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(54) **Laundry drying domestic appliance having a steam nozzle unit**

Haushaltsgerät zur Wäschetrocknung mit einer Dampfdüseneinheit

Appareil domestique de séchage du linge doté d'une unité de buse à vapeur

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Description

[0001] The invention relates to a laundry dryer having a steam generation unit and a nozzle unit for supplying steam into a laundry treatment compartment for steam treatment. More particularly, the invention relates to a laundry dryer as defined in the preamble of claim 1 and as known from EP 1 985 742.

[0002] EP 1 887 127 A1 discloses laundry treating machines having means for applying a steam treatment to laundry. The steam is directed inside a rotatable drum containing the laundry to be treated. Such steam treatment is used for removing odours from laundry or for relaxing and removing wrinkles from clothes.

[0003] WO 2004/059070 A1 teaches a laundry dryer with a laundry storing compartment defined by a cylindrical rotatable drum, a loading opening at the front end of the drum and a drum back wall at the rear end. This laundry dryer contains a processing unit having an evaporator for generating steam in order to remove odours from the laundry disposed in the drum. The steam is injected into the laundry storing compartment by an outlet of the process air channel fluidly connected to the laundry storing compartment at its rear end. The processing unit and its evaporator are arranged outside the laundry storing compartment adjacent to the mentioned outlet of the process air channel.

[0004] EP 2287389 discloses a steam injection arrangement for a laundry appliance comprising a steam separator fixed to a bearing shield of the laundry appliance, wherein a steam outlet of the steam separator is connected to a nozzle via a hose, the nozzle opening into a drum of the laundry appliance.

[0005] KR 100692556 discloses a drier having a steam injection apparatus comprises a cabinet where an intake port and a discharge outlet are formed; a drum where the laundry is stored; a driving motor connected to the drum; a supporting panel where a backside end of the drum is rotatably combined; an intake pipe extended to the inner side of the drum from a through-hole part; a heater heating air; a case where water is filled; a nozzle correspondently positioned at the through-hole part to allow water to jet into the inner part of the drum; and a removal unit installed between the case and the supporting panel to allow the case to be separated from the supporting panel by the manipulation of users.

[0006] It is an object of the invention, to provide a laundry dryer in which the steam treatment of laundry is further improved.

[0007] The invention is defined in claim 1. Particular embodiments of the invention are set out in the dependent claims.

[0008] According to claim 1 a laundry dryer comprises a laundry storing compartment for receiving the laundry to be treated. The laundry storing compartment includes a circumferential wall defined by a rotatable drum and a compartment back wall. The dryer also comprises a front wall with a front loading opening for loading laundry into the laundry storing compartment. In this regard, the compartment back wall is arranged opposite to the loading opening. Furthermore, the dryer comprises a rear frame which includes the compartment back wall and it comprises a rear wall forming at least a portion of a back cover of the dryer. A rear channel is arranged for guiding process air at the backside of the laundry storing compartment into this compartment. Preferably, the rear channel is defined by the compartment back wall and the rear wall and is able to pass process air through the compartment back wall into the laundry storing compartment. For this purpose, the compartment back wall is perforated by a plurality of back wall openings designed for passing said process air. The dryer comprises a steam generation unit (in short 'steamer') for generating steam for laundry steam treatment and a nozzle unit having one or a plurality of nozzle outlets for injecting steam generated in the steam generation unit into the laundry storing compartment.

[0009] The nozzle outlet of the nozzle unit is arranged between the compartment back wall and the rear wall inside the rear channel such that steam ejected from the nozzle outlet is passing firstly or substantially through at least one back wall opening of the compartment back wall before entering the laundry storing compartment. Such arrangement of the nozzle outlet(s) permits a nozzle unit design without any functional portion extending into the laundry storing compartment. This design avoids any potential direct contact between the laundry in the laundry storing compartment and parts of the nozzle unit. Particularly, any direct contact between the laundry in the laundry storing compartment and the nozzle outlet(s) of the nozzle unit is avoided and consequently any potential drawbacks of the nozzle unit's performance are avoided (e.g. by laundry fluff at the nozzle outlets).

[0010] The nozzle unit comprises a drain outlet (here and throughout the invention, 'a' drain outlet comprises one, two, three or more (a plurality of) drain outlets) for draining liquid water (condensed steam or water that has not completely been evaporated) from within the nozzle unit to the outside. In this way, the amount of water droplets reaching the laundry inside the laundry storing compartment can be reduced. Preferably the nozzle unit and the drain outlet(s) are arranged such that the water is drained from the nozzle unit to the rear channel. Draining the liquid water to the rear channel provides the advantage that it can evaporate into the process air that may be guided through the rear channel, in which case it may also reach the laundry together with the process air flowing into the laundry storing compartment through the back wall openings.

[0011] In a preferred embodiment, the nozzle unit comprises a separation chamber designed for separating steam and water. This chamber has at least one steam inlet in fluid connection with the steam generation unit and one or more chamber outlets in fluid connection with the one or more nozzle outlets. Preferably, the separation chamber is integrated space-saving within the base portion of the nozzle unit. Particularly, the at least one chamber outlet (also denotable as

steam outlet) providing the steam to the respective nozzle outlet(s) is arranged at an upper or top section of the separation chamber. Thus, the natural rising of the steam can be used for a simple steam guiding within the nozzle unit.

[0012] Preferably, the drain outlet of the nozzle unit is arranged at the separation chamber such as to drain water out of the separation chamber. More preferably, at least one drain outlet is arranged at or close to the lowest portion of the nozzle unit and/or of the separation chamber, in particular because condensed liquid will accumulate at the lower parts of the steam path due to its higher density as compared to the steam. Condensed liquid will therefore accumulate at the drain outlet and will be pushed towards the outside of the nozzle unit by the pressure of the steam.

[0013] In an embodiment of the nozzle unit, a flow axis direction of a steam inlet and a flow axis direction a nozzle outlet are inclined to each other or are perpendicular to each other. Such inclined or perpendicular arrangement may alternatively occur between the flow axis directions of the steam inlet and several steam guiding portions providing the steam from the separation chamber to the respective nozzle outlets. Said inclined or perpendicular arrangement of flow axis allows an efficient assistance in separating steam and water.

[0014] Preferably, the steam inlet is arranged at a lower or bottom section of the separation chamber and the conduit fluidly connecting the steam generation unit and the separation chamber is designed or formed as a draining conduit for draining water from the separation chamber towards the steam generation unit. For this purpose, the conduit is arranged at the dryer usually as a rising conduit with respect to the steam flow, particularly as a monotonically or constant rising conduit. The rising of conduit's design provides simultaneously a descending conduit (down pipe) with respect to the draining water.

[0015] In a preferred embodiment, the separation chamber is designed to have a portion arranged within the rear channel and/or another portion arranged at the back side of the rear wall. This embodiment has several advantages. First, it allows to optimize the space requirements for a given size (here: depth) of the separation chamber. Second, having a portion of the separation chamber at the back side of the rear wall provides a simple way for arranging a lateral connection of the conduit arriving from the steam generation unit. Furthermore, such lateral connection of the conduit easily allows to arrange for a beneficial inclination of the flow axis direction of a steam inlet as compared to the flow axis direction of a nozzle outlet as explained. Moreover, having at least portion of the separation chamber within the rear channel provides a simple way for draining water from the separation chamber into the rear channel, since no guiding, no conduit, no sealing or similar means is needed between the drain outlet(s) and the rear channel.

[0016] The nozzle unit (or at least portions thereof) is arranged at the backside of the compartment back wall. Preferably, the complete construction of the nozzle unit is arranged at the backside of the compartment back wall thus allowing a simple nozzle unit design to achieve the desired arrangement of the nozzle outlet(s) inside the rear channel.

[0017] Preferably, the nozzle unit has only a single nozzle outlet thus supporting a simple and space-saving construction of the nozzle unit and its steam guiding portion.

[0018] The nozzle unit is at least partially arranged preferably at the external side of the dryer cabinet. This arrangement of the nozzle unit supports a space-saving design of the cabinet. Particularly, a nozzle base portion mountable at the rear wall and a nozzle connection portion arranged at the base portion and adapted to connect a steam conduit between the steam generation unit and the nozzle unit are arranged at the external side of the dryer cabinet.

[0019] With regard to the feature "rear" it is noted that the rear side is the side opposite to the front of the dryer when the dryer is in operation orientation or position. In this regard, the front side is the side seen when standing in front of the dryer and looking towards the back side.

[0020] As already mentioned, the rear wall is forming a back cover of the dryer cabinet. The dryer cabinet is formed by sidewalls (left and right), a front wall, a rear wall and a top cover of the dryer.

[0021] The steam generating unit may be any steam generating unit, like a boiler-type steam generator or preferably a flow-through steam generator that transforms the supplied liquid into steam with a rate corresponding to the liquid supply rate. The steam generator is preferably arranged in the cabinet of the dryer, more preferably is arranged at a lower region of the dryer, e.g. below the laundry storing compartment and/or at a basement cover shell - for example of a heat pump system dryer.

[0022] The dryer may be any type of dryer, like an exhaust type dryer that exhausts the drying air to the outside of the dryer body after the process air has passed the laundry storing compartment. Preferably the dryer is a condenser type in which the processing air is (substantially or the most time) circulated in a closed loop and the humidity from the laundry is condensed at a process air heat exchanger or condenser and collected in at least one condensate collection tank. The condenser type dryer may use ambient or outside air for heat exchanging or may use a heat pump system.

[0023] In an embodiment, the rear channel is defined by the compartment back wall and the rear wall and/or the compartment back wall is stationary and the rotatable drum of the laundry storing compartment is rotatably coupled to the stationary compartment back wall.

[0024] Preferably, the rear wall forming the back cover of the dryer comprises a nozzle port into which a portion of the nozzle unit is inserted. Preferably the substantial portion of the nozzle unit is arranged outside the dryer cabinet and from there one or more steam guiding portions are passed through the nozzle port. In this regard, the nozzle unit comprises a connection portion and/or a base portion which is/are protruding from the rear wall or is/are extending at

the backside of the rear wall. Particularly, the base portion and/or connection portion (connecting a steam conduit running from the steam generation unit to the nozzle unit) is/are arranged at or mounted on the rear side of the rear wall. This arrangement or mounting is preferably outside the cabinet of the dryer, whereat the back cover is considered the rear part of the cabinet.

[0025] Regarding the mounting of the nozzle unit the nozzle outlet(s) and other nozzle parts, e.g. steam guiding portion(s), are preferably mounted exclusively by mounting the nozzle base portion thus reducing mounting efforts and mounting time.

[0026] In another embodiment, a steam conduit is provided to fluidly connect the nozzle unit to the steam generation unit, wherein the steam conduit from the steam generation unit is passing through a conduit port formed in the rear wall which forms at least portion of the back cover of the dryer. This passing occurs such that a portion of the steam conduit extends from the conduit port to the connection portion of the nozzle unit. This specific course and guiding of the steam conduit allows arranging and guiding a steam conduit portion external to the dryer cabinet, i.e. outside the cabinet of the dryer or at the backside of the rear wall. Such an arrangement of the steam conduit portion facilitates additionally the mounting efforts and servicing regarding the fluid gateway between the connection portion of the nozzle unit and the steam conduit portion.

[0027] Preferably, the provided single nozzle outlet or the plurality of nozzle outlets each is associated to a predefined one of the plurality of back wall openings perforating the compartment back wall. In this regard, the single nozzle outlet or each one of the nozzle outlets is designed to direct a steam flow exiting this nozzle outlet directly to its associated back wall opening or through its associated back wall opening. Preferably, at least one, some or all of the back wall openings associated or assigned to a single nozzle outlet respectively, are already provided at the compartment back wall and thereby designed as air openings for passing air from the rear channel into the laundry storing compartment. Thus, a standard dryer design can be used for a machine model containing steam supply without any modification in the design of the compartment back wall. If the nozzle unit or the respective nozzle outlet is not provided, process air passes through the back wall opening during drying operation. The predefined association of nozzle outlets to air openings in the compartment back wall respectively makes a clear allocation (or also 'association'): at least one air opening is allocated to steam injection into the laundry storing compartment and the other air openings are allocated to the process air passing into the laundry storing compartment. This allocation supports an efficient performance of the dryer when the process air flow and the steam injection are operating at the same time.

[0028] Preferably, the aforementioned allocation is improved by abutting the at least one nozzle outlet against a rear side region at the associated back wall opening or against the rim of the respective associated wall opening.

[0029] Particularly, said abutting occurs such that a sealing is formed between the nozzle outlet(s) and the compartment back wall. Alternatively or additionally, a front surface portion of the nozzle outlet or the nozzle outlets is formed such that it is mating (e.g. like a negative relief) to a rear surface portion or rim surface portion of the respective associated back wall opening of the compartment back wall. Thus, steam cannot escape from the nozzle outlet into the rear channel and/or process air guided in the rear channel does not pass between the nozzle outlet and the associated back wall opening into the laundry storing compartment.

[0030] In an embodiment, a chamber outlet of the or a base portion of the nozzle unit, each of the chamber outlets or at least a portion of the chamber outlets has an associated steam guiding portion for guiding the steam from the nozzle unit base portion to the nozzle outlet. In this regard, the steam guiding portion or at least a portion of the steam guiding portion is formed such that it is extending or passing from the back region of the rear channel or from the rear side of the rear wall through the rear channel to the nozzle outlet. In case of a plurality or multiple nozzle outlets the nozzle unit base portion may include a separation chamber or at least a manifold. Thus, a defined distribution of the steam is possible.

[0031] In a preferred embodiment, the steam generation unit is arranged in a bottom section or a base section of the dryer. These sections having already existing hollow spaces can receive the steam generation unit without any additional space request. In particular, the steam generation unit is arranged below the laundry storing compartment and/or on an upper shell of the base section.

[0032] Preferably, the steam conduit is the only conduit connected to the nozzle unit at the backside of the rear wall. This keeps conduit guidance between the nozzle unit and the steam generation unit very simple and supports an easy servicing of these parts. Alternatively or additionally, the steam conduit is designed to supply steam from the steam generation unit to the nozzle unit and simultaneously to drain condensed liquid from the nozzle unit to the steam generation unit. This means that two separate conduits (one conduit for steam and another conduit for condensed liquid) are avoided. Rather, the steam conduit has a double function (supplying steam and draining condensed liquid). Preferably at least part of the condensed liquid is drained out of the nozzle unit by means of at least one drain outlet of the nozzle unit as described above. As an advantage, less liquid remains to be guided back to the steam generation unit through the steam conduit.

[0033] In an embodiment, the nozzle unit comprises a or the connection portion or a conduit stub for facilitating mounting the steam conduit thereto. Preferably this connection portion or conduit stub has a fluid axis or flow axis oriented parallel or substantially parallel to the back side surface of the rear wall. Thus, the connected steam conduit is able to run parallel

to the compartment back wall and/or the rear wall surface. This allows a space-saving arrangement of parts at the backside of the rear wall by using reduced depth dimension.

[0034] In another embodiment, the base portion of the nozzle unit comprises a mounting socket for mounting the nozzle unit on or at the backside of the rear wall. This mounting socket is preferably provided by a flange of the nozzle unit's base portion.

[0035] Preferably, a sealing element is arranged between the backside of the rear wall and the base portion and/or the mounting socket of the nozzle unit. This arrangement of a sealing element offers an efficient sealing against potential escape of process air out of the rear channel.

[0036] In an embodiment, a chamber or the separation chamber of the nozzle unit is formed of two or more chamber forming parts, wherein these parts are integrally fixed or connected, joined or bonded to each other. Preferably these parts are welded (e.g. ultrasonic-welding) together. For example, a cover portion is welded to the base portion or the separation chamber in order to close this base portion or separation chamber. A non-removable connection of these parts to each other may be such that these parts can be separated only by destruction. The chamber forming parts can be made of any plastic material.

[0037] Preferably, the/a separation chamber or the/a connection portion of the nozzle unit is mounted at the backside of the rear wall and the nozzle unit comprises at least one steam guiding portion each having an extension which passes through a or the nozzle port formed in the rear wall.

[0038] In a preferred embodiment, the at least one steam guiding portion has a span extending or substantially extending along the depth of the rear channel between the rear wall and the backside of the compartment back wall. This assists in avoiding any direct contact between the laundry in the laundry storing compartment and parts of the nozzle unit. Furthermore, steam guiding portion's extension along the complete depth of the rear channel allows a direct fluid connection between a nozzle outlet or several nozzle outlets and the compartment back wall. This design avoids potential loss of the steam performance by a steam portion flowing potentially into the rear channel (where it may condense) instead of guiding the steam straight into the laundry storing compartment.

[0039] In order to achieve a stable nozzle unit construction, at least two (e.g. two or three or more) elements or parts of the nozzle unit are formed preferably as a single-piece or monolithic piece or single-molded part. In particular, said at least two elements are selected from the following listing of elements:

- a separation chamber or a portion of this separation chamber for separating the supplied steam and water,
- the one or more nozzle outlets,
- one or more steam guiding portions fluidly connecting a base portion or separation chamber of the nozzle unit to a respective one of the one or more nozzle outlets,
- a connection portion for fluidly connecting a steam conduit to the nozzle unit, and
- a mounting socket of the nozzle unit for mounting the nozzle unit.

[0040] The aforementioned single-piece or monolithic piece or single-molded design of at least two parts of the nozzle unit allows a simple mounting of the whole nozzle unit. Particularly, the whole nozzle unit is provided as a single-piece at the backside of the dryer (e.g. at the rear wall or at the rear channel) thus permitting a simple mounting from the backside at the assembly line and easy servicing. The nozzle unit is provided preferably as an injection molded part. Alternatively, at least two of the listed elements can be provided each as injection molded parts which are joined or bonded together (e.g. by ultrasonic welding or by gluing) such that the joined or bonded parts are inseparable without destroying the provided single-piece. Or the initially two or more separate parts of the nozzle unit are connected together (e.g. by welding or gluing) such that thereafter these form together a single or monolithic piece. This offers a good protection against unaware damaging any parts of the nozzle unit.

[0041] Furthermore, independent from the specific method of joining or bonding some or all parts of the nozzle unit the joined or bonded parts support water and steam proof surfaces of the nozzle unit thus ensuring constant steam performance of the nozzle unit.

[0042] Preferably, the nozzle unit is mounted as a single-piece element at the backside of the dryer cabinet or at the backside of the rear wall and is extending from the backside through a or the nozzle port into the rear channel where the one or the plurality of nozzle outlets is arranged.

[0043] In an embodiment, a cross section area of the one or more nozzle outlets corresponds to the cross section area of the associated back wall opening. Preferably, the ratio of said area of the nozzle outlet and said area of the associated wall opening is one of the following ranges: 0.6 to 0.8, 0.7 to 0.9, 0.8 to 1, 0.9 to 1.1, 1 to 1.3 or 1.1 to 1.5. This allows an aligning or central aligning between the nozzle outlet's cross section area and the associated wall opening's cross section area and consequently supports a steam guiding directly into the laundry storing compartment.

[0044] Preferably the one or more nozzle outlets are assigned to respective back wall openings which are arranged according to at least one of the following positions: above a horizontal plane running through the center (axis) of the laundry storing compartment, below a horizontal plane running through the highest point of the laundry storing compart-

ment, and in a range of the upper third, upper fourth or upper fifth between the horizontal planes running through the center and the highest point of the laundry storing compartment.

This positioning of the back wall openings allows steam supply into the laundry storing compartment in a region where the laundry is passing or is passing close to during tumbling and being spaced of the top of the compartment. Consequently, this positioning offers an improved steam distribution in the laundry storing compartment and over different passing pieces of laundry.

[0045] In further embodiments the laundry dryer is a condensation type dryer or a heat pump type dryer. In this regard, the rear channel is a portion of the closed loop drying air circuit. Independent from the specific dryer type a detangling body may be provided which is designed to provide a detangling function or to reduce tangling of the laundry stored in the laundry storing compartment during rotation of the drum. This detangling body is projecting from the compartment back wall and extending into the laundry storing compartment. Preferably, it is cone-shaped extending with its tapered end into the laundry storing compartment.

[0046] Reference is made in detail to preferred embodiments of the invention, examples of which are illustrated in the accompanying figures, which show:

Fig. 1 a schematic view of a laundry dryer,

Fig. 2 a perspective view of the condenser dryer of Fig. 1 - partially disassembled,

Fig. 3 the front view of the dryer of Fig. 2,

Fig. 4 another perspective view of the dryer of Fig. 1 - partially disassembled,

Fig. 5 a front view of the rear frame and parts of a base section of the dryer of Fig. 1,

Fig. 6 an enlarged view of the detail VI in Fig. 5,

Fig. 7 the sectional view of the compartment back wall, nozzle unit and rear wall along line VII-VII in Fig. 6,

Fig. 8 a perspective view of the nozzle unit,

Fig. 9 a rear view of the nozzle unit of Fig. 8,

Fig. 10 the sectional view of the nozzle unit along line X-X in Fig. 9,

Fig. 11 an enlarged view of the detail XI in Fig. 10,

Fig. 12 a rear view of the rear frame with mounted nozzle unit and steam conduit,

Fig. 13 the sectional view of the rear frame along line XIII-XIII in Fig. 12,

Fig. 14 an enlarged view of the detail XIV in Fig. 13,

Fig. 15 a perspective view of the backside of the rear frame with mounted nozzle unit and steam conduit connected to the nozzle unit and the steam generation unit,

Fig. 16 a perspective view of the front side of the rear frame according to Fig. 15,

Fig. 17 a front view of the rear frame of Fig. 12,

Fig. 18 a perspective view of a front frame, a rear frame and in between a piping with a branching element for branching up a pump unit conduit of a condensation-type laundry dryer,

Fig. 19 another perspective view of the dryer of Fig. 18,

Fig. 20 a perspective view of the course of the piping of Fig. 18 between a pump unit, a steamer tank and a drain tank,

Fig. 21 an enlarged view of the detail XXI in Fig. 18,

Fig. 22 a side view of the branching element shown in Fig. 21,

Fig. 23 a sectional side view of the branching element of Fig. 22,

Fig. 24 the branching element of Fig. 23 in a closed position,

Fig. 25 the branching element of Fig. 23 in an open position,

Fig. 26 a perspective view of another model of dryer - in the assembled state,

Fig. 27 the perspective view of the dryer of Fig. 26 - with disassembled left cover,

Fig. 28 a perspective view of a dryer's base section carrying a steam generation unit and showing the steamer tank, the drain tank and the piping,

Fig. 29 a front view to the left front of the dryer parts of Fig. 28,

Fig. 30 a perspective view according to Fig. 28, without the base section,

Fig. 31 a front view to the left front of the dryer parts of Fig. 30,

Fig. 32 a perspective view of the piping between the drain pump, the steamer tank and the drain tank,

Fig. 33 the piping according to Fig. 32 in a disassembled state,

Fig. 34 a front view of an enlarged detail of a piping part according to Fig. 33 comprising the branching element,

Fig. 35 the sectional view of the branching element along line XXXV-XXXV in Fig. 34,

Fig. 36 a side view of the piping part according to Fig. 33 comprising the branching element,

Fig. 37 the sectional view of the branching element along line XXXVII-XXXVII in Fig. 36

Fig. 38 a rear view of the rear frame with mounted nozzle unit according to another embodiment and steam conduit,

Fig. 39 the sectional view of the rear frame along line A-A in Fig. 38,

Fig. 40 an enlarged view of the detail B in Fig. 39,

Fig. 41 a front view of the rear frame of Fig. 38 (compare Fig. 17),

Fig. 42 a perspective view of the nozzle unit,

Fig. 43 a front view of the nozzle unit of Fig. 42,

Fig. 44 a left view of the nozzle unit of Fig. 42,

Fig. 45 a rear view of the nozzle unit of Fig. 42

Fig. 46 the sectional view of the nozzle unit along line A-A in Fig. 43, and

Fig. 47 an enlarged view of the detail B in Fig. 46.

[0047] The following figures are not drawn to scale and are provided for illustrative purposes.

[0048] Fig. 1 shows a schematically depicted laundry dryer 2. The dryer 2 comprises a heat pump system 4, including a closed refrigerant loop 6 which comprises in the following order of refrigerant flow B: a first heat exchanger 10 acting as evaporator for evaporating the refrigerant and cooling process air, a compressor 14, a second heat exchanger 12 acting as condenser for cooling the refrigerant and heating the process air, and an expansion device 16 from where the

refrigerant is returned to the first heat exchanger 10. Together with the refrigerant pipes connecting the components of the heat pump system 4 in series, the heat pump system 4 forms the refrigerant loop 6 through which the refrigerant is circulated by the compressor 14 as indicated by arrow B.

[0049] The process air flow A within the dryer 2 is guided through a laundry storing compartment 17 of the dryer 2, i.e. through a compartment for receiving articles to be treated, e.g. a drum 18. The articles to be treated are textiles, laundry 19, clothes, shoes or the like. The process air flow is indicated by arrows A in Fig. 1 and is driven by a process air blower 8. The process air channel 20 guides the process air flow A outside the drum 18 and includes different sections, including the section forming the battery channel 20a in which the first and second heat exchangers 10, 12 are arranged. The process air exiting the second heat exchanger 12 flows into a rear channel 20b in which the process air blower 8 is arranged. The air conveyed by blower 8 is guided upward in a rising channel 20c to the backside of the drum 18. The air exiting the drum 18 through the drum outlet (which is the loading opening 53 of the drum 18) is filtered by a fluff filter 22 arranged close to the drum outlet in or at the channel 20. The optional fluff filter 22 is arranged in a front channel 20d forming another section of channel 20 which is arranged behind and adjacent the front cover of the dryer 2. The condensate formed at the first heat exchanger 10 is collected and guided to the condensate collector 30.

[0050] The condensate collector 30 is connected via a drain conduit 46, a drain pump 36 and a drawer pipe 50 to an extractable condensate drawer 40. I.e. the collected condensate can be pumped from the collector 30 to the drawer 40 which is arranged at an upper portion of the dryer 2 from where it can be comfortably withdrawn and emptied by a user.

[0051] The dryer 2 comprises a control unit 51 for controlling and monitoring the overall operation of the dryer 2. For example and as shown in Fig. 1, the control unit 51 receives a temperature signal from a temperature sensor 41 which is arranged at the outlet of the second heat exchanger 12 (condenser) and which is indicative of the refrigerant temperature at this position. According to Fig. 1, the control unit 51 also controls the drain pump 36. Additionally, the control unit 51 is able to control other parts of the dryer 2.

[0052] Fig. 2 shows a front perspective view of a partially disassembled condenser dryer that uses a heat pump system 4. In the shown state the loading door of the dryer 2, the right cover, the lower shell of a bottom unit and a bottom panel are removed. The outer appearance of the depicted dryer 2 is defined by a top cover 56, a left cover or wall 58, a front cover 60 having a loading opening 10 and a front top panel 62. The front top panel 62 frames a drawer cover 64 of the condensate drawer 40, wherein here the drawer 40 has a condensate container that is completely pushed in a drawer compartment located at the upper part of the dryer 2. The right portion of the front top panel 62 forms an input section 66 wherein here the details of the input section 66 are not shown (like indicators, a display, switches and so on).

[0053] The loading opening 54 is surrounded by a loading frame 68 which is formed in the front cover 60. In loading direction behind the bottom section of the loading frame 68 a filter compartment/process air channel 20 is arranged which is adapted to receive the fluff filter 22 and which is formed in a front frame 70. At the back side of the loading opening 54 in the front frame 70 the drum 18 is arranged. In the embodiment shown the drum 18 is a rotating drum cylinder that is extending between the back side of the front frame 70 and the front side of a rear frame 72 (Fig. 4, Fig. 5). The open rear end of cylindrical rotatable drum 18 is closed by a compartment back wall 74 (Fig. 3) which is mounted at the rear frame 72 (Fig. 5). Back wall 74 is preferably provided as a separate element to the rear frame 72, formed for example from a metal plate. The compartment back wall 74 is disposed stationary, whereas the rotatable drum 18 is rotatably coupled to the compartment back wall 74. In the shown embodiment the rotation axis of the drum 18 is horizontal, however, the rotation axis may be inclined with respect to the horizontal axis or may be even vertical with some modifications to the shown embodiment, however without the requirement to modify other groups of the dryer 2.

[0054] Below the condensate drawer 40 and adjacent to the left upper corner of the front cover 60 or left above middle of the loading opening 54, a window panel 76 is inserted into a front cover window opening 78 (Fig. 3, Fig. 4). The window opening 78 and the window panel 76 allow visual inspection into the inside of the dryer outer body to check the liquid level of a liquid reservoir, particularly a steamer (liquid storing) tank 140 (see more detail below).

[0055] As indicated in Fig. 3 showing the dryer of Fig. 2 in front view, the condensate drawer 40 has a draw handle 82 at the drawer cover 64 to be gripped by the user for pushing the condensate drawer 40 in or pulling it out of the condensate drawer compartment 37 that is extending into the interior of the dryer 2 (Fig. 18, Fig. 19). Fig. 3 gives a view onto the compartment back wall 74 which has a plurality of back wall openings 84 through which processing air A enters the laundry storing compartment 17 from the back side or rear side of the drum 18. In the center of the compartment back wall 74 and surrounded by the air back wall openings 84 a cone 86 is arranged which is extending into the laundry storing compartment 17 (preferably with a tapered end) and has in this embodiment laundry detangling function.

[0056] The dryer comprises the following parts described in more detail below: a nozzle unit 88 (Fig. 7 - Fig. 10) and a steam generation unit 90 (in short 'steamer'; see Figs. 15, 16). The nozzle unit 88 has a nozzle outlet 92 for injecting steam generated in the steam generation unit 90 into the laundry storing compartment 17. As can be seen from Fig. 7, the nozzle unit 88 is mounted at a rear wall 94 which is forming at least a portion of a back cover 95 of the dryer 2. The compartment back wall 74 and the rear wall 94 define portion of the rear channel 20b and the rising channel 20c. The compartment back wall 74 comprises a plurality of the back wall openings 84 designed for passing process air from the rear channel 20b, 20c into the laundry storing compartment 17.

[0057] The nozzle unit 88 comprises a base portion 96 mounted at the back side of the rear wall 94. For mounting the base portion it is perforated by mounting holes 96 interacting with mounting screws 98 or the like (Fig. 7, Fig. 8). According to Fig. 7, a steam guiding portion 102 is fluidly connecting the base portion 96 to the nozzle outlet 92. The steam guiding portion 102 is extending from the base portion 96 into the rear channel 20b, 20c such that it spans substantially just the distance between the rear wall 94 and the compartment back wall 74 (i.e. the depth of the rear channel 20b, 20c), whereas the nozzle outlet 92 is in contact with a respective back wall opening 84 at the back side of the compartment back wall 74. The nozzle unit 88 comprises a connection portion 104 which is adapted to connect a steam conduit 106 which fluidly connects the steam generation unit 90 to the nozzle unit 88 (Fig. 10, Fig. 13, Fig. 15).

[0058] The nozzle outlet 92 is arranged at the back side at the compartment back wall 74 in such a manner that steam ejected from the nozzle outlet 92 passes through a respective back wall opening 84 before entering the laundry storing compartment 17 (Fig. 7).

[0059] In the embodiments, several elements of the nozzle unit 88 are formed as a single-piece or monolithic piece or single-molded part. These elements are the base portion 96, a separation chamber 108 contained in the base portion 96 for separating the supplied steam and water, the nozzle outlet 92, the steam guiding portion 102, the connection portion 104 and a substantially plan mounting socket 110 for mounting the nozzle unit 88. The water that is separated in the separation chamber may be formed by condensing the supplied steam - for example in the starting phase of steam supply when the steam conduit and nozzle unit are at low temperature as compared to the steam temperature. Thus, the whole nozzle unit 88 is mountable only by mounting the mounting socket 110 via the mounting holes 98 and some screws 100. The separation chamber 108 defined by the inner geometry of the base portion 96 is closed by a chamber cover 112. Both parts 96 and 112 are joined together by a welding joint 114 (e.g. ultrasonic welding) such that these parts are integrally fixed and connected to each other in an inseparable monolithic manner. Consequently, the separation chamber 108 is water and steam proof.

[0060] The mounting socket 110 is part of the base section and mounted at the back side of the rear wall 94. In this regard, the rear wall 94 is perforated by a nozzle port 116 thus allowing the steam guiding portion 102 to extend from the base portion 96 through this nozzle port 116 into the rear channel 20b, 20c. To avoid any escape of process air out of the rear channel 20b, 20c in the region of the nozzle port 116, there is provided a flat sealing element 101 clamped between the back side of the rear wall 94 and the mounting socket 110 (Fig. 7, Fig. 10).

[0061] As can be seen from Fig. 15 and Fig. 16, the steam generation unit 90 is arranged in a base section 118 of the dryer 2. The steam conduit 106 is passing through a conduit port 120 contained in a bottom section of the rear frame 72 which is forming a portion of the back cover of the dryer 2 in this embodiment. The extension of the steam conduit 106 is such that a portion 122 of the steam conduit 106 extends at the back side of the rear frame 72 and the rear wall 94 from the conduit port 120 to the connection section 104 of the nozzle unit 88 (Fig. 15). The nozzle unit 88 and the steam conduit 106 are designed such that steam is supplied from the steam generation unit 90 to the nozzle unit 88 and condensed liquid (water) is drained from the nozzle unit 88 to the steam generation unit 90. For this purpose, the separation chamber 108 has a steam inlet 124 in fluid connection towards the steam generation unit 90 and a chamber outlet 126 in fluid connection towards the nozzle outlet 92 (Fig. 10, Fig. 14). The chamber outlet 126 is in fluid communication with the steam guiding portion 102 for guiding the steam from the separation chamber 108 to the nozzle outlet 92. The connection portion 104 comprises a conduit stub 128 for mounting the steam conduit 106, particularly its steam conduit portion 122, thereto (Fig. 9).

[0062] The steam inlet 124 is arranged at a lower section of the separation chamber 108, whereas the chamber outlet 126 is arranged at an upper section of the separation chamber 108. Simultaneously, the steam conduit portion 122 is descending from the connection portion 104 and the steam inlet 124 towards the steam generation unit 90 thus forming a draining conduit for draining water from the separation chamber 108 towards the steam generation unit 90. Thus, separation of steam and condensed water is realized in a natural physical manner without any complex design. In this regard, the flow axis direction of the steam inlet 124 (or the allocated/associated connection portion 104) and the flow axis direction of the steam guiding portion 102 are perpendicular to each other. In other embodiments, these flow axes are inclined to each other in an angle different from 90°.

[0063] The nozzle unit 88 comprises a single nozzle outlet 92 which is associated to one predefined back wall opening 84 (Fig. 7, Fig. 14). In further embodiments, the nozzle unit 88 comprises a plurality of nozzle outlets 92 and each one of these nozzle outlets 92 is assigned to a predefined one of a plurality of back wall openings 84. The nozzle outlet 92 is designed to direct a steam flow exiting this nozzle outlet 92 directly through its associated back wall opening 84 into the laundry storing compartment 17. In this regard, the nozzle outlet 92 abuts with its front surface portion 132 against an opening rim 130 of the respective associated back wall opening 84 such as to form a sealing between the nozzle outlet 92 and the compartment back wall 74. The nozzle outlet 92 is arranged such that its inner cross section area is centrally aligned to the cross section area of the associated wall opening 84.

[0064] According to Fig. 17, a first horizontal plane 134 running through the center of the laundry storing compartment 17 is defined and a second horizontal plane 136 running through the highest point of the laundry storing compartment 17 is defined. The distance between these two planes 134, 136 defines a vertical range 138. Along this range 138, the

one nozzle outlet 92 or a plurality of nozzle outlets 92 is assigned to respective back wall openings 84. In other embodiments here not shown the assigned back wall opening(s) 84 is/are arranged in the upper third or in the upper fourth or in the upper fifth of the range 138.

[0065] The condensation-type laundry dryer 2 according to Fig. 18 comprises in principle the elements and parts shown in Fig. 1. In particular, a drain tank (i.e. condensate drawer 40), a steam generation unit 90, a steamer tank 140 for storing liquid to be supplied to the steam generation unit 90 for generating the steam, and a pump unit (i.e. drain pump 36) for pumping the liquid collected in the condensation collection unit (i.e. condensate collector 30) to the drain tank 40 and the steamer tank 140 are provided. Additionally, a branching element 142 is provided. This element 142 is made for branching a pump unit conduit 144 into a steamer tank unit 146 and into a drain tank unit 148 (Fig. 20). The pump unit conduit 144 is connecting the branching element 142 to the pump unit 36. The steamer tank conduit 146 is connecting the branching element 142 to the steamer tank 140. The drain tank conduit is connecting the branching element 142 to the drain tank 40. The conduits 144, 146, 148 form a piping 150 for conveying the condensate to different destinations in the dryer.

[0066] The branching element 142 comprises a backflow-preventing member 152 preventing a backflow of liquid from the steamer tank 140 towards the pump unit 36. The backflow-preventing member 152 shown in Fig. 23 is a one-way valve arranged in the branching element 142. Furthermore, the backflow-preventing member 152 is arranged in the branch 154 of the branching element 142 where the liquid flows towards the steamer tank conduit 146. The member 152 comprises a valve seat 156 at a valve passage 158 and a valve member 160 which is adapted to cooperate with the valve seat 156. The movable valve member 160 is constituted by a ball or sphere and is urged against the valve seat 156 when the pump unit 36 is not activated and subsequently liquid tends to flow back from the line 146 towards the steamer tank 140 towards the branching element 142 and towards the pump unit 36. If this is the case, the valve member 160 and the valve seat 156 cooperate to close the valve passage 158, i.e. the valve member 160 is in a close position (Fig. 24). Then the liquid in the branch between the backflow- preventing member 152 and the upper hydraulic point of the steamer tank conduit 146.

[0067] If the valve member 160 is actuated by liquid pressure exerted by liquid pressurized by the pump unit 36 the valve passage 158 will be opened, i.e. the valve member 160 is in an open position (Fig. 23, Fig. 25). Within the valve passage 158 and opposite to the valve seat 156 there is arranged a stopping element 162 for restricting the opening path of the valve member 160 when the liquid is flowing into the forward direction 164 of the one-way backflow-preventing member 152. In other words, the stopping element 162 is designed to provide a clearance passage 166 for the liquid flow which bypasses the valve member 160 in its open position (Fig. 25). Thus, the backflow-preventing member 152 provides additionally a liquid flow restriction.

[0068] The liquid flow restriction function of the branching element 142 is adapted to reduce the liquid flow into the steamer tank conduit 146 in comparison to the liquid flow into the drain tank conduit 148. Due to the valve member 160 in its open position according to Fig. 25 the flow resistance between the branching element 142 and the steamer tank 140 is higher than the flow resistance of the drain tank conduit 148 between the branching element 142 and the drain tank 40. The valve member 160 and the stopping element 162 a liquid flow restricting element of the branching element 142 by providing a reduced liquid flow cross section towards the steamer tank conduit 146 in comparison to the liquid flow cross section towards the drain tank conduit 148. The liquid flow cross section towards the steamer tank conduit 146 is defined particularly by the clearance passage 166 and an orifice 168 arranged in the axial end region of the branch 154 and having a diameter or cross section area that is less than the inner diameter 170 or cross section area of the branch 154 providing the fluid connection to the drain tank conduit 148.

[0069] In Fig. 20, the branching element 142 is arranged in a region of the base section 118 of the dryer 2 (see also Fig. 18). In further embodiments the branching element 142 is arranged at an upper region 172 of the cabinet of the dryer 2 (Fig. 28 - Fig. 31). In this regard, the branching element 142 is preferably arranged in a height level within the dryer which is at least 3/4 or 4/5 or 5/6 of the total height of the dryer 2. As seen from Fig. 22 - Fig. 25, the branching element 142 is made as a T-junction.

[0070] According to Fig. 20 or Fig. 28, the highest point 174 of the steamer tank conduit 146 has a height level which is lower than the highest point 176 of the drain tank conduit 148. In particular, the height level of the steamer tank conduit 146 is at least 3/4 or 4/5 or 5/6 of the height level of the drain tank conduit 148. In other embodiments, the highest point 174 of the steamer tank conduit 146 has the same height or is even higher than the highest point 176 of the drain tank unit 148.

[0071] Regarding Fig. 28 - Fig. 31, it can be seen that the conduit 146 arranged between the branching element 142 and the steamer tank 140 is designed such that its connection length between the branching element 142 and the steamer tank 140 is minimized with respect to the connection line provided by the conduit 144, 148 between the pump unit 36 and the drain tank 40. Hereby a second piping 184 for supplying the condensate to the steamer tank 140 and removable tank 40 is provided.

[0072] In Fig. 28 and Fig. 29 it can be seen that the steam generation unit 88 is arranged in the region of the base section 118 of the dryer 2. The steam generation unit 88 is supplied with liquid to generate steam in order to convey this

steam to the nozzle unit 90, as described above. The liquid is supplied to the steam generation unit from the steamer tank 140 via a connection conduit 178 (Fig. 28 - Fig. 31).

[0073] Fig. 34 - Fig. 37 show a branching element 142 in a second piping 184 having a design different to the design of the piping 150 according to Fig. 20 - Fig. 25. The branching element 142 according to Fig. 34 - Fig. 37 does not have a backflow-preventing function but only a liquid flow reducing function such that a flow resistance between the branching element 142 and the steamer tank 140 is higher than a flow resistance of the drain tank conduit 148 between the branching element 142 and the drain tank 40. This liquid flow reduction towards the steamer tank 140 occurs by a conduit passage 180 in the branch 154 having locally a smaller diameter 182 than the inner diameter 170 in the branching element 142 towards the drain tank conduit 148 and towards the drain pump 36.

[0074] In the above the reason for reducing the flow rate of condensate pumped by the pump unit 36 toward the steamer tank 140 as compared to the higher flow rate pumped towards the condensate drawer 40 (drain tank) is the expectation that only a lower portion of the condensate is needed for steam treatment of the laundry. Thus most part of the condensate formed in a laundry drying cycle will normally not be required for steam treatment. The steamer tank 140 is provided with an overflow conduit 190 shown in Fig. 30 by which excess water that can not be stored by the steamer tank 140 is flowing back to the condensate collector 30. From there it is pumped upward to tanks 40 and 140 again. By reducing the ratio of the flow rate to steamer tank 140 an excessive activation of the pump 36 can be avoided.

[0075] In both embodiments of above piping 150 or 184, a backflow prevention member (compare 152) and/or a flow restriction element (compare 166 or 170) can be provided at the branching element 142. Alternatively the backflow prevention member can be provided at any position between the branching element and the inlet to the steamer tank 140 of the steamer tank conduit 146.

[0076] In the following, a modified nozzle unit 300 is described in detail. As compared to the nozzle unit 88, nozzle unit 300 has a few modifications and is a preferred embodiment of the present invention. Apart from these modifications, the nozzle unit 300 is preferably embodied as above nozzle unit 88, as can be seen from Figs. 38 to 47. For example mounting and piping structure as well as positioning of the nozzle outlet are as for nozzle unit 88. It shall be understood that all the advantages and details of nozzle unit 88 also apply to the modified nozzle unit 300 and will therefore not be repeated here except when specific differences or advantages are to be highlighted.

[0077] As can be seen from Figs. 38 and 39, the nozzle unit 300 is mounted at a rear wall 94 which is forming at least a portion of a back cover 95 of the dryer 2. As in the above embodiment, the compartment back wall 74 and the rear wall 94 define portion of the rear channel 20b and the rising channel 20c (cf. Figs. 7, 39, and 40). The compartment back wall 74 comprises a plurality of the back wall openings 84 designed for passing process air from the rear channel 20b, 20c into the laundry storing compartment 17. The nozzle unit 300 preferably comprises a base portion 301 mounted at the back side of the rear wall 94, see Fig. 40. It is particularly beneficial to arrange the nozzle outlet 92 at the back side of the compartment back wall 74 in such a manner that steam ejected from the nozzle outlet 92 passes through a respective back wall opening 84 before entering the laundry storing compartment 17 (see also Figs. 41 and 7/17).

[0078] The nozzle unit 300 comprises at least one drain outlet 308 for draining water from within the nozzle unit to the outside, as can be seen in Figs. 40, 42, 43, 44, 46, and 47. In particular, it is beneficial for the nozzle unit and the drain outlet(s) to be arranged such that the water is drained from the nozzle unit to the rear channel 20b, 20c. A preferred embodiment of this arrangement is shown in Figs. 39 and 40. Draining condensed water out of the nozzle unit provides the advantage that less water remains within the steam path and so less water needs to flow back to the steam generation unit and probability of condensate droplets being ejected through the nozzle outlet onto laundry in the drum is lowered. Draining the condensed water to the rear channel further provides the advantage that the water can evaporate into the process air that may be guided through the rear channel, in which case it may also reach the laundry as evaporated steam together with the process air flowing into the laundry storing compartment 17 through the back wall openings 84.

[0079] Fig. 40 shows that in preferred embodiments of the nozzle unit 300, the steam guiding unit 102 of nozzle unit 88 may be partially or completely replaced by a separation chamber 302. In such embodiments the steam guiding portion 102 - if present - extends from the separation chamber 302 towards the rear side of the compartment back wall 74. The separation chamber 302 serves for separating condensed water from the flow of steam so as to avoid water droplets reaching the laundry 19 inside the laundry storing compartment 17 (compare separation chamber 108 described above). Condensed water may be formed by (partial) condensation of the supplied steam - for example in the starting phase of the steam supply when the steam conduit and nozzle unit are at low temperature as compared to the steam temperature.

[0080] Fig. 40 is a sectional view of the nozzle unit 300 mounted to the rear wall 94 of the laundry dryer and depicts a preferred embodiment of the separation chamber 302. As can be seen, the separation chamber 302 preferably has at least one steam inlet 124 in fluid connection with the steam generation unit 90, e.g., by means of a steam conduit 106, and furthermore has one or more steam outlets 126 (see also Figs. 46 and 47) in fluid connection with one or more nozzle outlets 92. In the embodiment shown, the drain outlet 308 is arranged at the separation chamber such that condensed water is drained out of the separation chamber.

[0081] As can be seen in Fig 40, it is particularly beneficial to design the separation chamber 302 to have a portion 304 arranged within the rear channel 20b, 20c and/or another portion 306 arranged at the back side of the rear wall 94.

This embodiment has several advantages. First, it allows to optimize the space requirements for a given size (here: depth) of the separation chamber. Second, having a portion 306 of the separation chamber 302 at the back side of the rear wall 94 provides a simple way for arranging a lateral conduit stub 128, which in turn reduces the amount of space needed for the connection of the steam conduit 106 to the nozzle unit 300. Third, having a portion 306 of the separation chamber 302 at the back side of the rear wall with a lateral conduit stub 128 allows to arrange for a significant deflection of the steam path direction inside the separation chamber, which is beneficial for an efficient separation of condensed water from the steam. Furthermore, having a portion 304 of the separation chamber 302 within the rear channel 20b, 20c provides a simple way for draining water from the separation chamber into the rear channel, since no guiding, no conduit, no sealing or similar means is needed between the drain outlet(s) 308 and the rear channel.

[0082] According to Figs. 40, 42, 43, 44, 46, and 47, it is preferable to arrange the drain outlet(s) at or close to the lowest portion of the nozzle unit 300 or the separation chamber 302, particularly because condensed water will accumulate at the lower parts of the steam path due to its higher density as compared to the steam. Condensed water will therefore accumulate at the drain outlet and will be pushed towards the outside of the nozzle unit 300 by the pressure of the steam. In preferred embodiments, the separation chamber is designed or formed so that condensed liquid is guided towards the drain outlet.

[0083] As depicted by Figs. 39 and 40 the compartment back wall 74 and the rear wall 94 are arranged to form at least part of the rear channel 20b, 20c. In this way it is simple to arrange the drain outlet 308 of the nozzle unit 300 inside the rear channel as described above.

[0084] Further details of preferred embodiments of the nozzle unit according to the present invention are depicted in Figs. 42 to 47. Thereof Figs. 42, 43, 44 and 45 show the nozzle unit 300 at different viewing sides, namely a perspective front/left-side view, a front view, a left-side view and a rear view, respectively.

Reference Numeral List:

2	laundry dryer	60	front cover
4	heat pump system	62	front top panel
6	refrigerant loop	64	drawer cover
8	blower	66	input section
10	first heat exchanger	68	loading frame
12	second heat exchanger	70	front frame
14	compressor	72	rear frame
16	expansion device	74	compartment back wall
17	laundry storing compartment	76	window panel
18	drum	78	front cover window opening
19	laundry	82	drawer handle
20	process air channel	84	back wall opening
20a	battery channel	86	detangling cone
20b	rear channel	88	nozzle unit
20c	rising channel	90	steam generation unit
20d	front channel	92	nozzle outlet
22	fluff element	94	rear wall
30	condensate collector	95	back cover
36	drain pump	96	base portion
37	condensate drawer compartment	98	mounting hole
40	condensate drawer	100	mounting screw
41	temperature sensor	101	sealing element
46	drain conduit	102	steam guiding portion
50	drawer pipe	104	connection portion
51	control unit	106	steam conduit
54	loading opening	108	separation chamber
56	top cover	110	mounting socket
58	left cover	112	chamber cover
114	welding joint	160	valve member
116	nozzle port	162	stopping element
118	base section	164	forward direction

(continued)

120	conduit port	166	clearance passage
122	steam conduit portion	168	orifice
124	steam inlet	170	inner diameter
126	chamber outlet	172	upper region
128	conduit stub	174	highest point
130	opening rim	176	highest point
132	front surface portion	178	connection conduit
134	first horizontal plane	180	conduit passage
136	second horizontal plane	182	smaller diameter
138	range	184	piping
140	steamer tank	190	overflow conduit
142	branching element	300	nozzle unit
144	pump unit conduit	301	base portion
146	steamer tank conduit	302	separation chamber
148	drain tank conduit	304, 306	separation chamber portions
150	piping	308	drain outlet
152	backflow-preventing member	A	process air flow
154	branch	B	refrigerant flow
156	valve seat		
158	valve passage		

Claims

1. Laundry dryer (2) comprising:

a laundry storing compartment (17) for receiving laundry (19) to be treated and including a circumferential wall defined by a rotatable drum (18) and a compartment back wall (74),
a front wall (60) with a front loading opening (54) for loading laundry (19) into the laundry storing compartment (17), wherein the compartment back wall (74) is opposite to the loading opening (54),
a rear frame (72) including said compartment back wall (74),
a rear wall (94) forming at least a portion of a back cover (95) of the dryer (2),
a steam generation unit (90) for generating steam for laundry steam treatment, and
a nozzle unit (300) comprising

one or a plurality of nozzle outlets (92) for injecting steam generated in the steam generation unit (90) into the laundry storing compartment (17), and
a drain outlet (308) for draining water from within the nozzle unit (300) to the outside,
wherein the laundry dryer (2) comprises a rear channel (20b, 20c) for guiding process air (A) at the backside of the laundry storing compartment (17) to the laundry storing compartment (17), the compartment back wall (74) comprises a plurality of back wall openings (84) designed for passing process air (A) from the rear channel (20b, 20c) into the laundry storing compartment (17), the laundry dryer being **characterized in that** the nozzle outlet (92) of the nozzle unit (300) is arranged between said compartment back wall (74) and said rear wall (94) inside said rear channel (20b, 20c) so that steam ejected from the nozzle outlet (92) passes through at least one back wall opening (84) of the compartment back wall (74) before entering the laundry storing compartment (17), and the drain outlet (308) is for draining the water from the nozzle unit (300) to the rear channel (20b, 20c).

2. Laundry dryer according to claim 1, wherein the nozzle unit (300) further comprises a separation chamber (302) being designed for separating steam and water and having a steam inlet (124) in fluid connection with the steam generation unit (90) and one or more chamber outlets (126) in fluid connection with the one or more nozzle outlets (92), wherein said drain outlet (308) is arranged at the separation chamber (302) such as to drain the water out of the separation chamber.

3. Laundry dryer according to claim 1,
wherein a portion (304) of the separation chamber (302) is arranged within the rear channel (20b, 20c), or
wherein a portion (306) of the separation chamber (302) is arranged at the back side of the rear wall, or
wherein a portion (304) of the separation chamber (302) is arranged within the rear channel and a portion (306) of the separation chamber is arranged at the back side of the rear wall.

4. Laundry dryer according to any of the preceding claims, wherein the drain outlet (308) is arranged at or close to the lowest portion of the nozzle unit (300) or the separation chamber (302).

5. Laundry dryer according to any of the preceding claims,
wherein said compartment back wall (74) and said rear wall (94) define said rear channel (20b, 20c), and/or
wherein the compartment back wall (74) is stationary and the rotatable drum (18) of the laundry storing compartment (17) is rotatably coupled to the stationary compartment back wall (74), and/or
wherein process air (A) flows through the rear channel (20b, 20c) when the nozzle outlet (92) ejects steam.

6. Laundry dryer according to any of the preceding claims, wherein the rear wall (94) forming at least a portion of the back cover (95) of the laundry dryer (2) comprises a nozzle port (116) through which the nozzle unit (300) is arranged and the nozzle unit (300) comprises a connection portion (104) or a base portion (96), wherein the connection portion (104) or the base portion (96) is protruding from the rear wall (94) or is extending at the back side of the rear wall (94).

7. Laundry dryer according to any of the preceding claims, wherein a steam conduit (106) is fluidly connecting the nozzle unit (300) to the steam generation unit (90), wherein the steam conduit (106) from the steam generation unit (90) is passing through a conduit port (120) formed in the rear wall (94) forming at least a portion of the back cover (95) of the laundry dryer (2) so that a portion (122) of the steam conduit (106) extends from the conduit port (120) to the connection portion (104) of the nozzle unit (300).

8. Laundry dryer according to any of the preceding claims,
wherein in case of a single nozzle outlet (92) the one nozzle outlet (92) is associated to a predefined one of the back wall openings (84) or wherein in case of a plurality of nozzle outlets (92) each one of the nozzle outlet (92) is assigned to a predefined one of the plurality of back wall openings (84), and
wherein the one or each one of the nozzle outlets (92) is designed to direct a steam flow exiting this nozzle outlet (92) directly to its associated back wall opening (84) or through its associated back wall opening (84).

9. Laundry dryer according to any of the preceding claims, wherein the nozzle outlet (92) abuts or the nozzle outlets (92) abut against a rear side region at the associated back wall opening (84) or abuts against the rim (130) of the respective associated back wall opening (84).

10. Laundry dryer according to any of the preceding claims, comprising a chamber outlet (126) of the or a base portion (301) of the nozzle unit (300), wherein each of the chamber outlets (126) or at least a portion of the chamber outlets (126) has an associated steam guiding portion (102) for guiding the steam from the or a base portion (96) or a separation chamber to the nozzle outlet (92), wherein the steam guiding portion (102) or at least a portion of the steam guiding portion (102) are formed passing from the back region of the rear channel (20b, 20c), from the separation chamber or from the rear side of the rear wall (94) through the rear channel (20b, 20c) to the nozzle outlet (92).

11. Laundry dryer according to any of the preceding claims,
wherein the steam generation unit (90) is arranged in a bottom section or a base section (118) of the dryer (2); or
wherein the steam conduit (106) is the only conduit connected to the nozzle unit (300) at the backside of the rear wall (94) or the steam conduit (106) is designed to supply steam from the steam generation unit (90) to the nozzle unit (300) and to drain condensed liquid from the nozzle unit (300) to the steam generation unit (90).

12. Laundry dryer according to any of the preceding claims, wherein the steam inlet (124) is arranged at a lower or bottom section of the separation chamber (302) and a conduit (106, 122) fluidly connecting the steam generation unit (90) and the separation chamber (302) is formed as a draining conduit for draining water from the separation chamber (302) towards the steam generation unit (90).

13. Laundry dryer according to any of the preceding claims, wherein the base portion (301) of the nozzle unit (300) comprises a mounting socket (110) for mounting the nozzle unit (300) on or at the backside of the rear wall (94).

14. Laundry dryer according to any of the preceding claims, wherein two or three or more of the following elements which are part of the nozzle unit (300) are formed as a single-piece or monolithic piece or single-molded part:

a separation chamber (302) or a portion of the separation chamber (302) for separating the supplied steam and water,
the one or more nozzle outlets (92),
one or more steam guiding portions (102) fluidly connecting a base portion (301) or separation chamber (302) of the nozzle unit (300) to a respective one of the one or more nozzle outlets (92),
a connection portion (104) for fluidly connecting a steam conduit (106) to the nozzle unit (300),
a mounting socket (110) of the nozzle unit (300) for mounting the nozzle unit (300).

15. Laundry dryer according to any of the preceding claims, wherein the laundry dryer is a condensation type dryer or a heat pump type dryer (2) and the rear channel (20b, 20c) is a portion of the closed loop drying air circuit (20).

Patentansprüche

1. Wäschetrockner (2), der Folgendes umfasst:

ein Wäschestaufach (17) zum Aufnehmen von zu behandelnder Wäsche (19), und eine umlaufende Wand, die durch eine drehbare Trommel (18) definiert wird, sowie eine Fachrückwand (74) umfassend,
eine vordere Wand (60) mit einer vorderen Ladeöffnung (54) zum Laden von Wäsche (19) in das Wäschestaufach (17),
wobei die Fachrückwand (74) der Ladeöffnung (54) gegenüberliegt,
einen hinteren Rahmen (72), umfassend die Fachrückwand (74),
eine hintere Wand (94), die zumindest einen Teil einer hinteren Abdeckung (95) des Trockners (2) bildet,
eine Dampferzeugungseinheit (90) zum Erzeugen von Dampf für Wäschedampfbehandlung, und
eine Düseneinheit (300), die Folgendes umfasst:

einen oder mehrere Düsenauslässe (92) zum Einspritzen von in der Dampferzeugungseinheit (90) erzeugtem Dampf in das Wäschestaufach (17), und
einen Entwässerungsauslass (308) zum Ablassen von Wasser aus dem Inneren der Düseneinheit (300) zur Außenseite,

wobei der Wäschetrockner (2) einen hinteren Kanal (20b, 20c) zum Leiten von Prozessluft (A) an der Rückseite des Wäschestaufachs (17) zum Wäschestaufach (17) umfasst,
wobei die Fachrückwand (74) mehrere Rückwandöffnungen (84) umfasst, die ausgestaltet sind, um Prozessluft (A) vom hinteren Kanal (20b, 20c) in das Wäschestaufach (17) zu führen,
wobei der Wäschetrockner **dadurch gekennzeichnet ist, dass** der Düsenauslass (92) der Düseneinheit (300) zwischen der Fachrückwand (74) und der hinteren Wand (94) innerhalb des hinteren Kanals (20b, 20c) angeordnet ist, sodass Dampf, der von dem Düsenauslass (92) ausgestoßen wird, durch die zumindest eine Rückwandöffnung (84) der Fachrückwand (74) strömt, bevor er in das Wäschestaufach (17) eintritt, und wobei der Entwässerungsauslass (308) dazu dient, Wasser aus der Düseneinheit (300) zum hinteren Kanal (20b, 20c) abzulassen.

2. Wäschetrockner nach Anspruch 1, wobei die Düseneinheit (300) ferner eine Trennkammer (302) umfasst, die ausgestaltet ist zum Trennen von Dampf und Wasser und einen Dampfeinlass (124) in Fluidverbindung mit der Dampferzeugungseinheit (90) und einen oder mehrere Kammerauslässe (126) in Fluidverbindung mit dem einen oder den mehreren Düsenauslässen (92) aufweist, wobei der Entwässerungsauslass (308) an der Trennkammer (302) angeordnet ist, um das Wasser aus der Trennkammer abzulassen.

3. Wäschetrockner nach Anspruch 1, wobei ein Teil (304) der Trennkammer (302) innerhalb des hinteren Kanals (20b, 20c) angeordnet ist oder wobei ein Teil (306) der Trennkammer (302) an der Rückseite der hinteren Wand angeordnet ist oder wobei ein Teil (304) der Trennkammer (302) innerhalb des hinteren Kanals angeordnet ist und ein Teil (306) der Trennkammer an der Rückseite der hinteren Wand angeordnet ist.

4. Wäschetrockner nach einem der vorhergehenden Ansprüche, wobei der Entwässerungsauslass (308) am oder nahe dem niedrigsten Teil der Düseneinheit (300) oder der Trennkammer (302) angeordnet ist.

5. Wäschetrockner nach einem der vorhergehenden Ansprüche,
wobei die Fachrückwand (74) und die hintere Wand (94) den hinteren Kanal (20b, 20c) definieren, und/oder
wobei die Fachrückwand (74) stationär ist und die drehbare Trommel (18) oder das Wäschestaufach (17) drehbar mit der stationären Fachrückwand (74) gekoppelt ist, und/oder
wobei Prozessluft (A) durch den hinteren Kanal (20b, 20c) strömt, wenn der Düsenauslass (92) Dampf ausstößt.

6. Wäschetrockner nach einem der vorhergehenden Ansprüche, wobei die hintere Wand (94), die zumindest einen Teil der hinteren Abdeckung (95) des Wäschetrockners (2) bildet, einen Düsenanschluss (116) umfasst, durch den die Düseneinheit (300) angeordnet ist, und wobei die Düseneinheit (300) einen Verbindungsteil (104) oder einen Basisteil (96) umfasst, wobei der Verbindungsteil (104) oder der Basisteil (96) aus der hinteren Wand (94) herausragt oder sich an der Rückseite der hinteren Wand (94) erstreckt.

7. Wäschetrockner nach einem der vorhergehenden Ansprüche, wobei eine Dampfleitung (106) die Düseneinheit (300) fluidisch mit der Dampferzeugungseinheit (90) verbindet, wobei die Dampfleitung (106) von der Dampferzeugungseinheit (90) durch einen in der hinteren Wand (94) ausgebildeten Leitungsanschluss (120) verläuft, zumindest einen Teil der hinteren Abdeckung (95) des Wäschetrockners (2) bildend, sodass sich ein Teil (122) der Dampfleitung (106) vom Leitungsanschluss (120) zum Verbindungsteil (104) der Düseneinheit (300) erstreckt.

8. Wäschetrockner nach einem der vorhergehenden Ansprüche,
wobei im Falle eines einzelnen Düsenauslasses (92) der eine Düsenauslass (92) mit einer vordefinierten der Rückwandöffnungen (84) verknüpft ist, oder
wobei im Falle von mehreren Düsenauslässen (92) jeder der Düsenauslässe (92) einer vordefinierten der mehreren Rückwandöffnungen (84) zugeordnet ist, und
wobei der eine oder jeder der Düsenauslässe (92) dazu ausgestaltet ist, einen Dampfstrom, der diesen Düsenauslass (92) verlässt, direkt zu seiner verknüpften Rückwandöffnung (84) oder durch seine verknüpfte Rückwandöffnung (84) zu leiten.

9. Wäschetrockner nach einem der vorhergehenden Ansprüche, wobei der Düsenauslass (92) oder die Düsenauslässe (92) an einem hinteren Seitenbereich an der verknüpften Rückwandöffnung (84) anliegt bzw. anliegen oder am Rand (130) der entsprechenden verknüpften Rückwandöffnung (84) anliegt bzw. anliegen.

10. Wäschetrockner nach einem der vorhergehenden Ansprüche, umfassend einen Kammerauslass (126) des oder eines Basisteils (301) der Düseneinheit (300), wobei jeder der Kammerauslässe (126) oder zumindest ein Teil der Kammerauslässe (126) einen verknüpften Dampfführungsteil (102) zum Führen des Dampfes von dem oder einem Basisteil (96) oder einer Trennkammer zum Düsenauslass (92) aufweist, wobei der Dampfführungsteil (102) oder zumindest ein Teil des Dampfführungsteils (102) so gebildet sind, dass er vom hinteren Bereich des hinteren Kanals (20b, 20c), von der Trennkammer oder von der hinteren Seite der hinteren Wand (94) durch den hinteren Kanal (20b, 20c) zum Düsenauslass (92) führt.

11. Wäschetrockner nach einem der vorhergehenden Ansprüche,
wobei die Dampferzeugungseinheit (90) in einem untersten Abschnitt oder einem Basisabschnitt (118) des Trockners (2) angeordnet ist; oder
wobei die Dampfleitung (106) die einzige mit der Düseneinheit (300) an der Rückseite der hinteren Wand (94) verbundene Leitung ist oder die Dampfleitung (106) dazu ausgestaltet ist, Dampf von der Dampferzeugungseinheit (90) zur Düseneinheit (300) zuzuführen und kondensierte Flüssigkeit aus der Düseneinheit (300) zur Dampferzeugungseinheit (90) abzulassen.

12. Wäschetrockner nach einem der vorhergehenden Ansprüche, wobei der Dampfeinlass (124) an einem unteren oder untersten Abschnitt der Trennkammer (302) angeordnet ist und eine Leitung (106, 122), die die Dampferzeugungseinheit (90) und die Trennkammer (302) fluidisch verbindet, als eine Entwässerungsleitung zum Ablassen von Wasser aus der Trennkammer (302) in Richtung der Dampferzeugungseinheit (90) gebildet ist.

13. Wäschetrockner nach einem der vorhergehenden Ansprüche, wobei der Basisteil (301) der Düseneinheit (300) eine Befestigungsbuchse (110) zum Montieren der Düseneinheit (300) auf oder an der Rückseite der hinteren Wand (94) umfasst.

14. Wäschetrockner nach einem der vorhergehenden Ansprüche, wobei zwei oder drei oder mehr der folgenden Elemente, die Teil der Düseneinheit (300) sind, als einstückiges oder monolithisches Stück oder Einzelformteil ausge-

bildet sind:

eine Trennkammer (302) oder ein Teil der Trennkammer (302) zum Trennen von zugeführtem Dampf und Wasser,
der eine oder die mehreren Düsenauslässe (92),
ein oder mehrere Dampfführungsteile (102), einen Basisteil (301) oder eine Trennkammer (302) der Düseneinheit (300) fluidisch mit einem entsprechenden der einen oder mehreren Düsenauslässe (92) verbindend,
ein Verbindungsteil (104) zum fluidischen Verbinden einer Dampfleitung (106) mit der Düseneinheit (300),
eine Befestigungsbuchse (110) der Düseneinheit (300) zum Montieren der Düseneinheit (300).

15. Wäschetrockner nach einem der vorhergehenden Ansprüche, wobei der Wäschetrockner ein Trockner vom Kondensationstyp oder ein Trockner vom Wärmepumpentyp (2) ist und wobei der hintere Kanal (20b, 20c) ein Teil des geschlossenen Trocknungsluftkreislaufs (20) ist.

Revendications

1. Sèche-linge (2) comprenant :

un compartiment de stockage de linge (17) destiné à recevoir du linge (19) devant être traité et comportant une paroi circonférentielle définie par un tambour rotatif (18) et une paroi arrière de compartiment (74), une paroi avant (60) dotée d'une ouverture de chargement avant (54) pour le chargement du linge (19) dans le compartiment de stockage de linge (17), dans lequel la paroi arrière de compartiment (74) est opposée à l'ouverture de chargement (54),
un cadre arrière (72) comportant ladite paroi arrière de compartiment (74),
une paroi arrière (94) formant au moins une portion d'un couvercle arrière (95) du sèche-linge (2),
une unité de génération de vapeur (90) servant à générer de la vapeur pour le traitement à la vapeur du linge, et
une unité de buse (300) comprenant

une sortie de buse ou une pluralité de sorties de buse (92) servant à injecter de la vapeur générée dans l'unité de génération de vapeur (90) dans le compartiment de stockage de linge (17), et
une sortie d'évacuation (308) servant à évacuer de l'eau provenant de l'intérieur de l'unité de buse (300) vers l'extérieur,

le sèche-linge (2) comprenant un canal arrière (20b, 20c) servant à guider de l'air de traitement (A) au niveau du côté arrière du compartiment de stockage de linge (17) vers le compartiment de stockage de linge (17), le compartiment de stockage de linge (74) comprenant une pluralité d'ouvertures de paroi arrière (84) conçues pour faire passer l'air de traitement (A) à partir du canal arrière (20b, 20c) dans le compartiment de stockage de linge (17), le sèche-linge étant **caractérisé en ce que** la sortie de buse (92) de l'unité de buse (300) est disposée entre ladite paroi arrière de compartiment (74) et ladite paroi arrière (94) à l'intérieur dudit canal arrière (20b, 20c) de telle sorte que la vapeur éjectée de la sortie de buse (92) traverse au moins une ouverture de paroi arrière (84) de la paroi arrière de compartiment (74) avant d'entrer dans le compartiment de stockage de linge (17), et la sortie d'évacuation (308) est destinée à l'évacuation de l'eau provenant de l'unité de buse (300) vers le canal arrière (20b, 20c).

2. Sèche-linge selon la revendication 1, dans lequel l'unité de buse (300) comprend en outre une chambre de séparation (302) conçue pour séparer la vapeur et l'eau et présentant une entrée de vapeur (124) en liaison fluidique avec l'unité de génération de vapeur (90) et une ou plusieurs sorties de chambre (126) en liaison fluidique avec la ou les sorties de buse (92), dans lequel ladite sortie d'évacuation (308) est disposée au niveau de la chambre de séparation (302) de manière à évacuer l'eau hors de la chambre de séparation.

3. Sèche-linge selon la revendication 1,
dans lequel une portion (304) de la chambre de séparation (302) est disposée à l'intérieur du canal arrière (20b, 20c), ou
dans lequel une portion (306) de la chambre de séparation (302) est disposée au niveau du côté arrière de la paroi arrière, ou
dans lequel une portion (304) de la chambre de séparation (302) est disposée à l'intérieur du canal arrière et une portion (306) de la chambre de séparation est disposée au niveau du côté arrière de la paroi arrière.

4. Sèche-linge selon l'une quelconque des revendications précédentes, dans lequel la sortie d'évacuation (308) est disposée au niveau de la portion la plus basse de l'unité de buse (300) ou de la chambre de séparation (302) ou près de cette portion.

5. Sèche-linge selon l'une quelconque des revendications précédentes,
dans lequel ladite paroi arrière de compartiment (74) et ladite paroi arrière (94) définissent ledit canal arrière (20b, 20c), et/ou
dans lequel la paroi arrière de compartiment (74) est fixe et le tambour rotatif (18) du compartiment de stockage de linge (17) est accouplé de manière rotative à la paroi arrière de compartiment fixe (74), et/ou dans lequel de l'air de traitement (A) s'écoule à travers le canal arrière (20b, 20c) lorsque la sortie de buse (92) éjecte de la vapeur.

6. Sèche-linge selon l'une quelconque des revendications précédentes, dans lequel la paroi arrière (94) formant au moins une portion du couvercle arrière (95) du sèche-linge (2) comprend un orifice de buse (116) à travers lequel l'unité de buse (300) est disposée et l'unité de buse (300) comprend une portion de liaison (104) ou une portion de base (96), dans lequel la portion de liaison (104) ou la portion de base (96) fait saillie à partir de la paroi arrière (94) ou s'étend au niveau du côté arrière de la paroi arrière (94).

7. Séchage selon l'une quelconque des revendications précédentes, dans lequel un conduit de vapeur (106) relie de manière fluidique l'unité de buse (300) à l'unité de génération de vapeur (90), dans lequel le conduit de vapeur (106) à partir de l'unité de génération de vapeur (90) traverse un orifice de conduit (120) formé dans la paroi arrière (94) formant au moins une portion du couvercle arrière (95) du sèche-linge (2) de sorte qu'une portion (122) du conduit de vapeur (106) s'étend à partir de l'orifice de conduit (120) jusqu'à la portion de liaison (104) de l'unité de buse (300).

8. Sèche-linge selon l'une quelconque des revendications précédentes,
dans lequel, dans le cas d'une seule sortie de buse (92), la sortie de buse (92) est associée à une ouverture prédéfinie parmi les ouvertures de paroi arrière (84) ou dans lequel, dans le cas d'une pluralité de sorties de buse (92), chacune des sorties de buse (92) est affectée à une ouverture prédéfinie parmi la pluralité d'ouvertures de paroi arrière (84), et dans lequel la sortie de buse ou chacune des sorties de buse (92) est conçue pour diriger un flux de vapeur sortant de cette sortie de buse (92) directement jusqu'à son ouverture de paroi arrière associée (84) ou à travers son ouverture de paroi arrière associée (84).

9. Sèche-linge selon l'une quelconque des revendications précédentes, dans lequel la sortie de buse (92) bute ou les sorties de buse (92) butent contre une région latérale arrière au niveau de l'ouverture de paroi arrière associée (84) ou bute contre le rebord (130) de l'ouverture de paroi arrière associée (84) respective.

10. Sèche-linge selon l'une quelconque des revendications précédentes, comprenant une sortie de chambre (126) de la ou d'une portion de base (301) de l'unité de buse (300), dans lequel chacune des sorties de chambre (126) ou au moins une portion des sorties de chambre (126) comporte une portion de guidage de vapeur associée (102) servant à guider la vapeur à partir de la ou d'une portion de base (96) ou d'une chambre de séparation vers la sortie de buse (92), dans lequel la portion de guidage de vapeur (102) ou au moins une portion de la portion de guidage de vapeur (102) sont formées de manière à passer à partir de la région arrière du canal arrière (20b, 20c), à partir de la chambre de séparation ou à partir du côté arrière de la paroi arrière (94) à travers le canal arrière (20b, 20c) jusqu'à la sortie de buse (92).

11. Sèche-linge selon l'une quelconque des revendications précédentes,
dans lequel l'unité de génération de vapeur (90) est disposée dans une section inférieure ou une section de base (118) du sèche-linge (2) ; ou
dans lequel le conduit de vapeur (106) est le seul conduit relié à l'unité de buse (300) au niveau du côté arrière de la paroi arrière (94) ou le conduit de vapeur (106) est conçu pour fournir de la vapeur à partir de l'unité de génération de vapeur (90) vers l'unité de buse (300) et pour évacuer du liquide condensé à partir de l'unité de buse (300) vers l'unité de génération de vapeur (90).

12. Sèche-linge selon l'une quelconque des revendications précédentes, dans lequel l'entrée de vapeur (124) est disposée au niveau d'une section plus basse ou inférieure de la chambre de séparation (302) et un conduit (106, 122) reliant de manière fluidique l'unité de génération de vapeur (90) et la chambre de séparation (302) est formé en tant que conduit d'évacuation pour l'évacuation de l'eau à partir de la chambre de séparation (302) vers l'unité de génération de vapeur (90).

13. Sèche-linge selon l'une quelconque des revendications précédentes, dans lequel la portion de base (301) de l'unité de buse (300) comprend un socle de montage (110) servant au montage de l'unité de buse (300) sur le côté arrière de la paroi arrière (94) ou au niveau de celui-ci.

14. Sèche-linge selon l'une quelconque des revendications précédentes, dans lequel deux ou trois ou plus des éléments suivants qui font partie de l'unité de buse (300) sont formés comme une seule pièce ou une pièce monolithique ou une partie moulée unique :

une chambre de séparation (302) ou une portion de la chambre de séparation (302) servant à la séparation de la vapeur et de l'eau fournies,
la ou les sorties de buse (92),
une ou plusieurs portions de guidage de vapeur (102) reliant de manière fluidique une portion de base (301) ou une chambre de séparation (302) de l'unité de buse (300) à une sortie respective parmi la ou les sorties de buse (92),
une portion de liaison (104) servant à la liaison fluidique d'un conduit de vapeur (106) à l'unité de buse (300) ,
un socle de montage (110) de l'unité de buse (300) servant au montage de l'unité de buse (300).

15. Sèche-linge selon l'une quelconque des revendications précédentes, le sèche-linge étant un sèche-linge du type à condensation ou un sèche-linge du type à pompe à chaleur (2) et le canal arrière (20b, 20c) étant une portion du circuit d'air de séchage à boucle fermée (20).

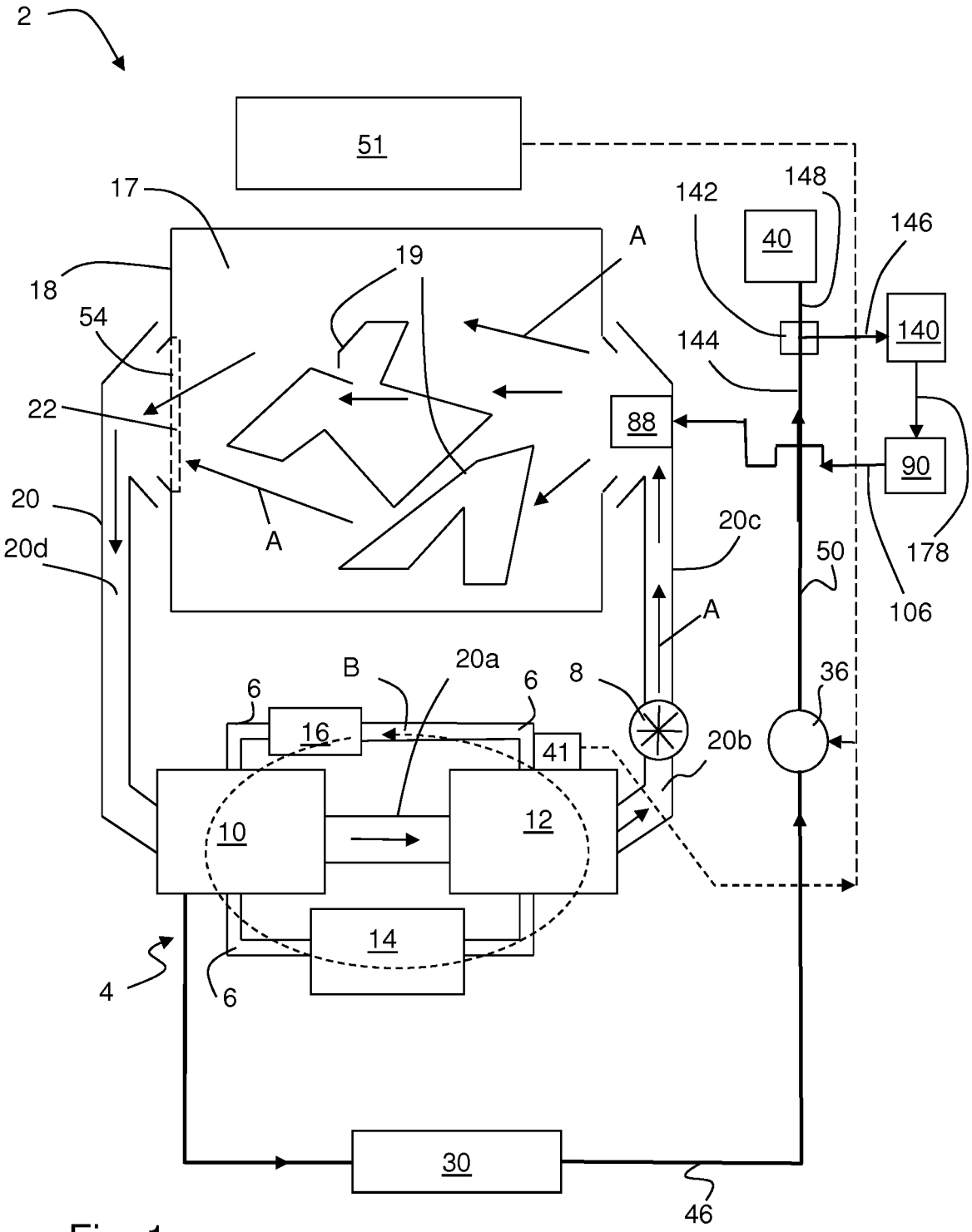
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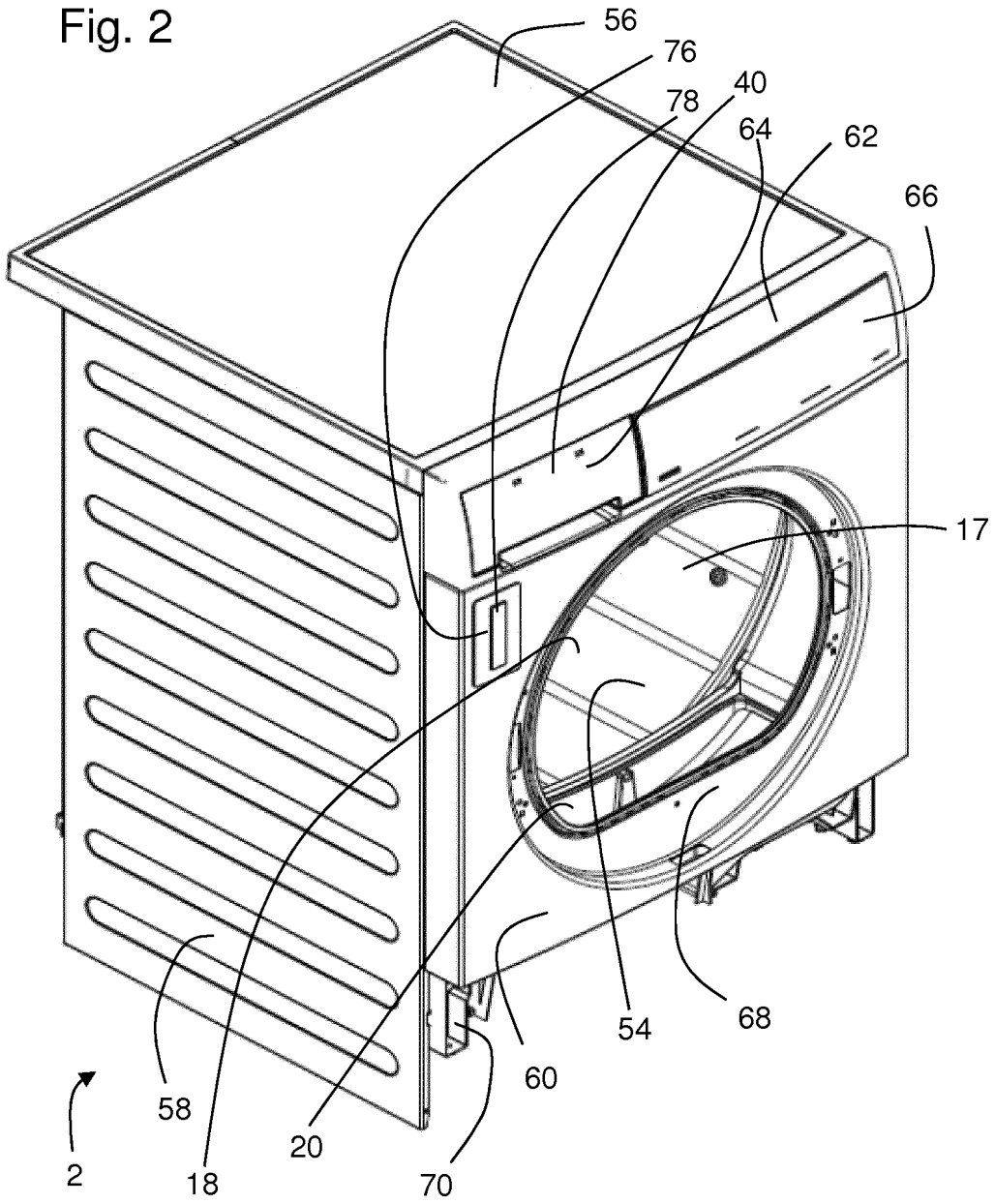
Fig. 1

Fig. 2



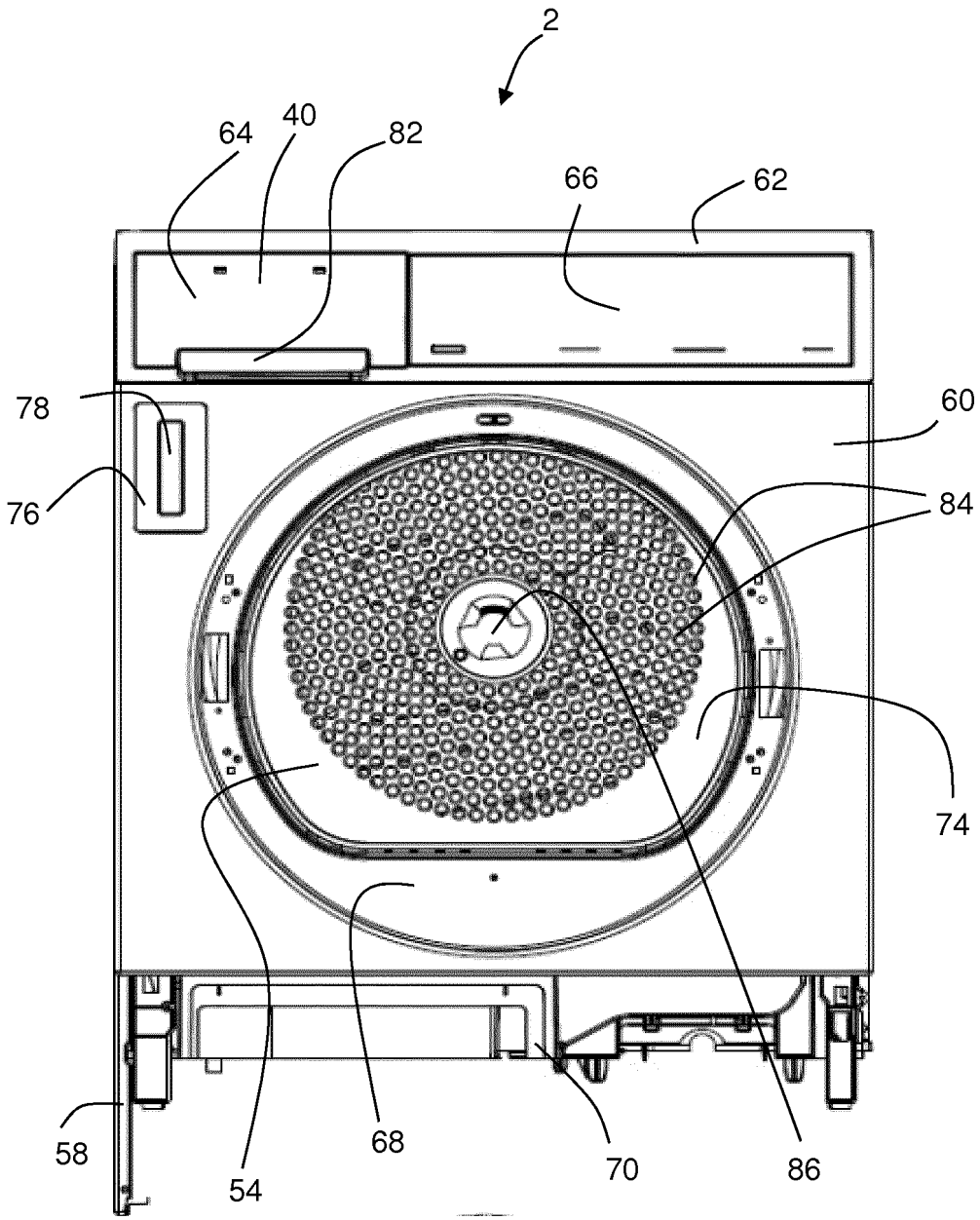


Fig. 3

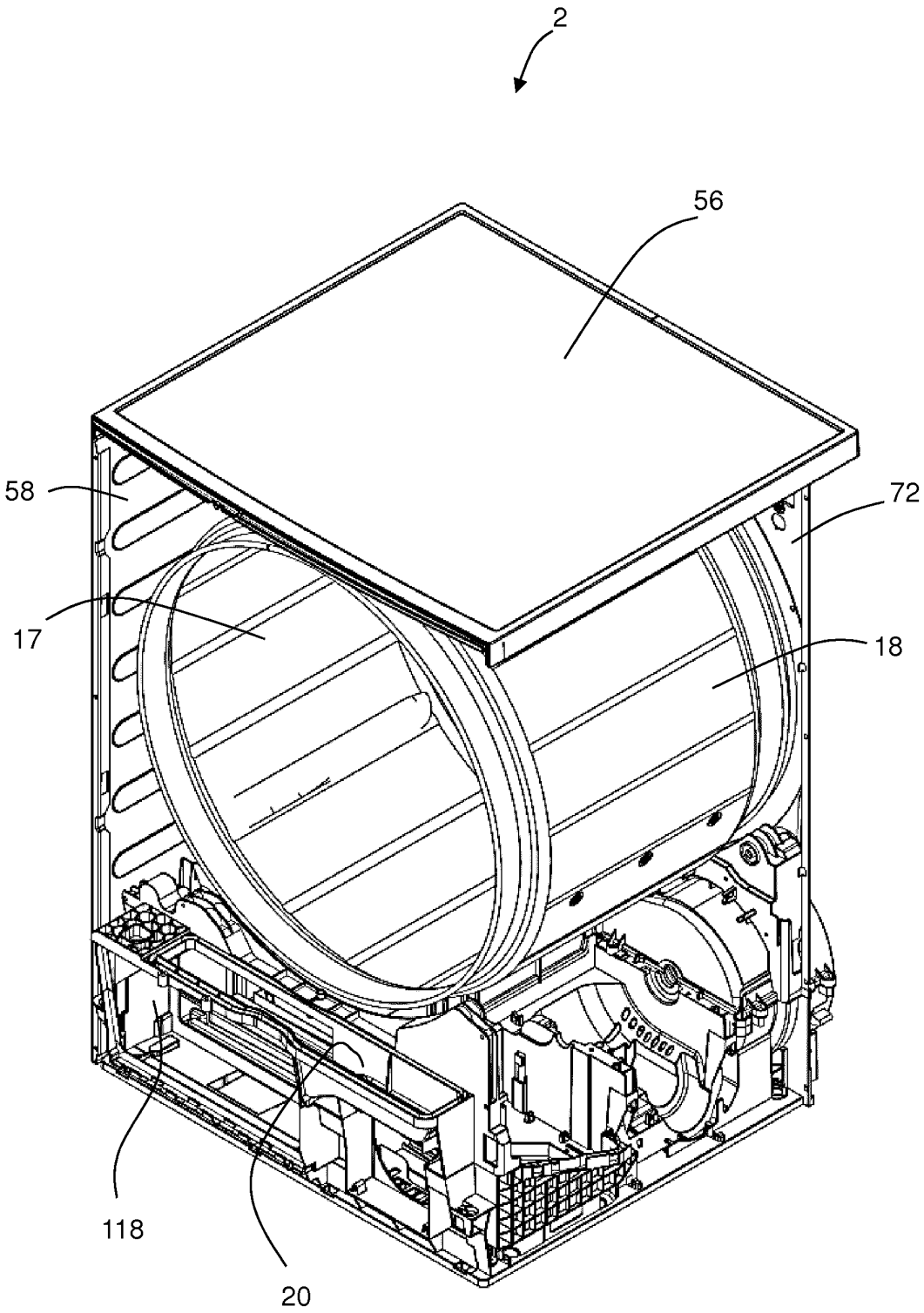


Fig. 4

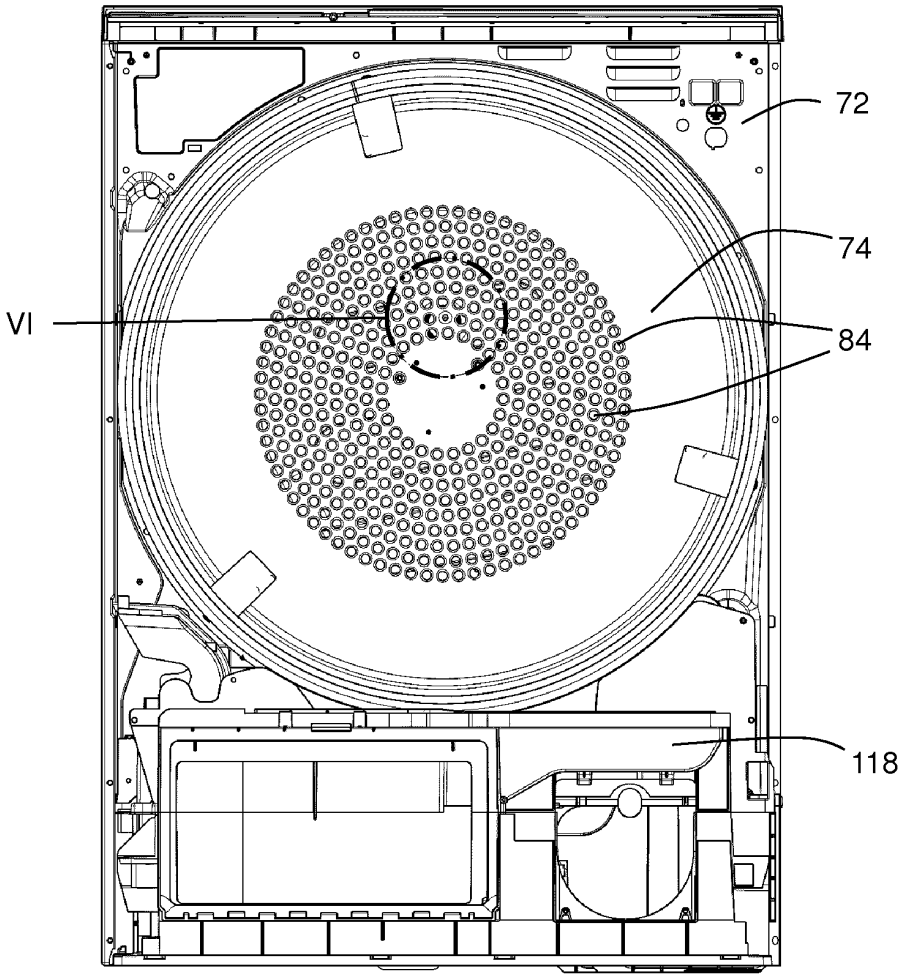


Fig. 5

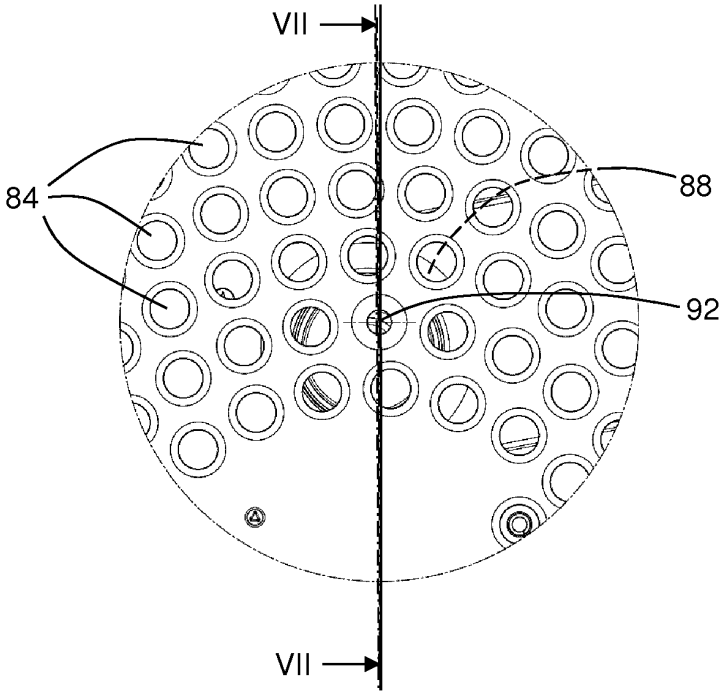


Fig. 6

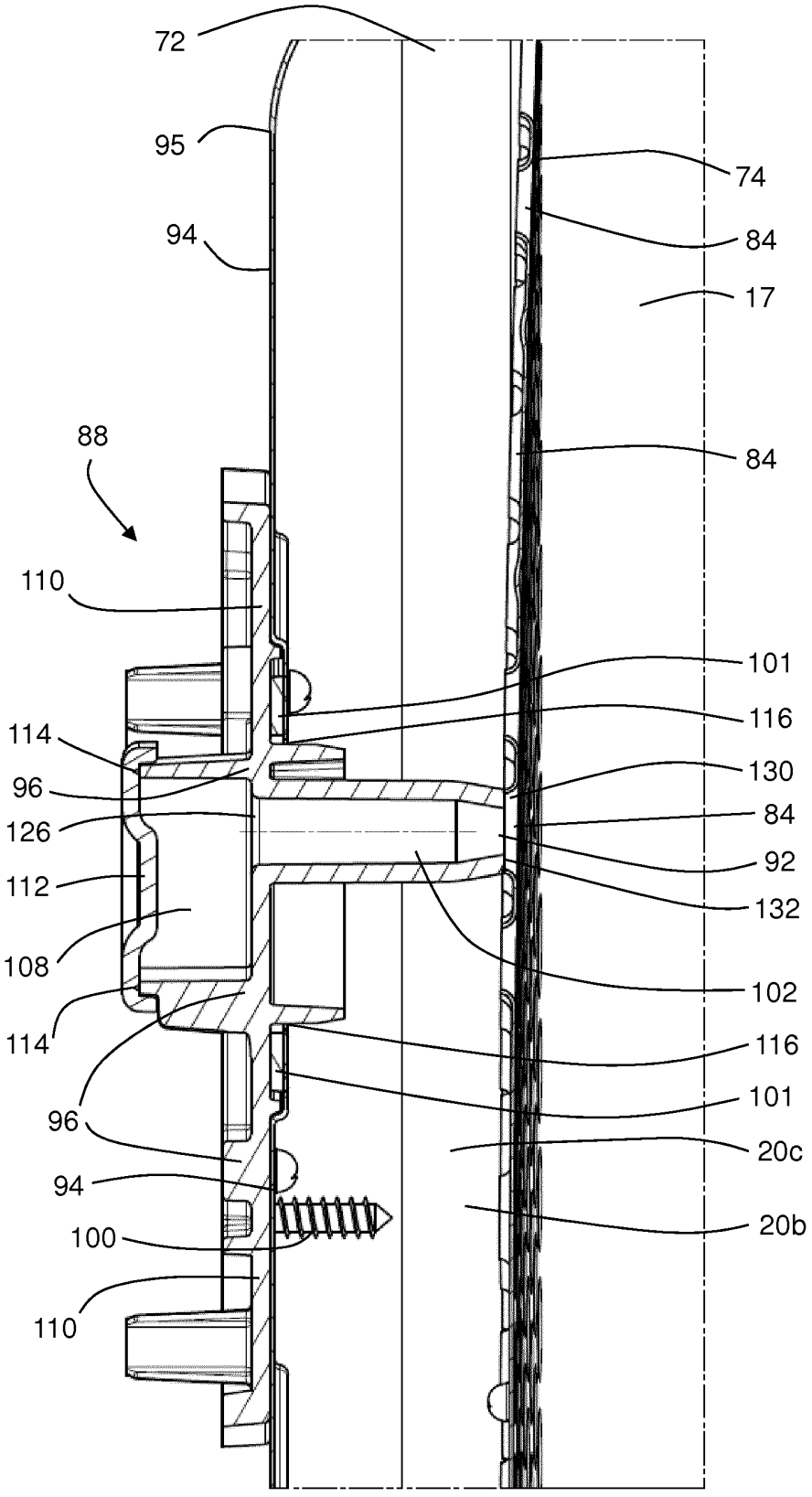

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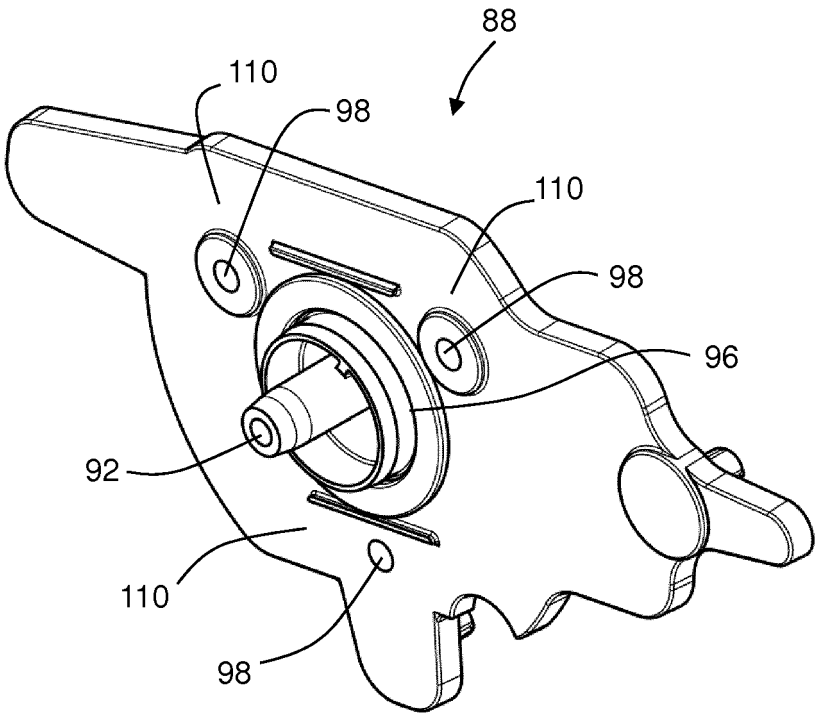
Fig. 7



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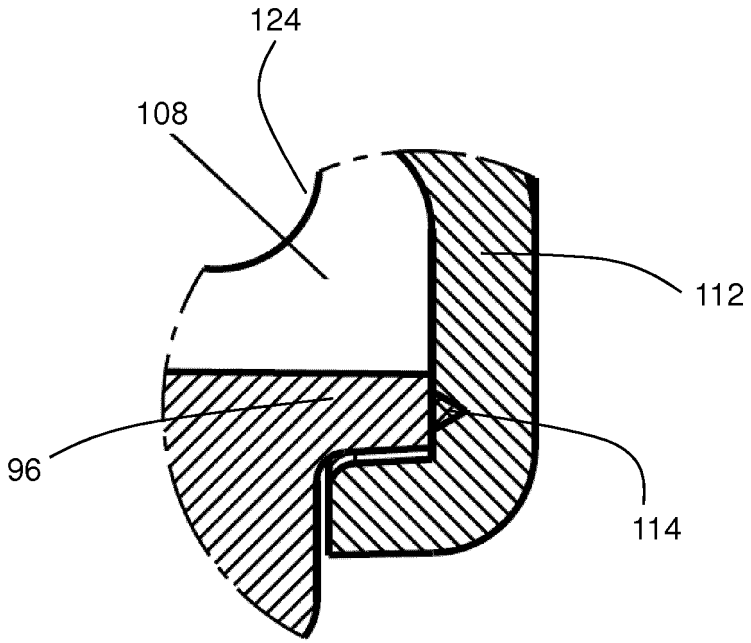

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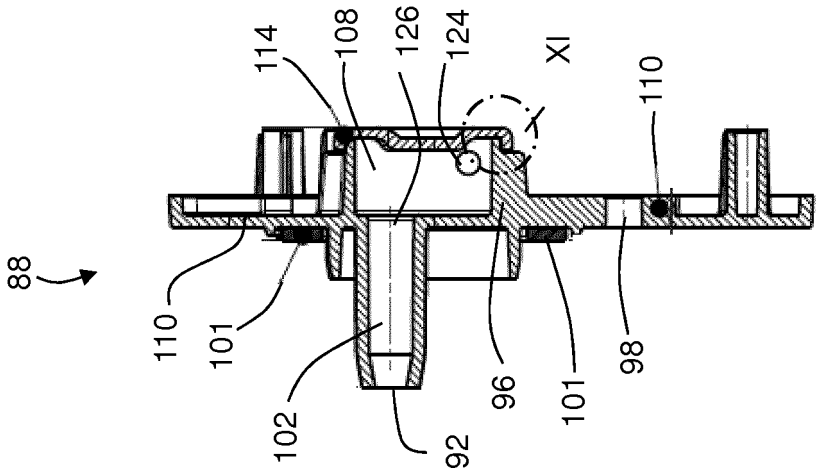
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Fig. 10

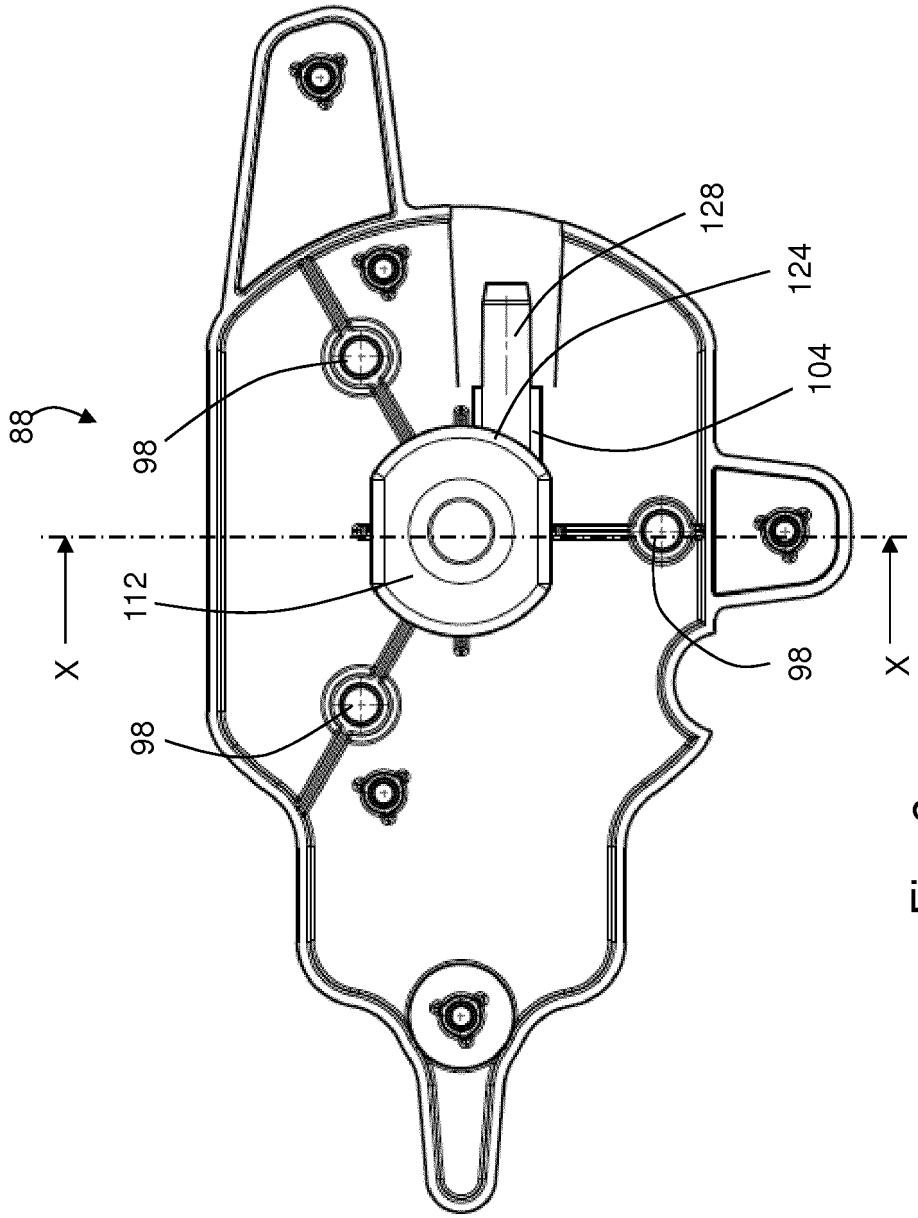
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Fig. 9

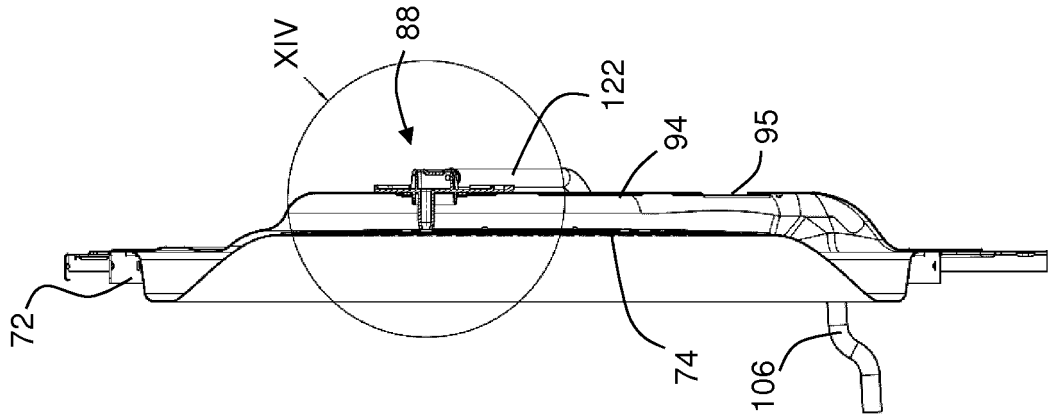


Fig. 13

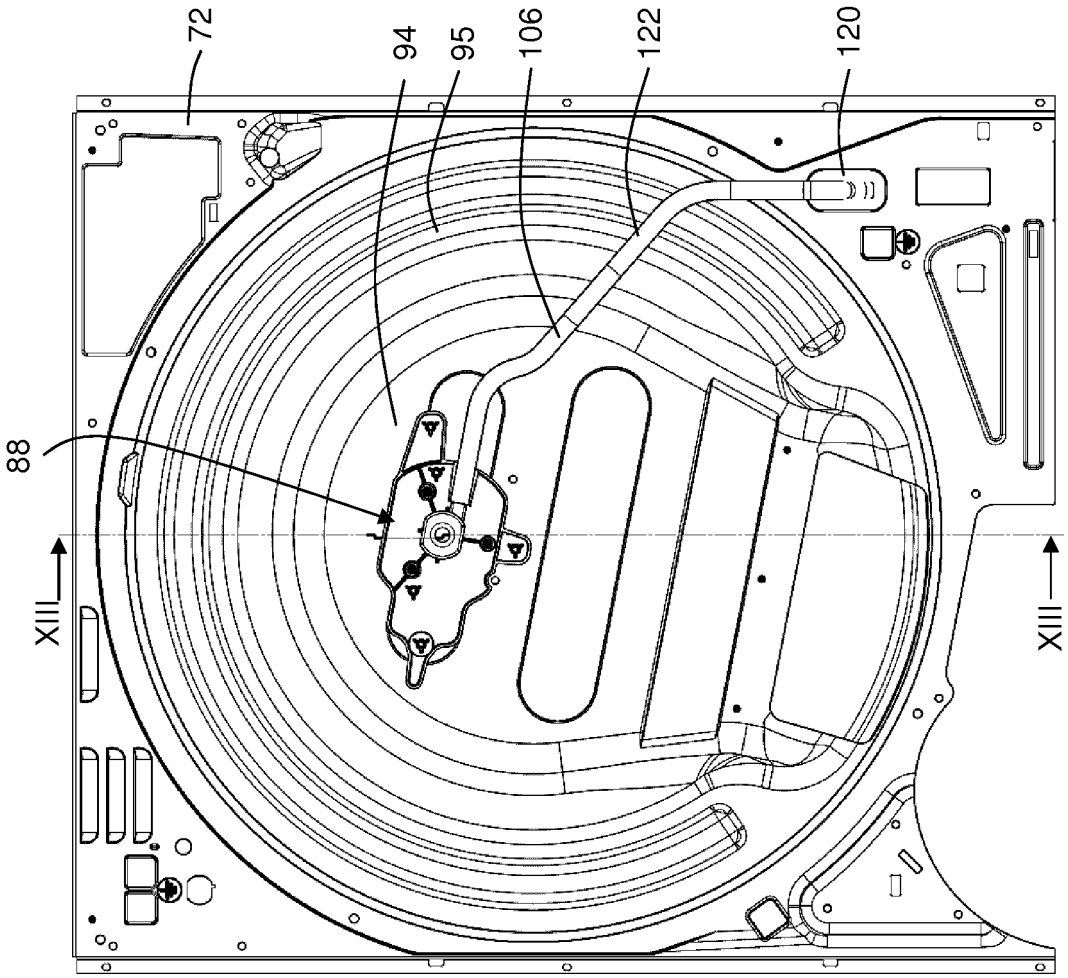
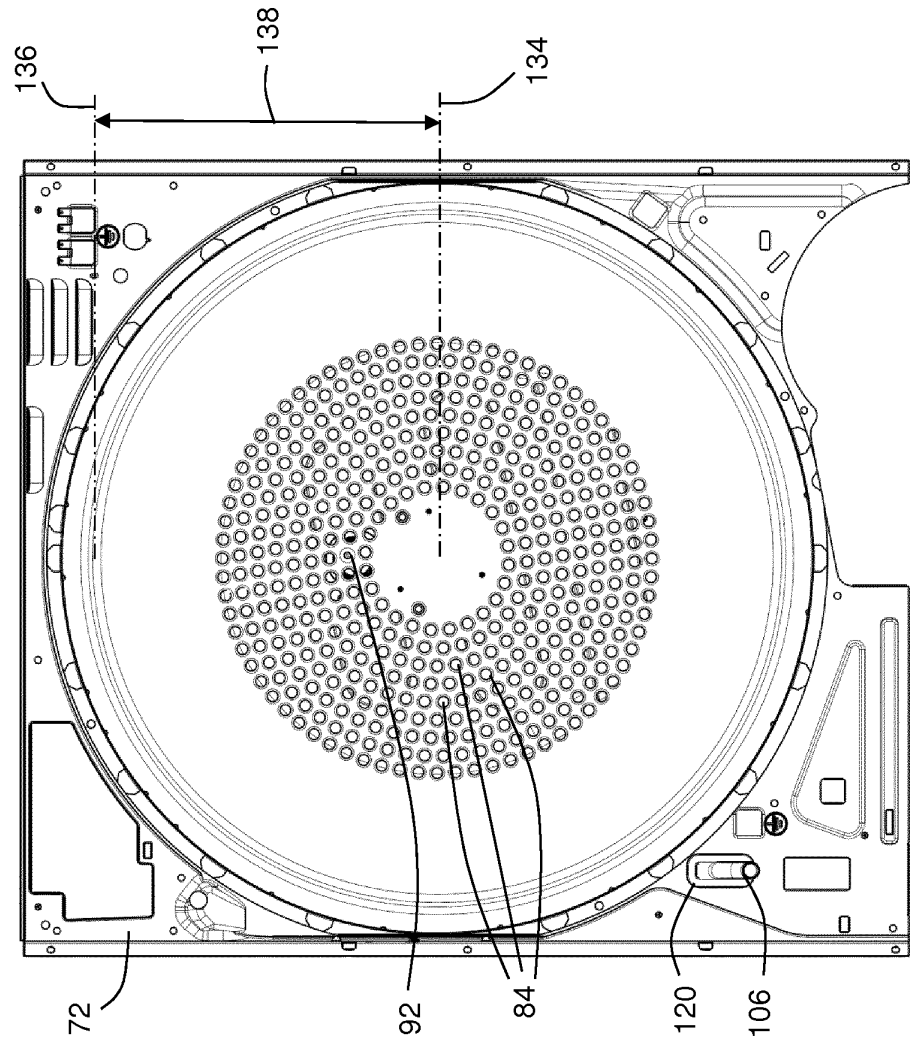


Fig. 12



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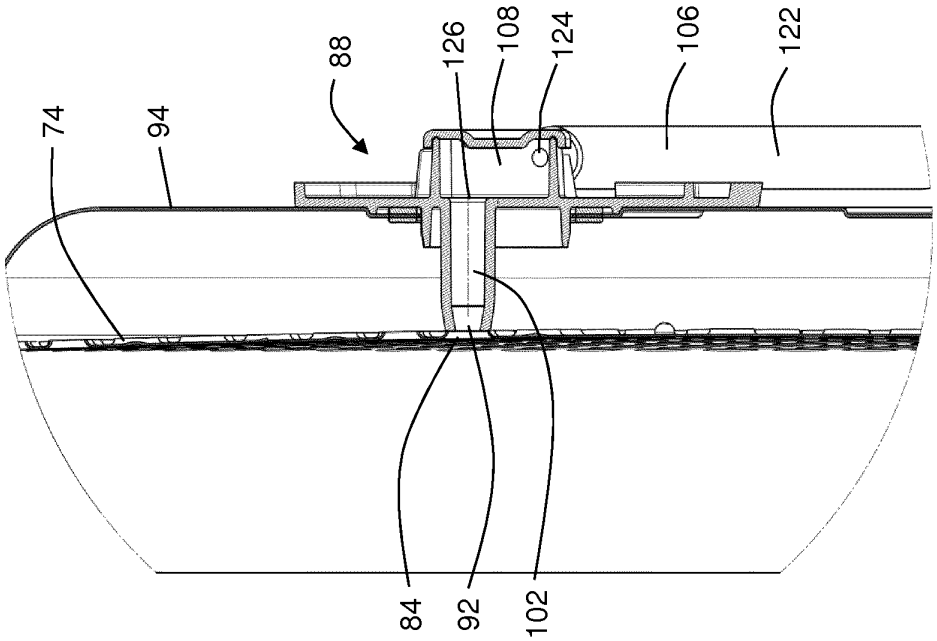
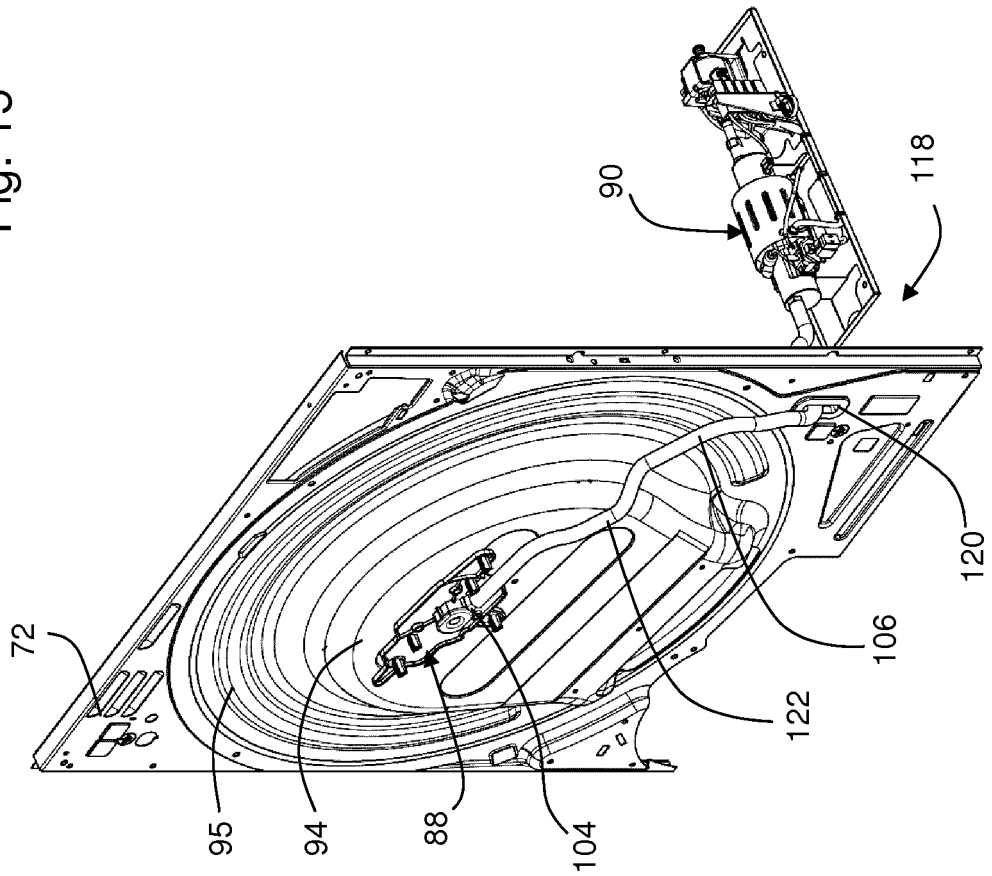


Fig. 14

Fig. 15



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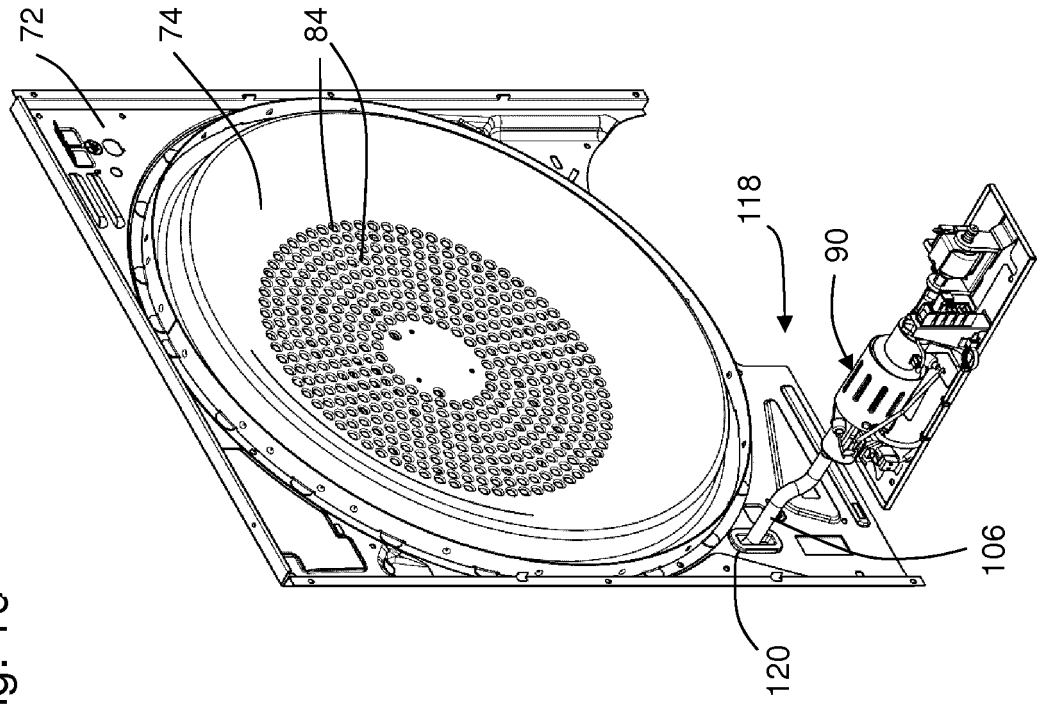

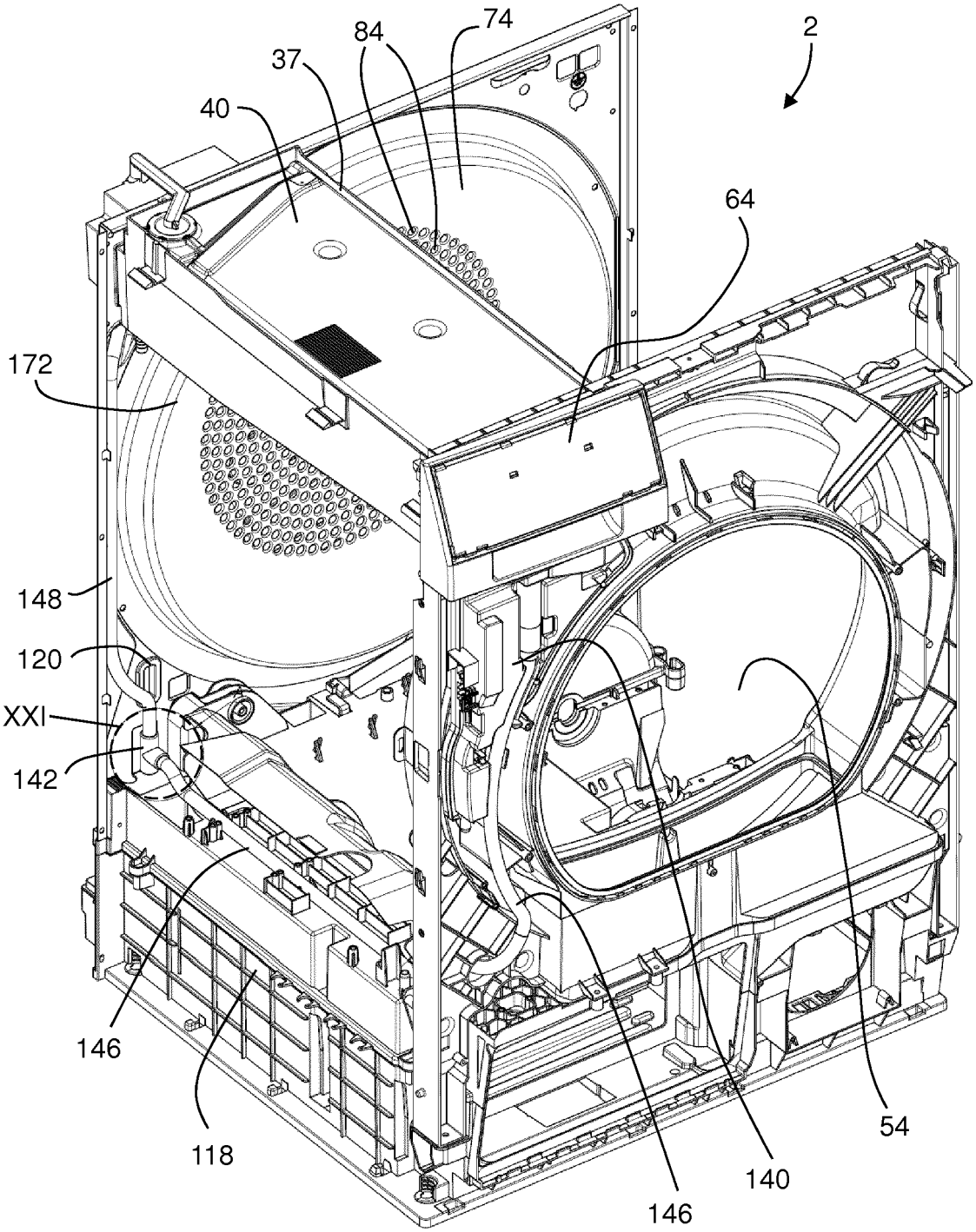

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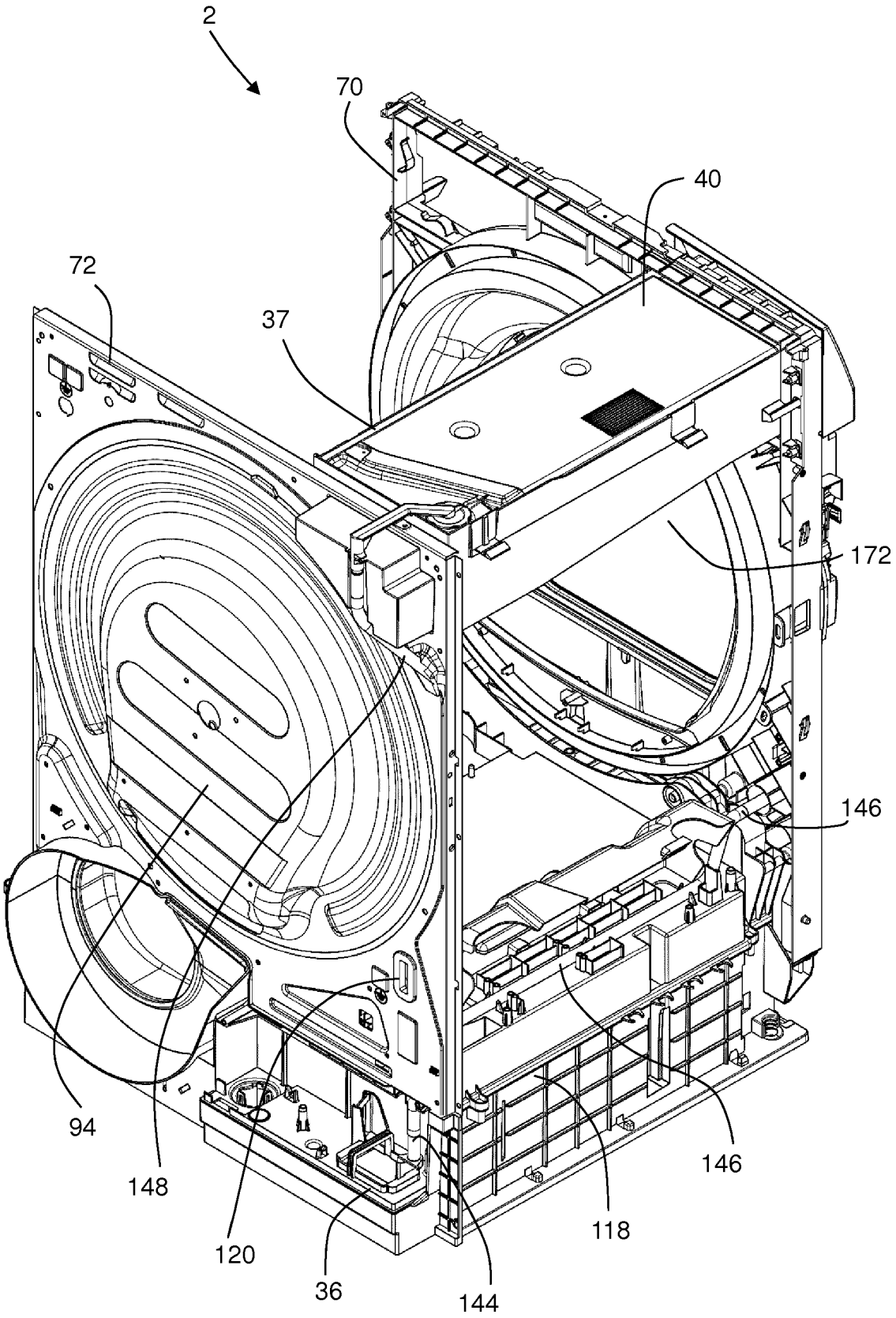

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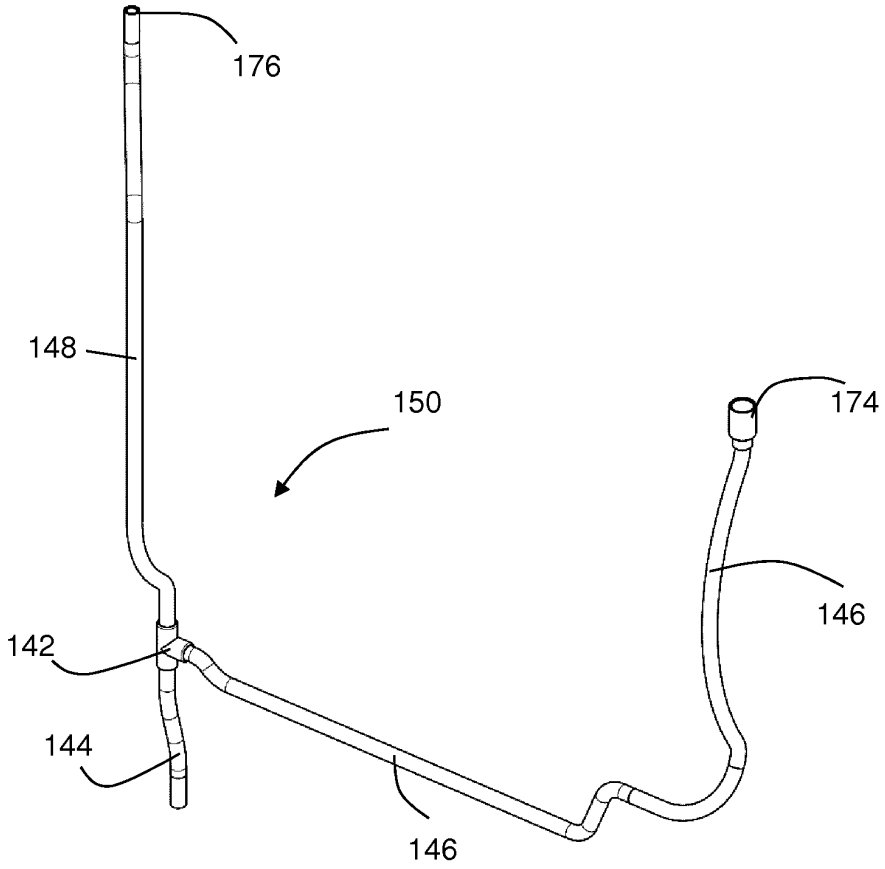

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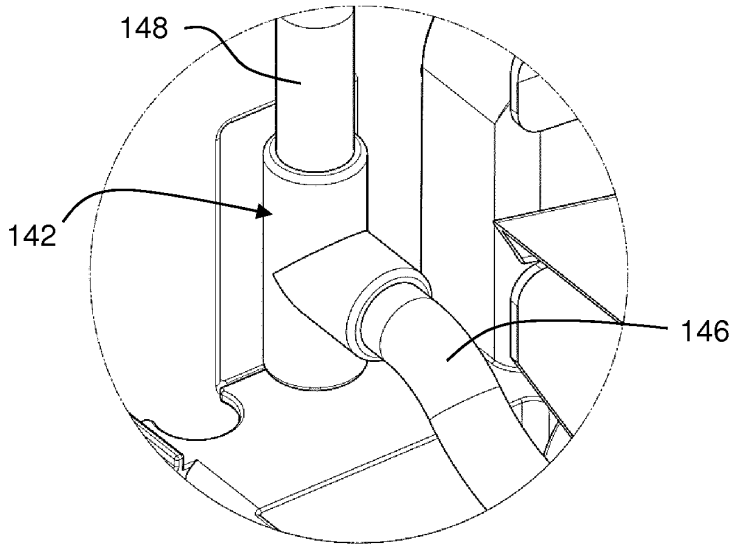

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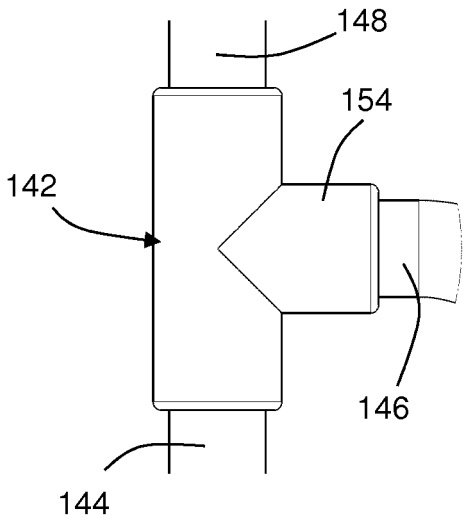

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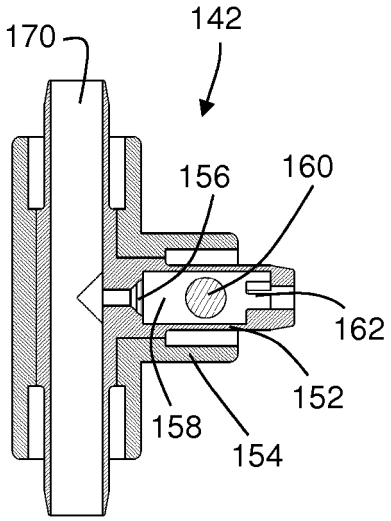

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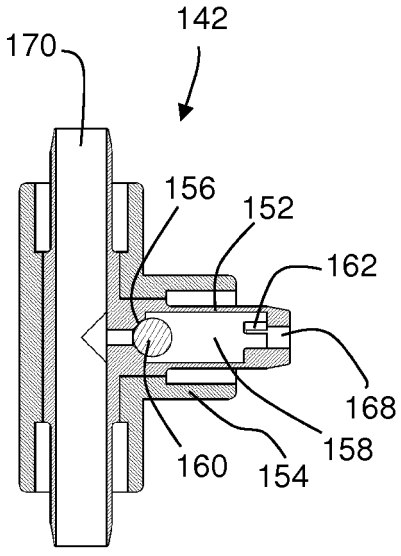

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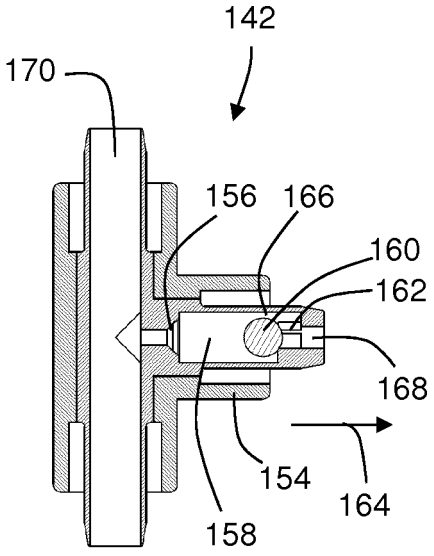

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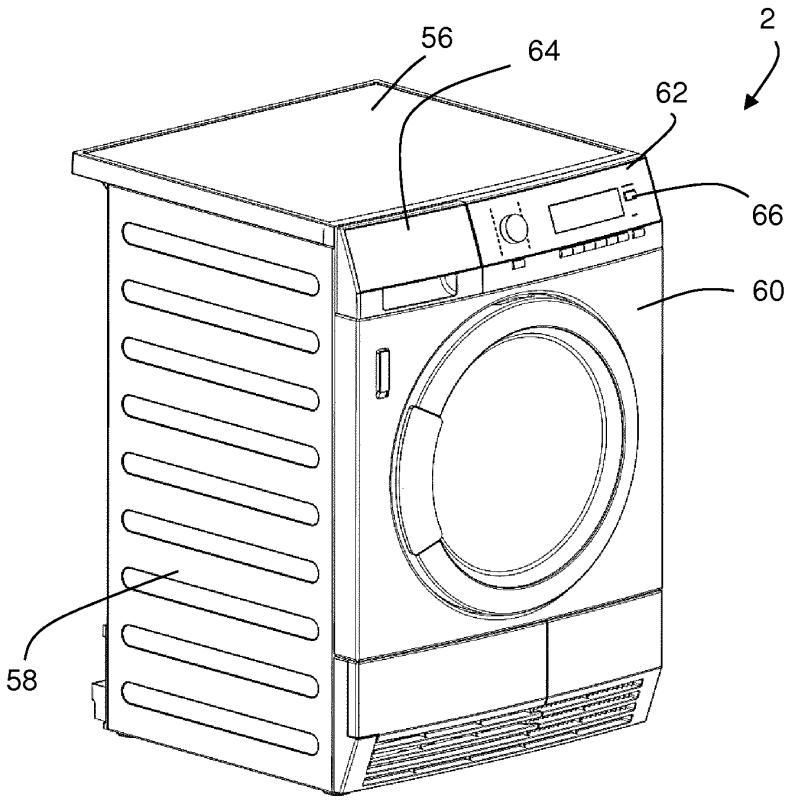

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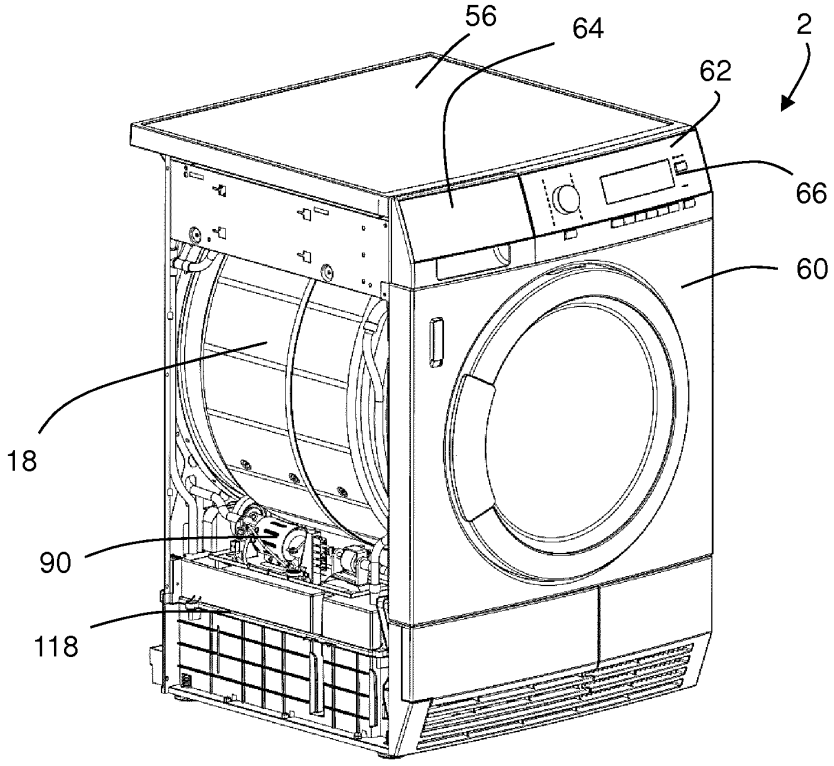

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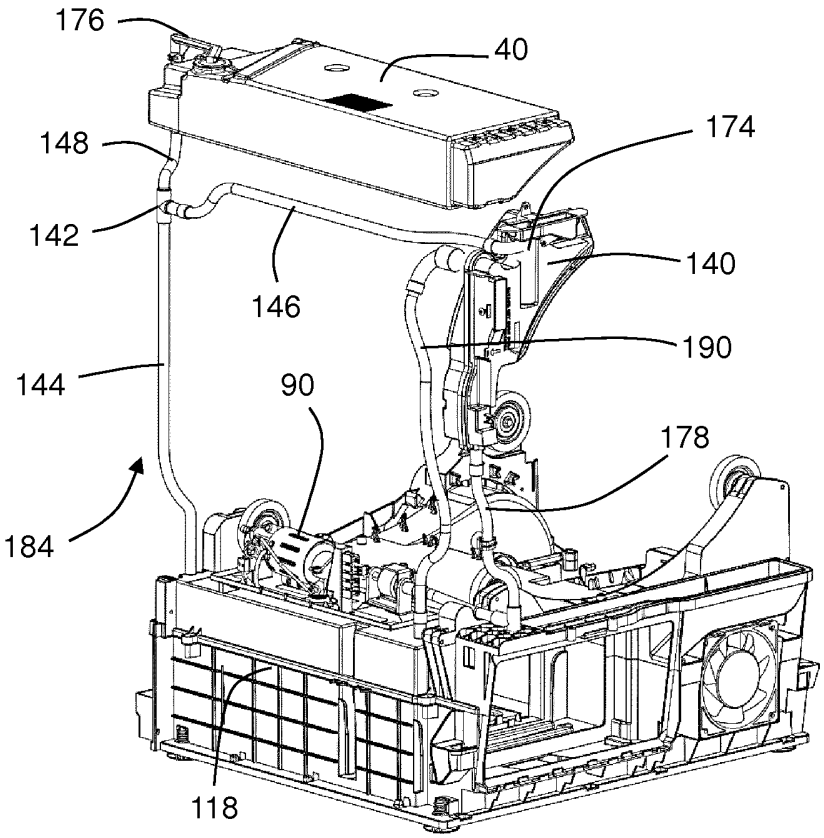
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Fig. 28

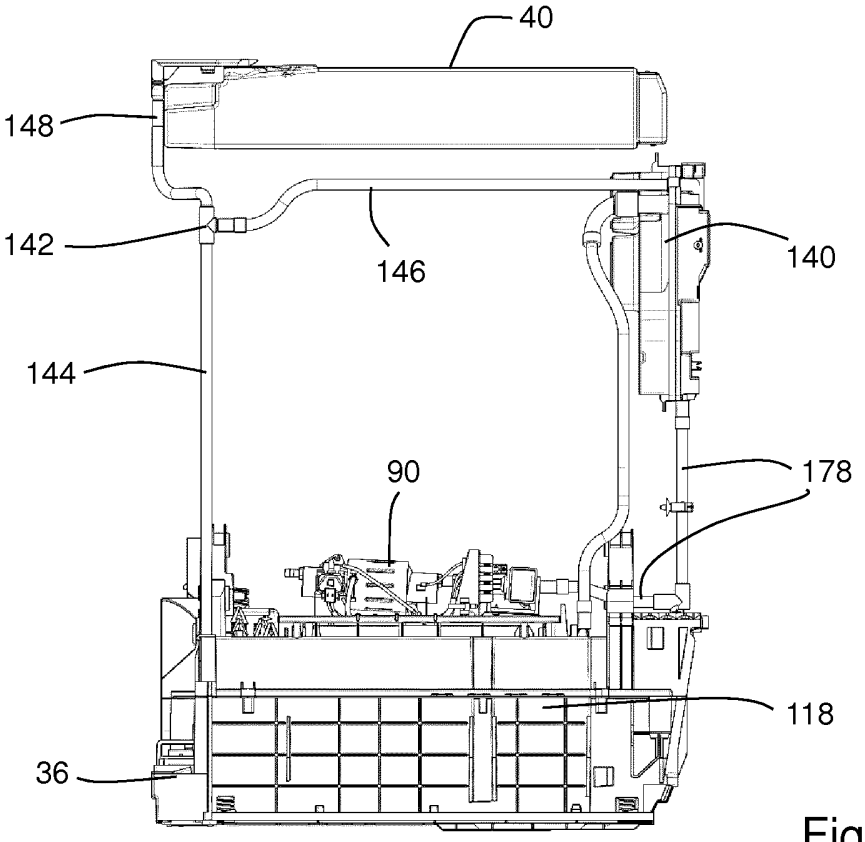
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Fig. 29

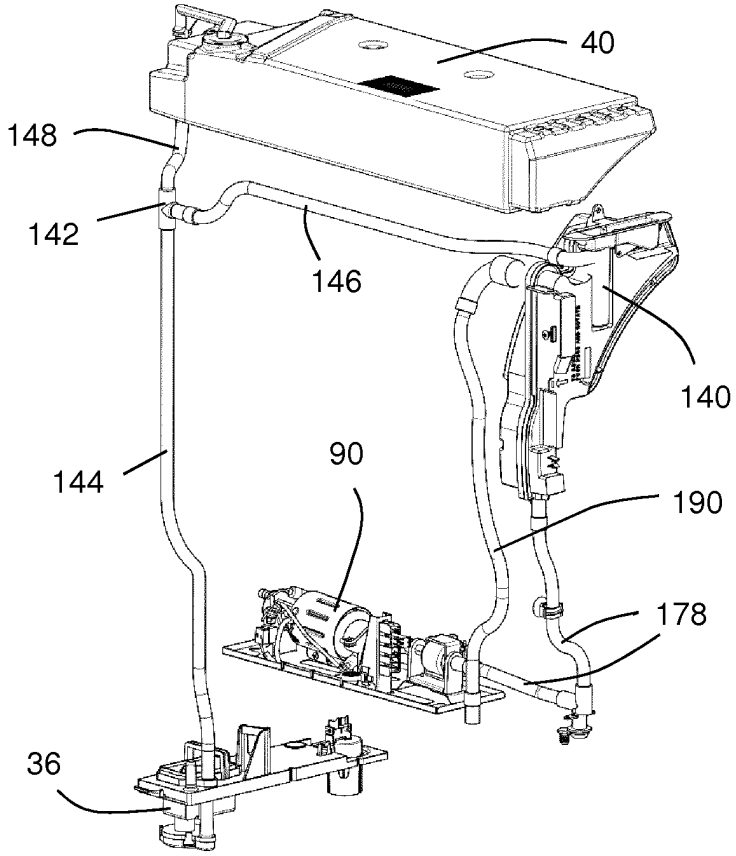
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Fig. 30

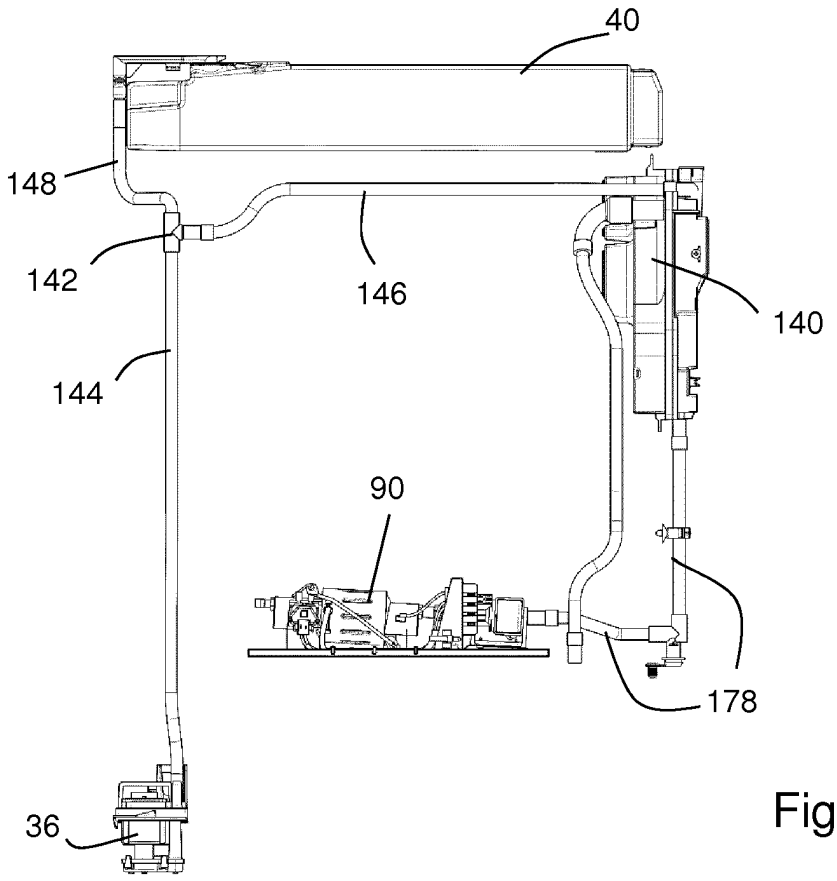
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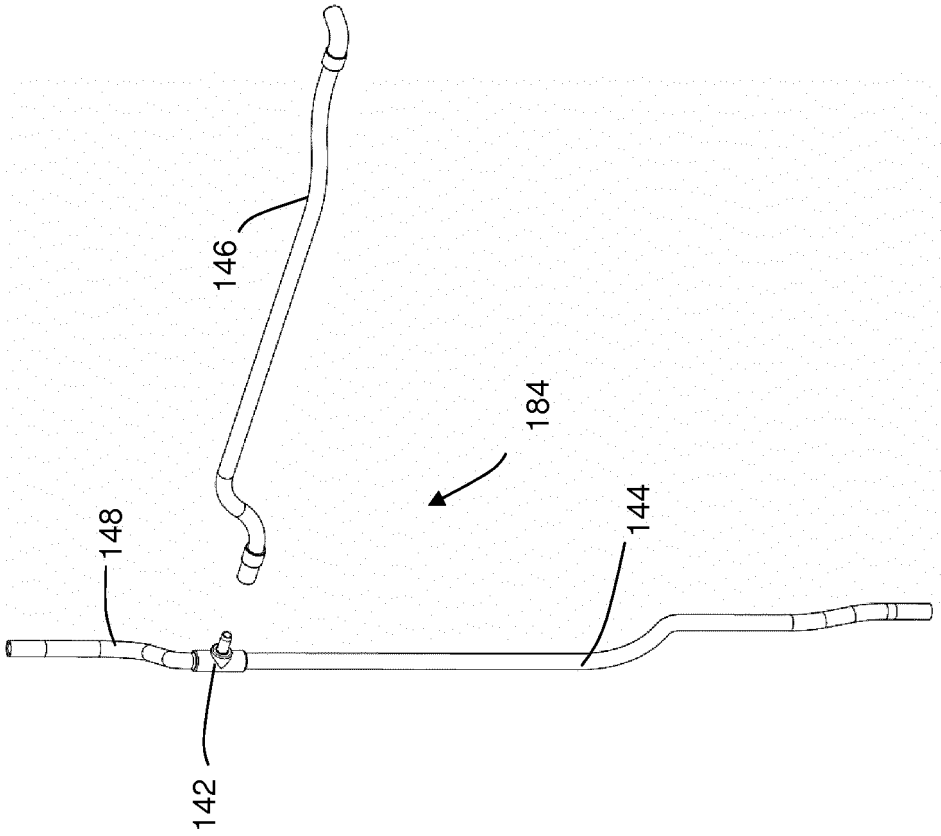
Fig. 31



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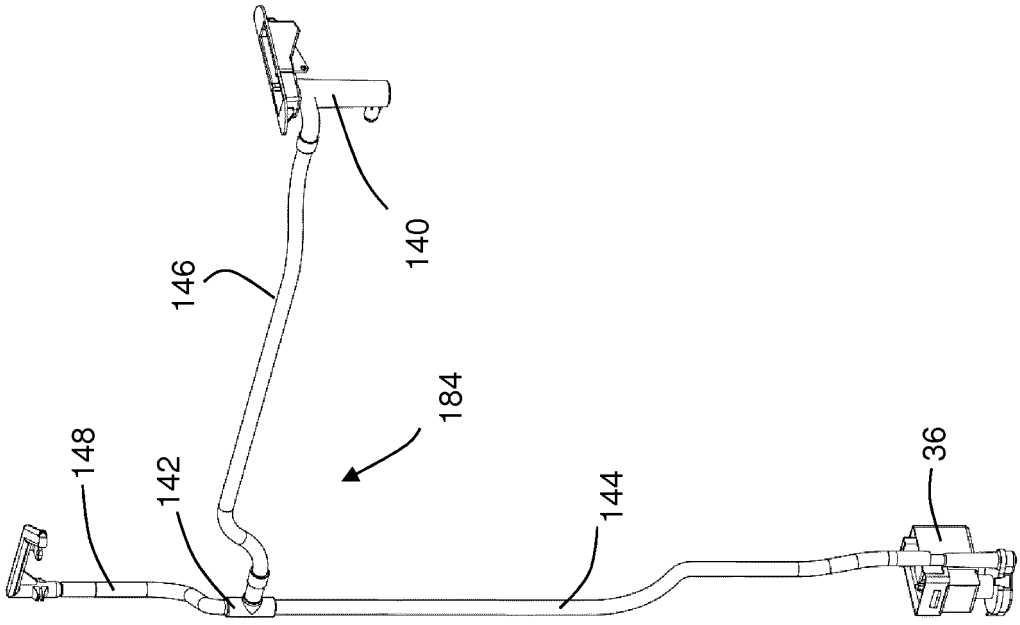

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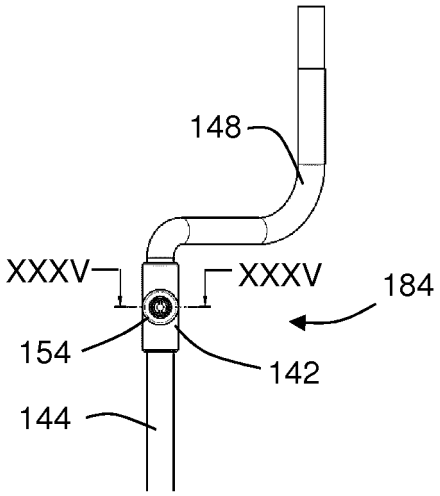

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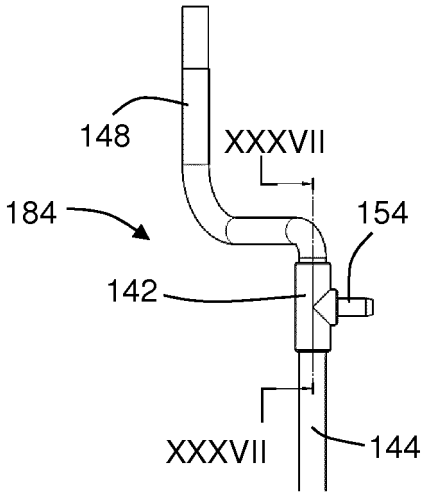

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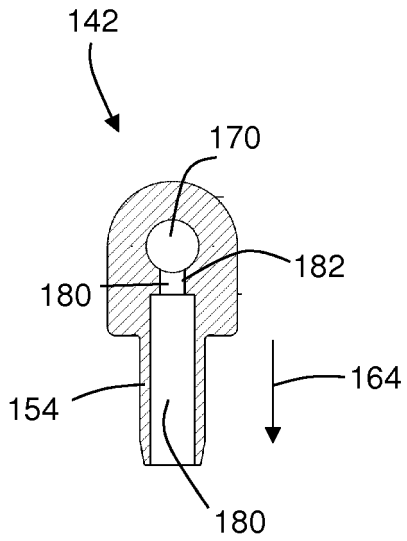

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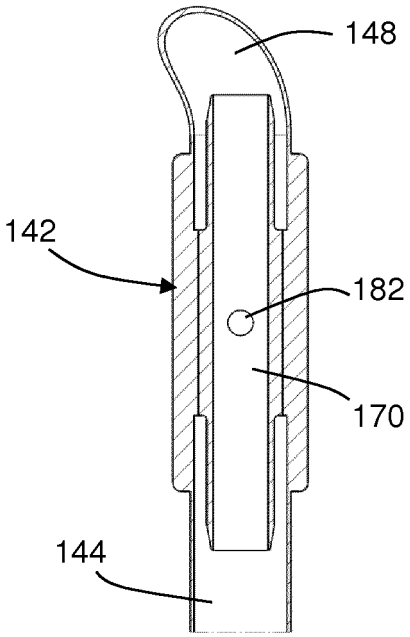

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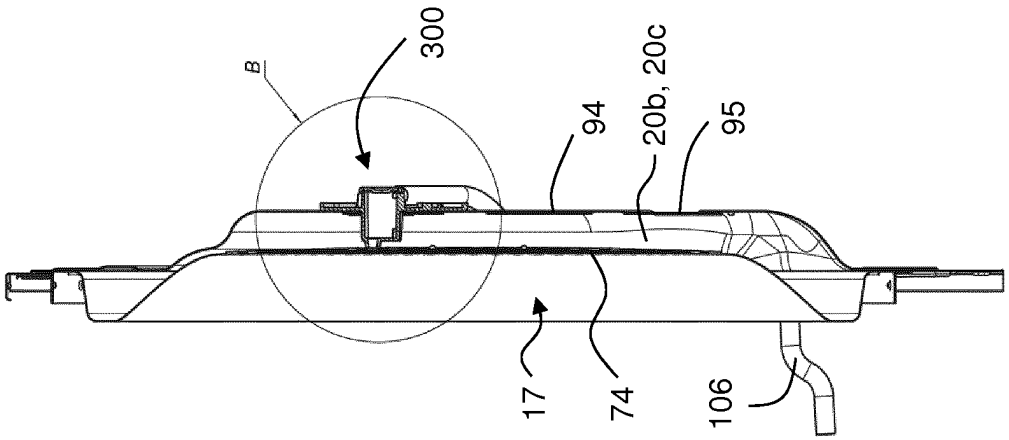

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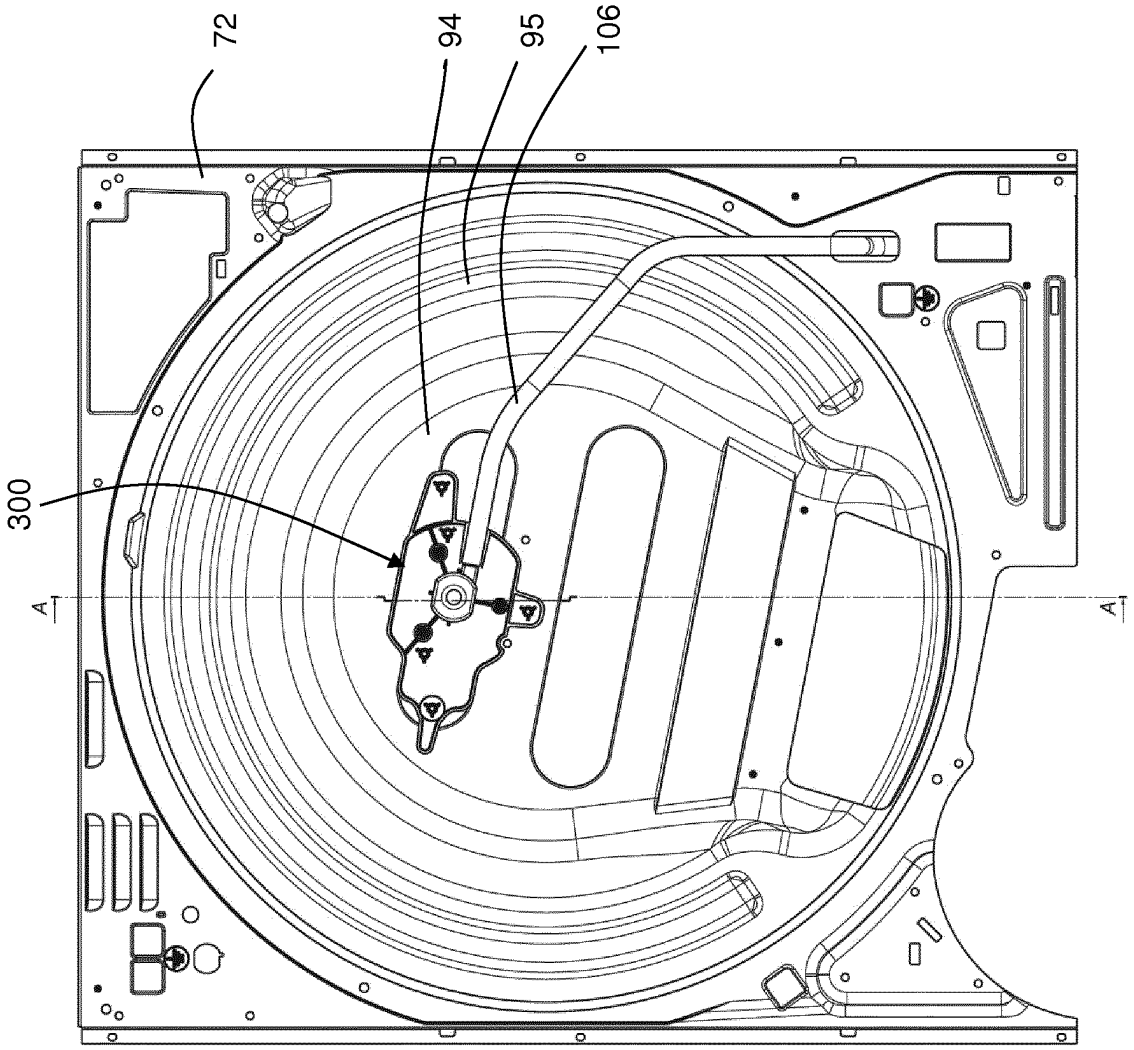

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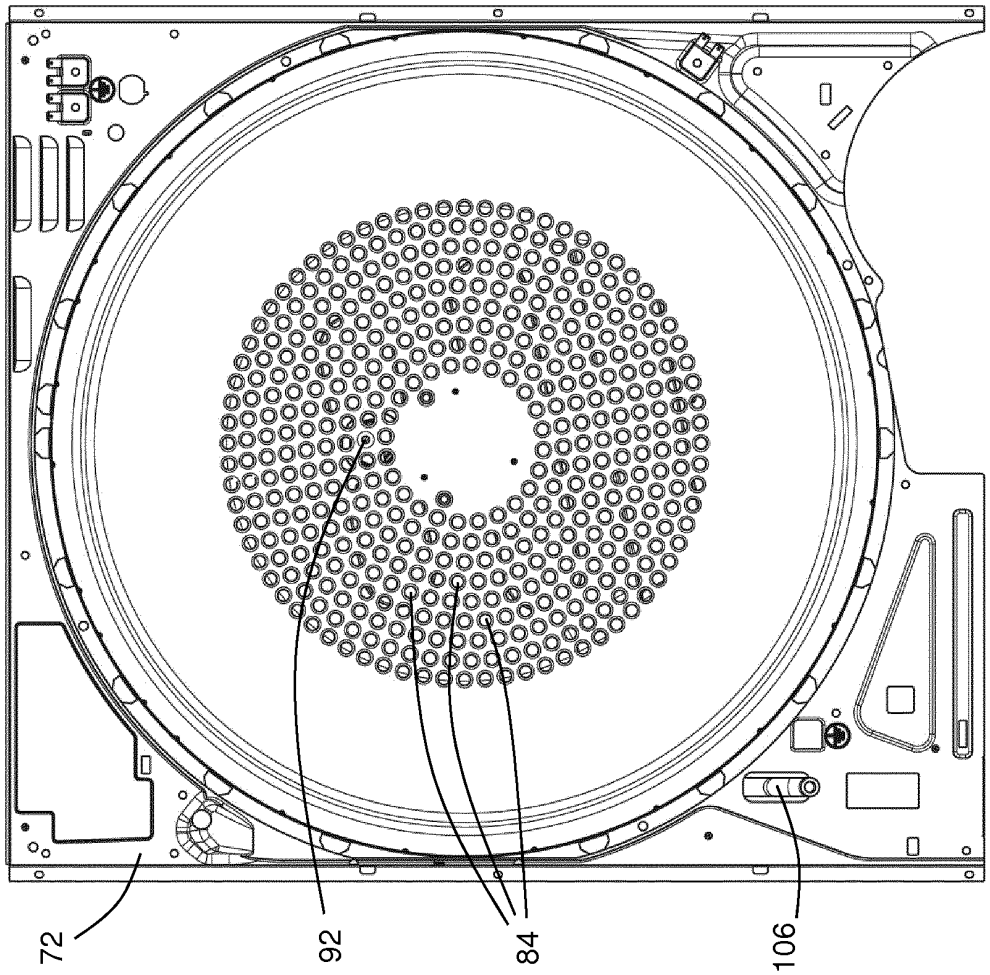
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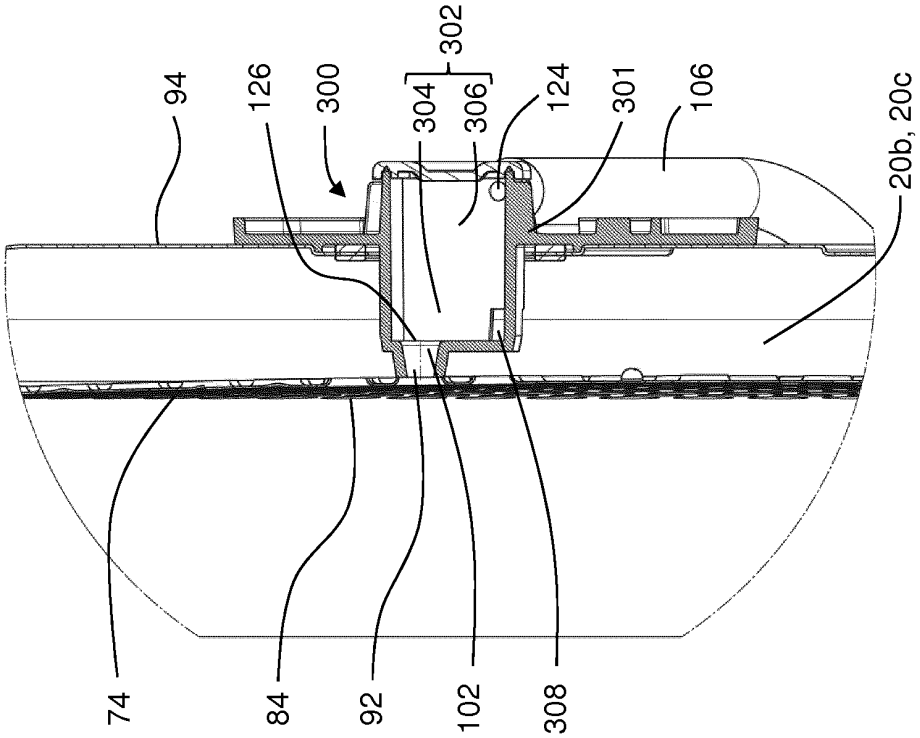
92
84
106

Fig. 41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20b, 20c
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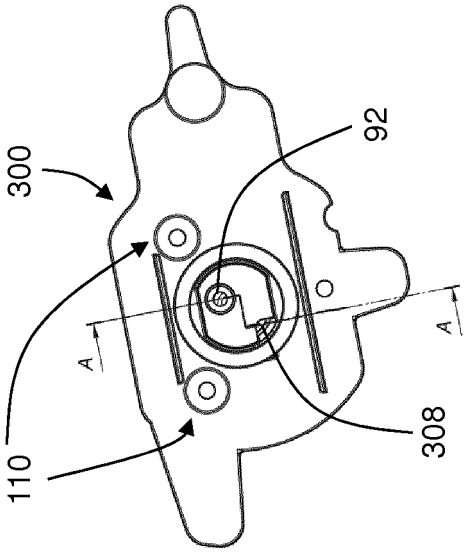
102
308

Fig. 40



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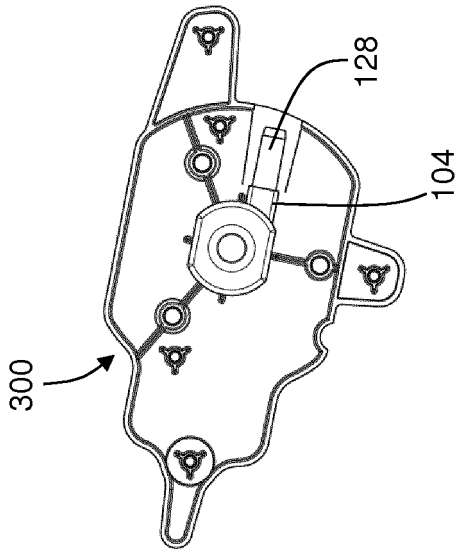

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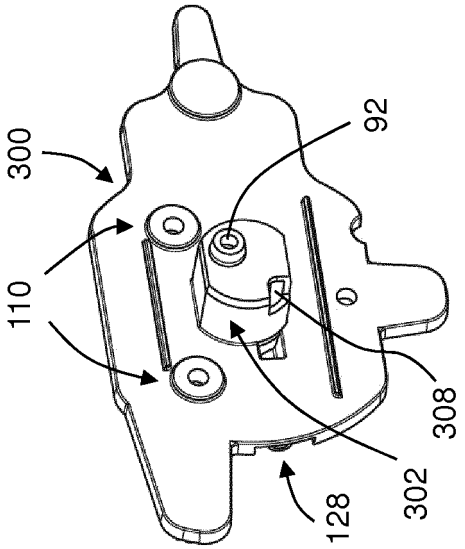

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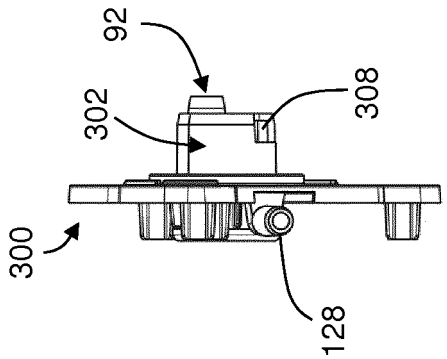

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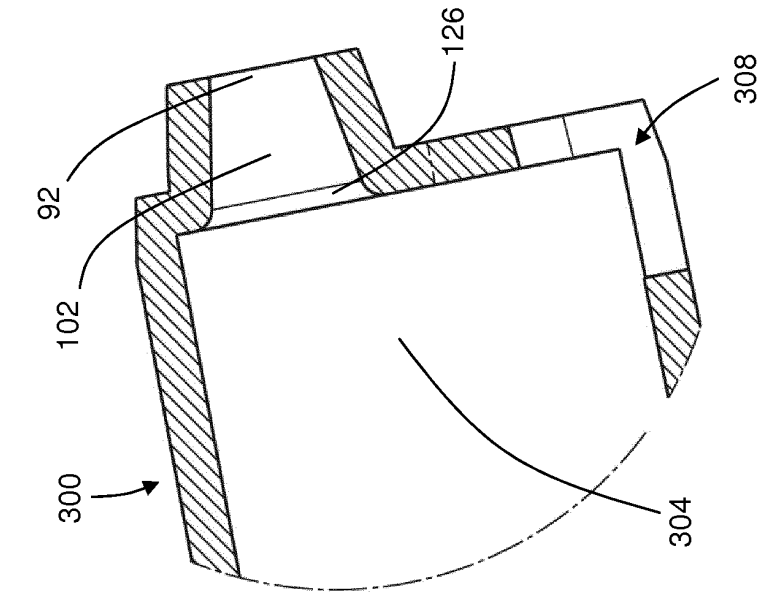

Fig. 47

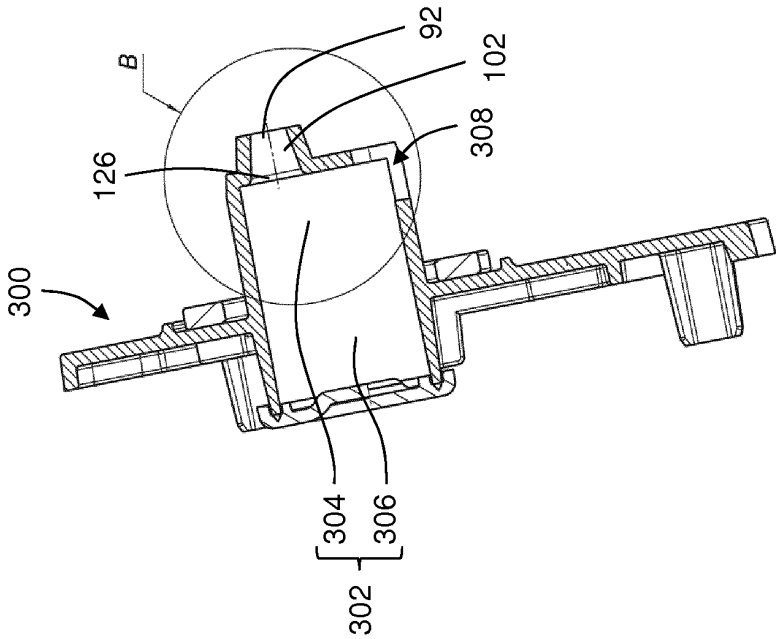

Fig. 46

REFERENCES CITED IN THE DESCRIPTION

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