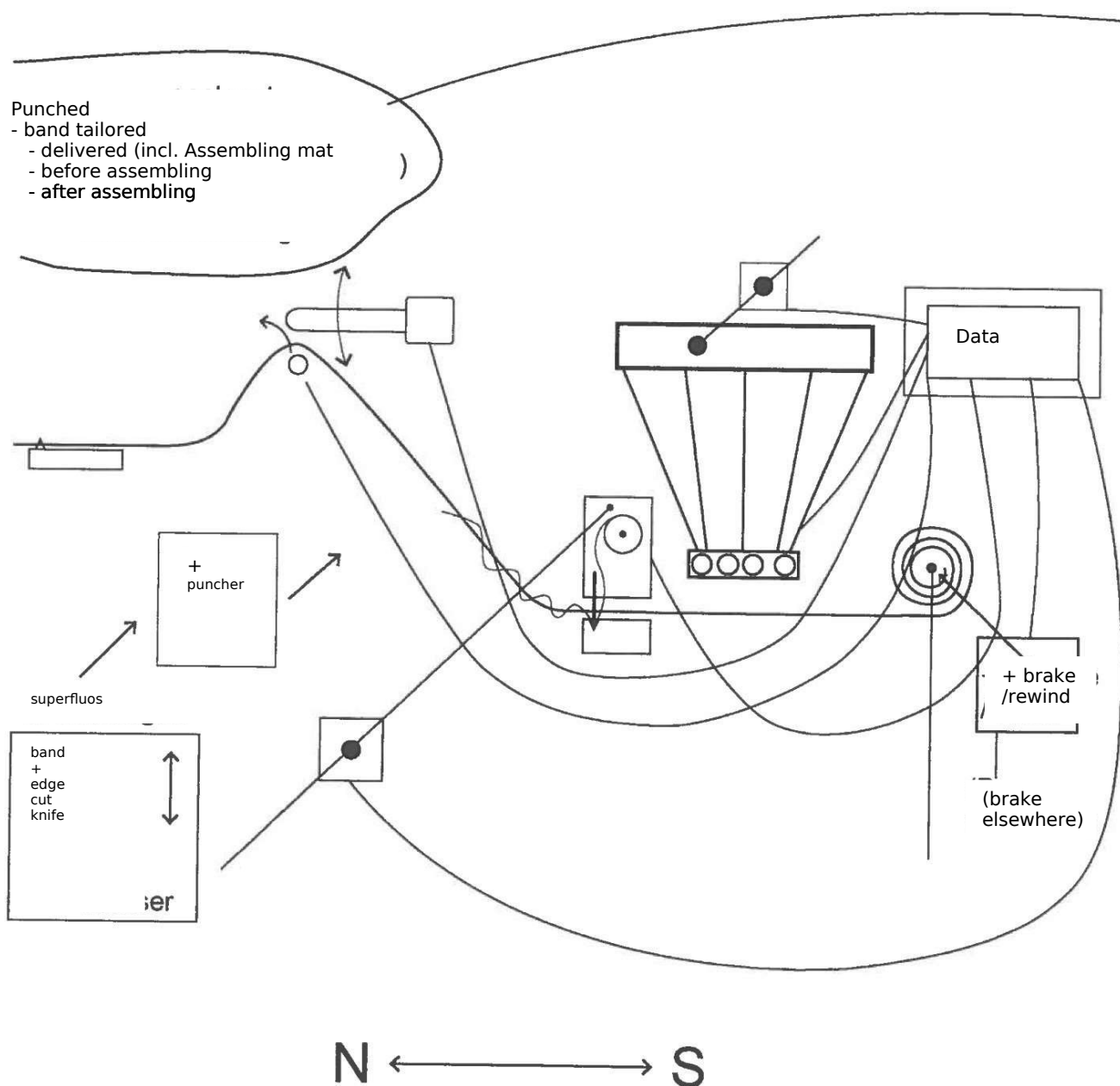
W - E



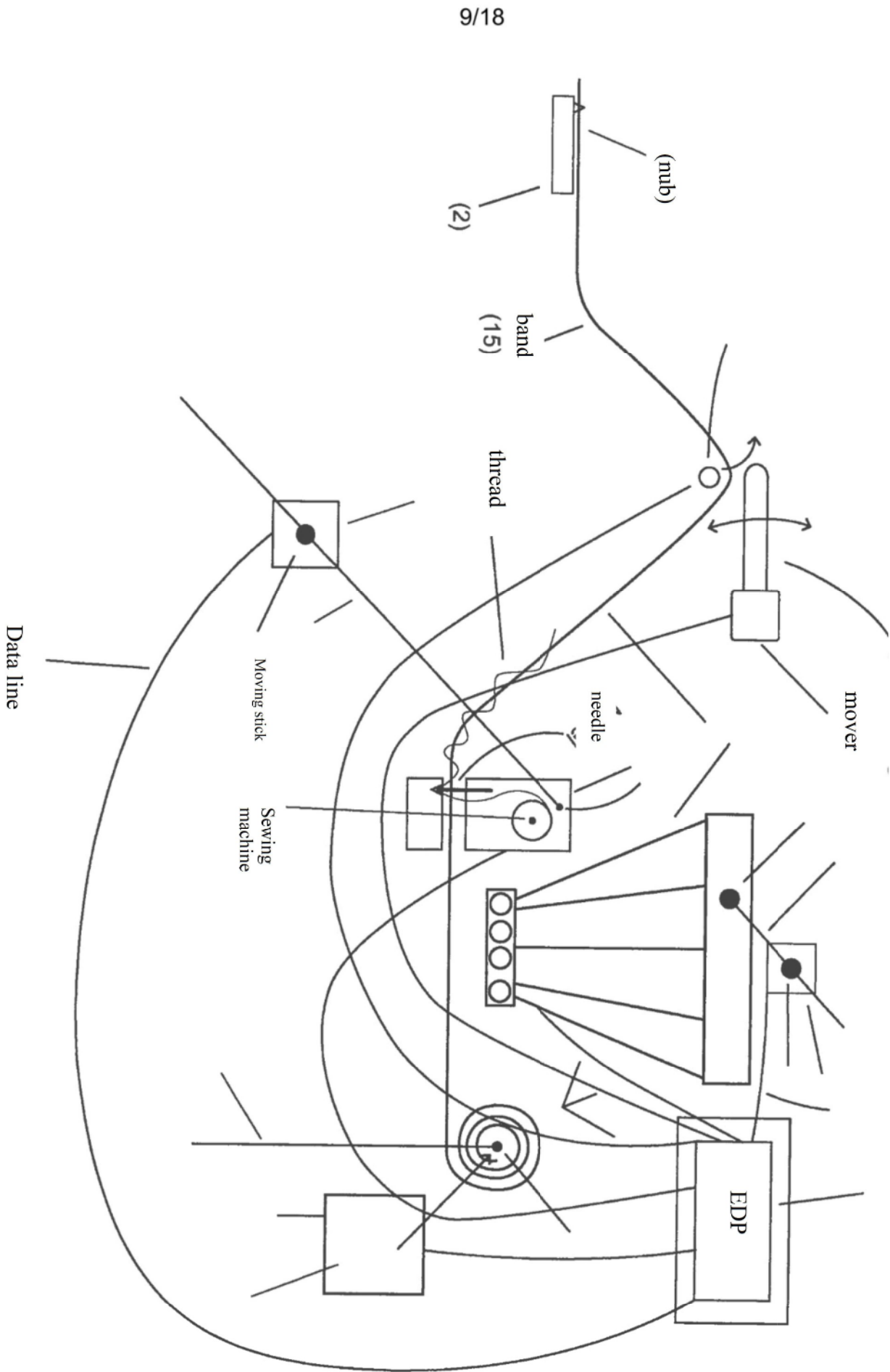
insert
sowing machine / glueing
possibly
+ other roll up mechanism (sticks)
+ push away sticks
+ pull hooks f. first layer
+ forerun f. assembly w/ plant matter

- plate + band assembled and fixated on short notice next to it with plant matter

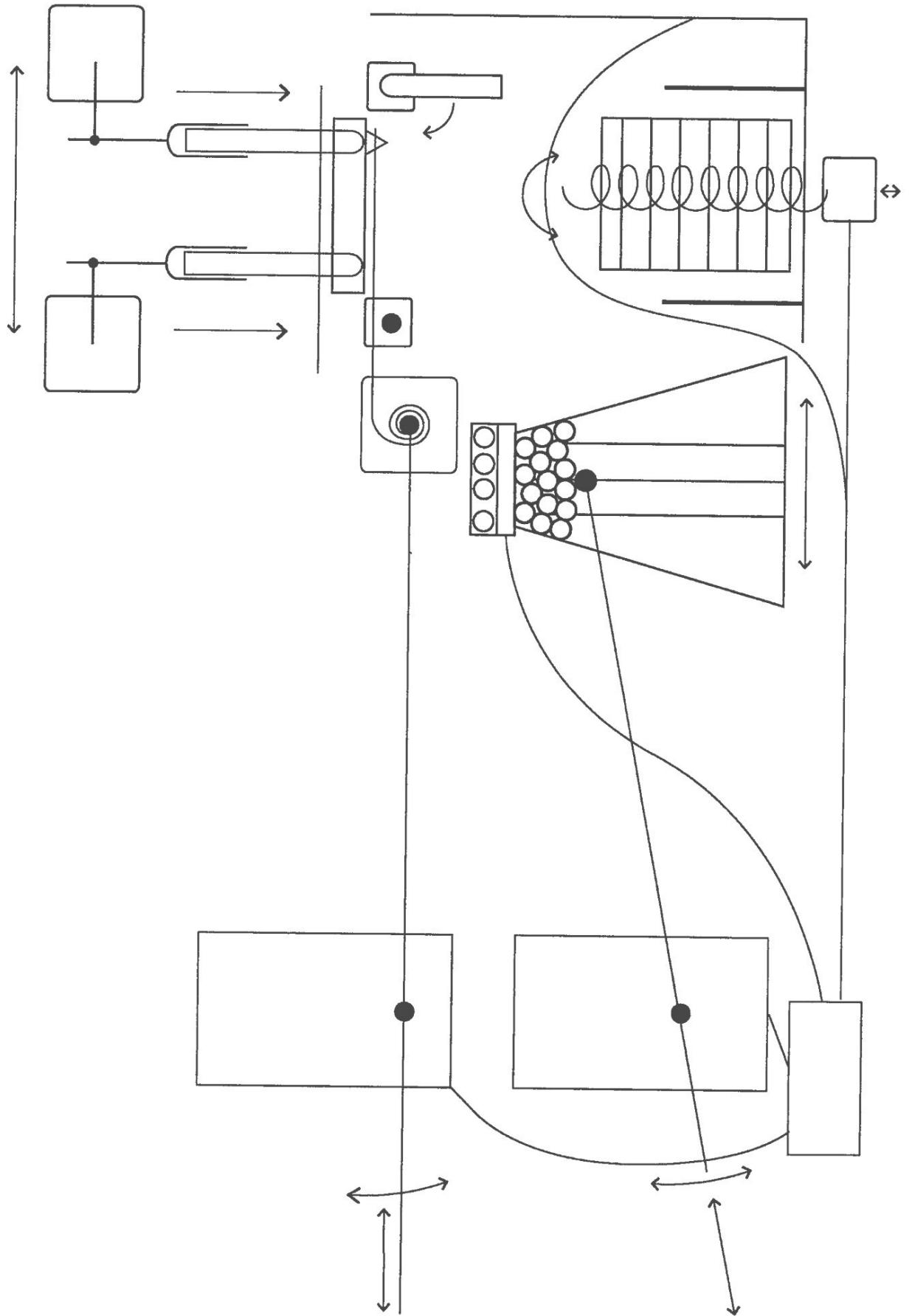
- plate + band + loosely strewn on/laid on seed matter

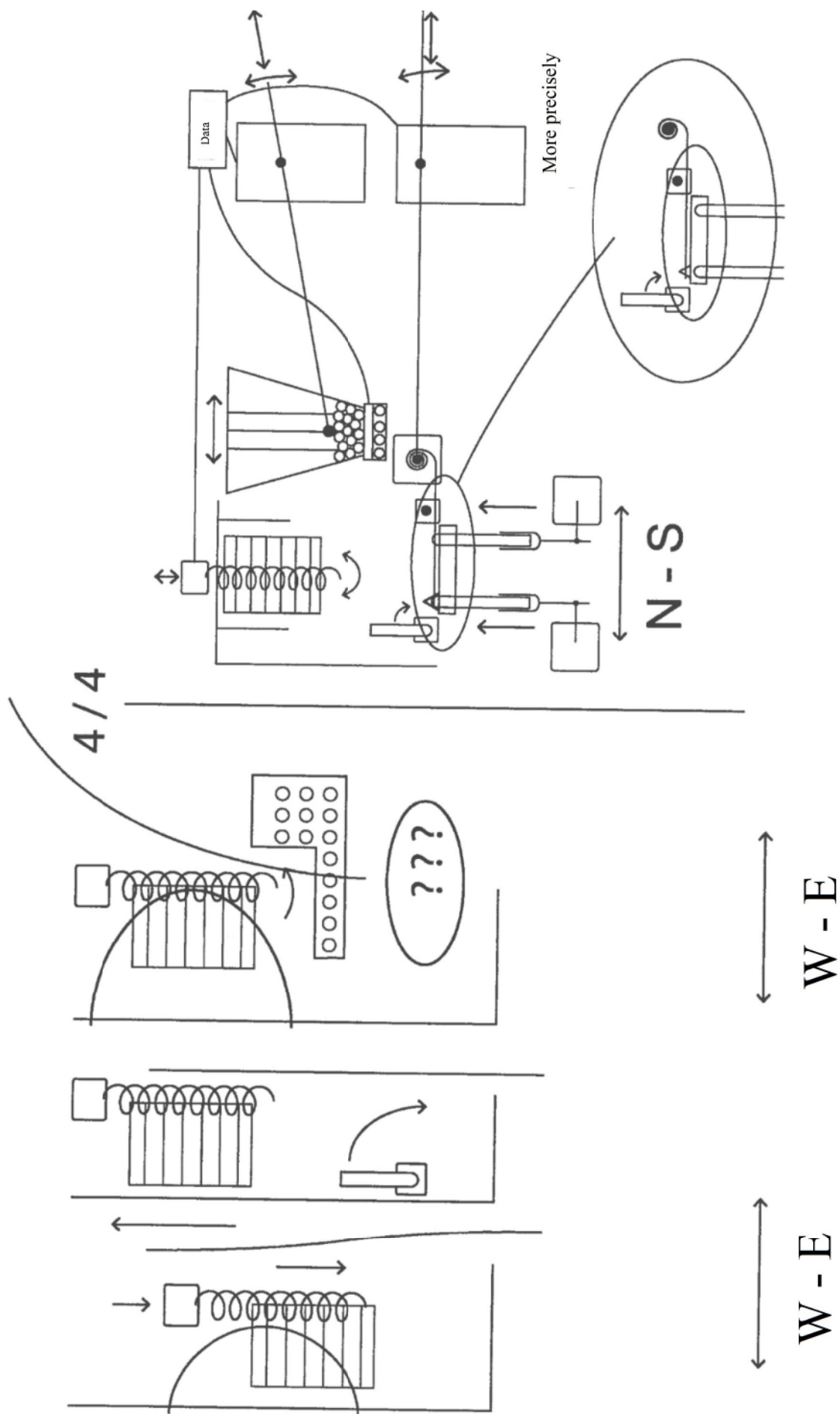


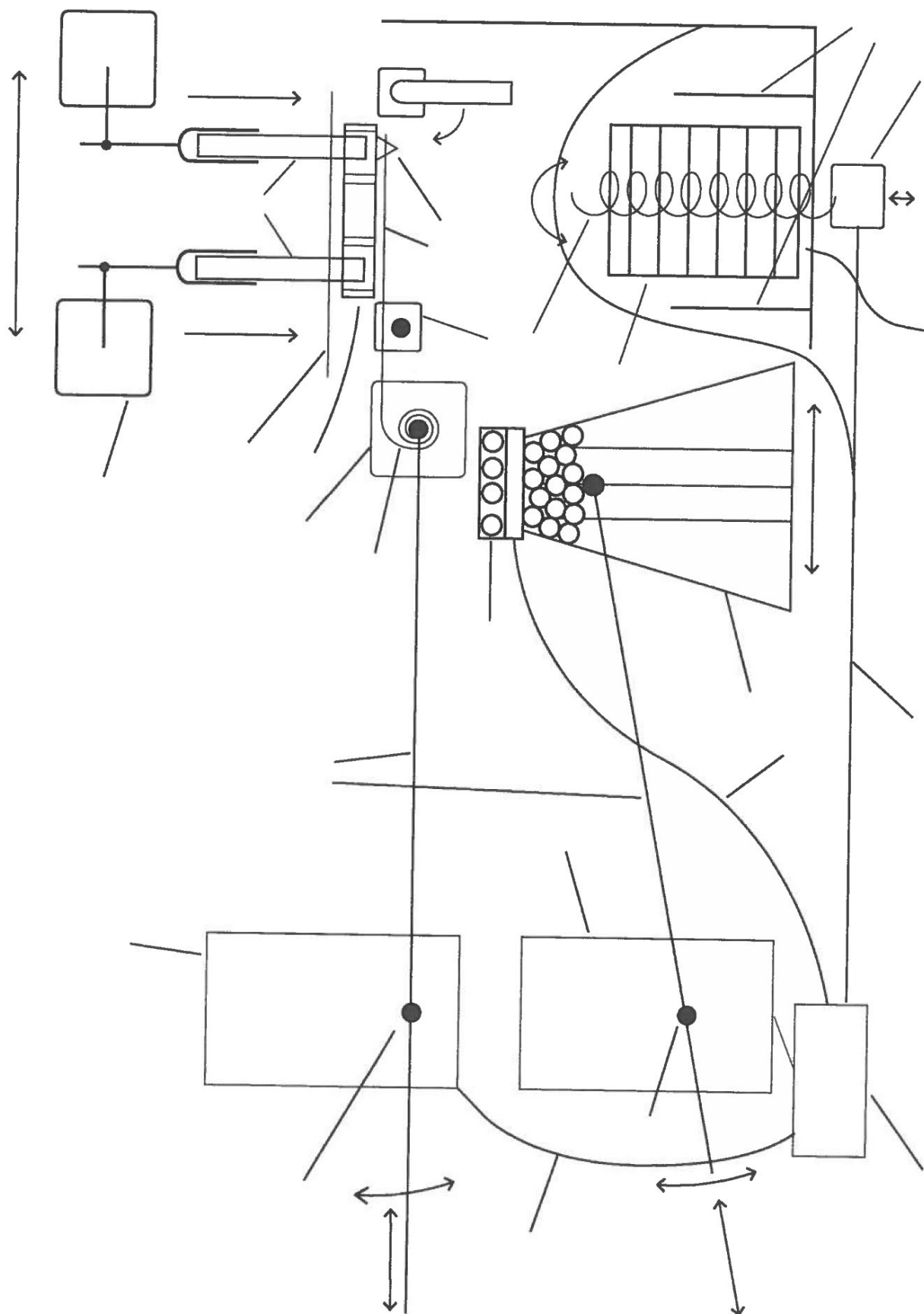
Push away stick

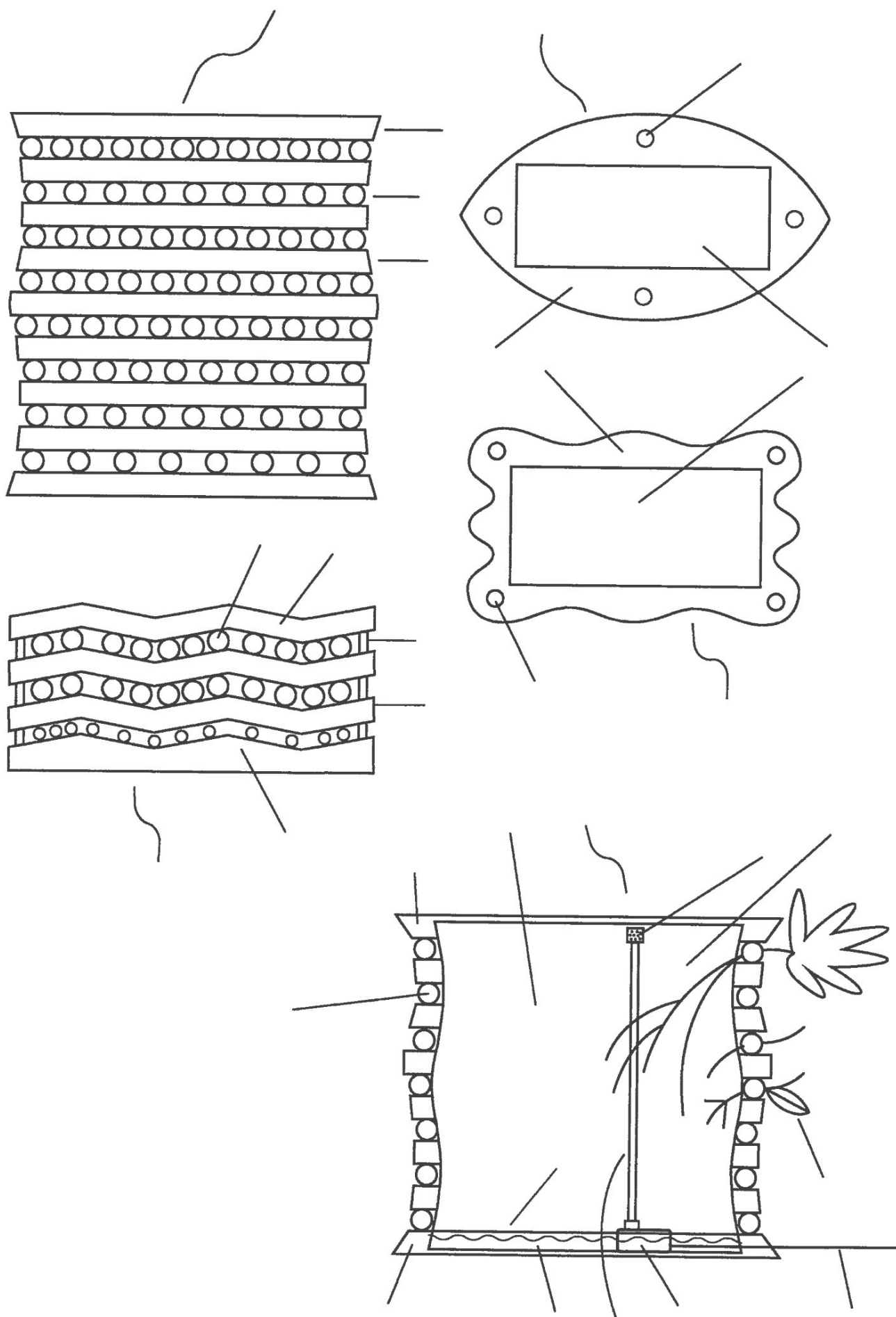


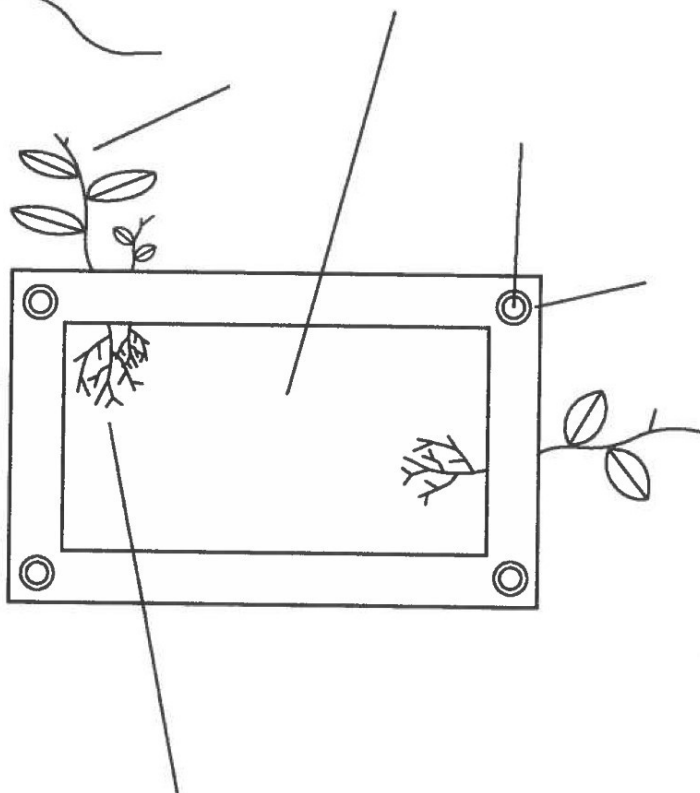
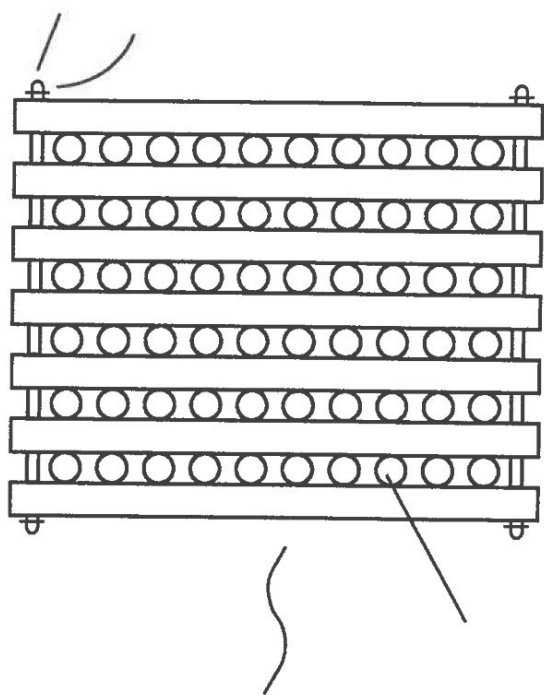
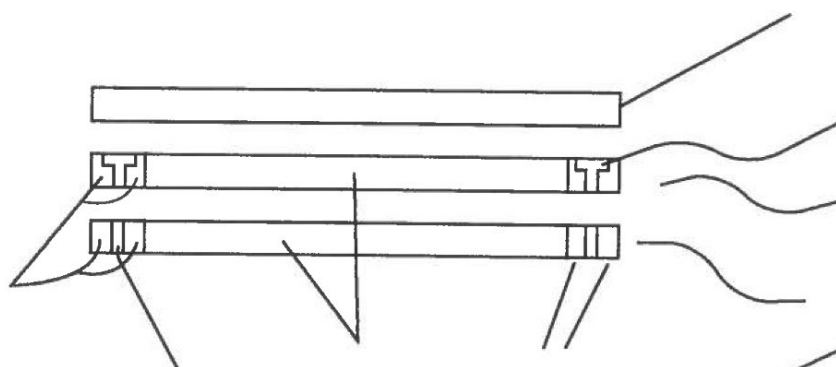
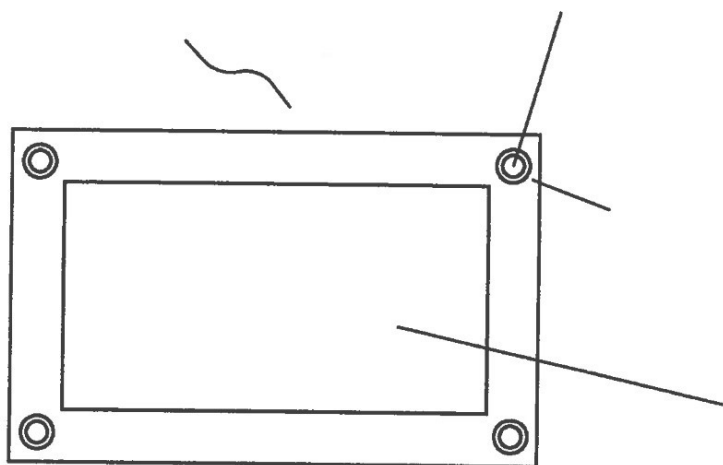
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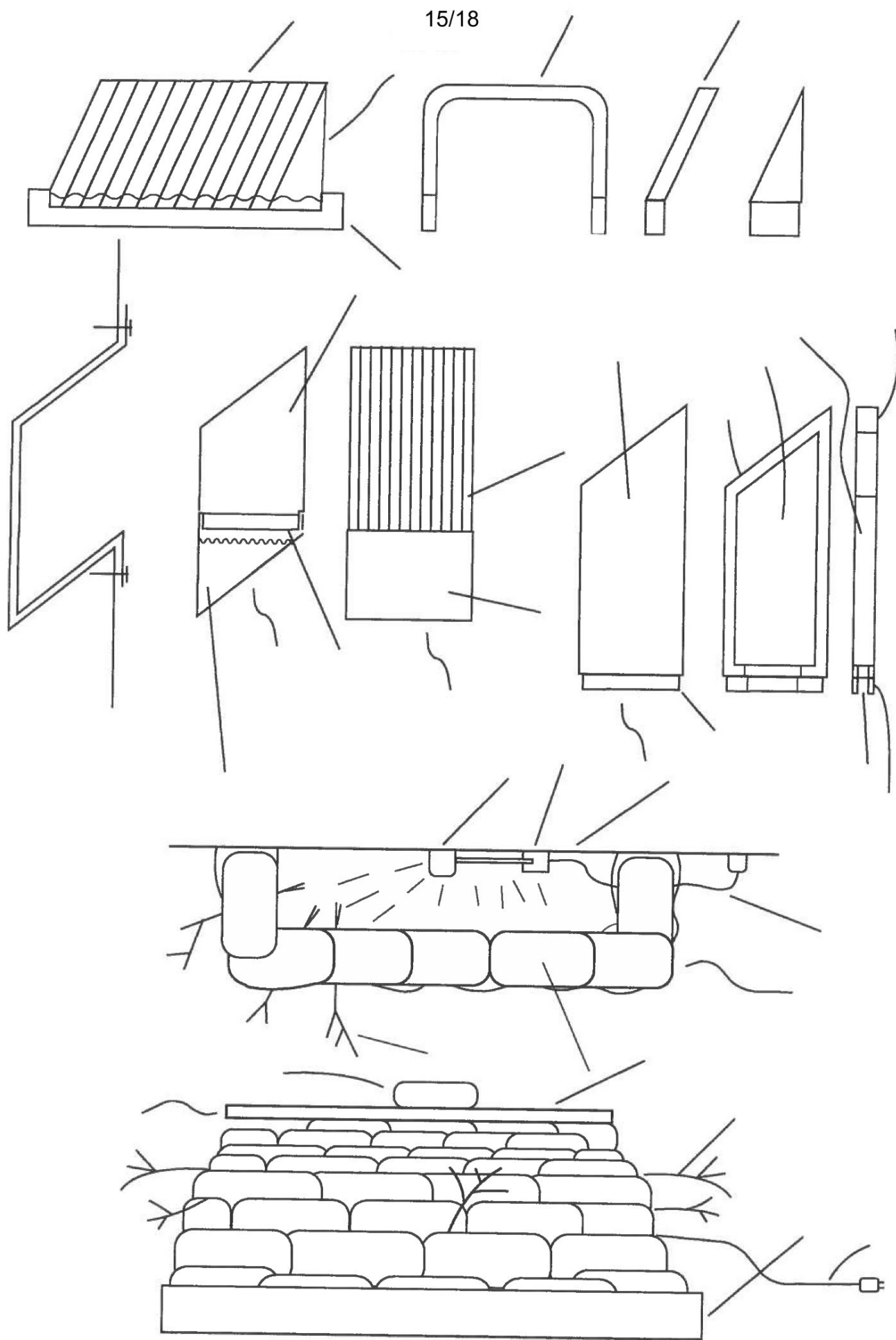


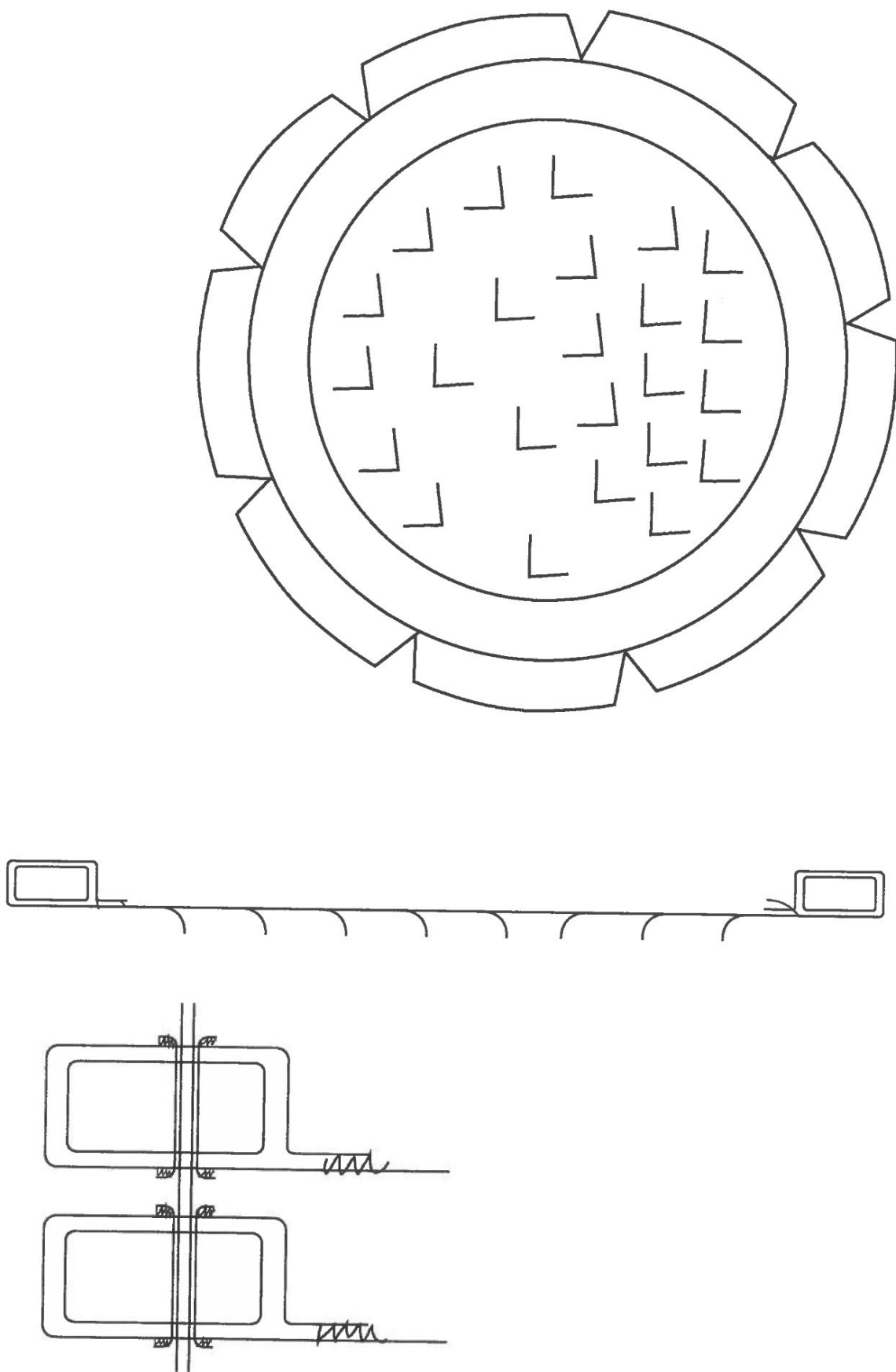


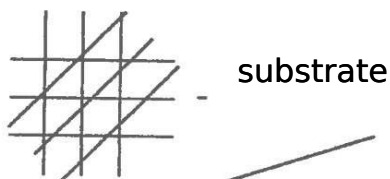
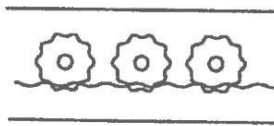




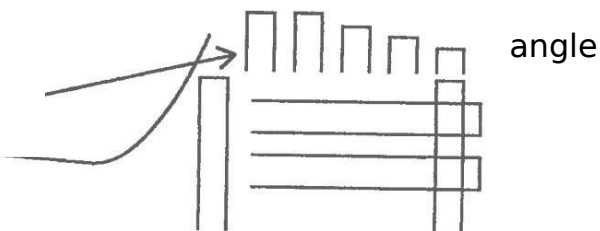




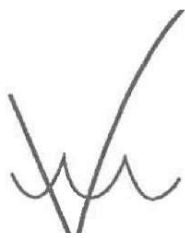




Cover plate segmented



Cover plate segmented



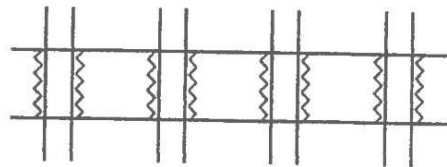
+ other
+ f. others



+ f. o.

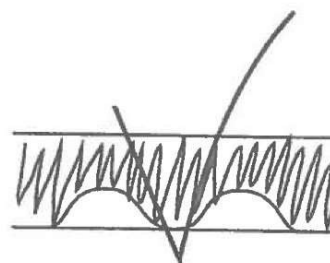
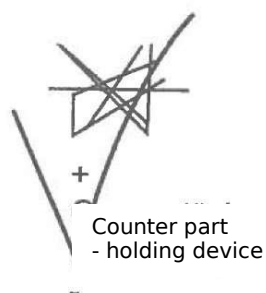
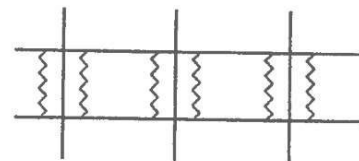
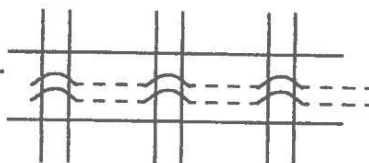
3. or combi

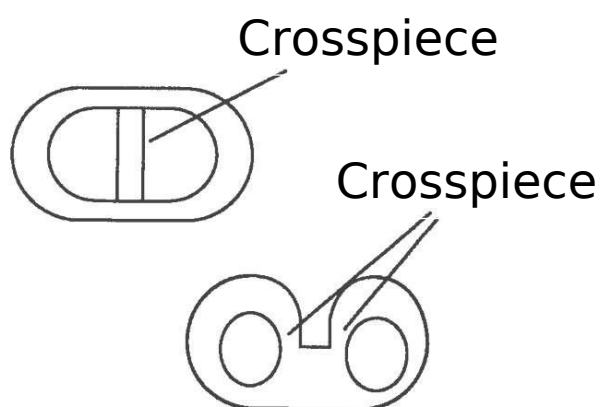
1.



or

2.





f. hooks

