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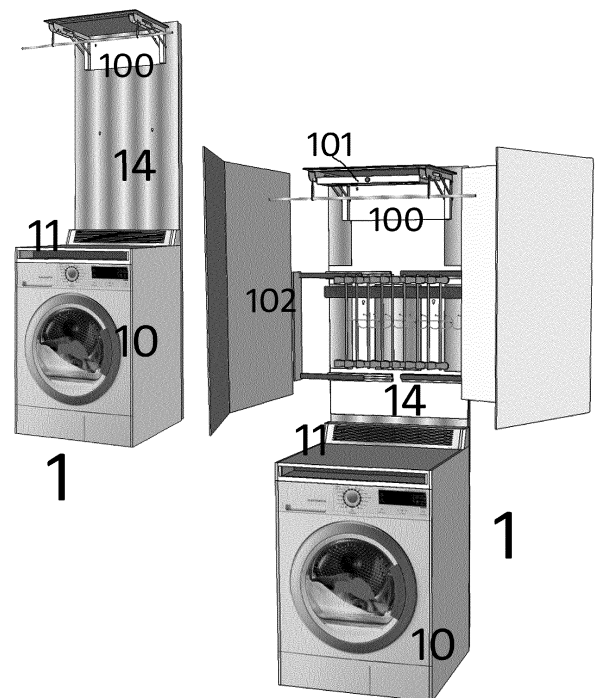
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(54) **DEVICE FOR WASHING AND DRYING CLOTHES**

(57) "DEVICE FOR WASHING AND DRYING CLOTHES PRODUCT " (1) comprising a household appliance (10) for washing fabrics in general including at least one apparatus (11) for dehumidifying the air, characterized in that the air to be dehumidified does not pass through the drum, as is the case in the dryer and in the washer-dryer, but it follows a completely independent path, useful to speed up the drying of the washed fabrics and put to dry externally to the household appliance, preferably hung, thanks to particular hanging dryers, in the space located immediately above the invention; capable of avoiding the formation of condensation and the onset of mould in the room where the drying takes place.

Fig. 3



Description

[0001] It is an object of the present invention a device for washing and drying clothes products, garments, clothing, sheets, towels, or the like, in particular a device for speeding up the washing and drying at home of laundry and garments in general, comprising a household appliance for washing fabrics (washing machine), including an air dehumidification apparatus, useful to speed up the drying of the washed fabrics and put to dry externally to the household appliance itself, preferably hung, thanks to particular hanging tumble dryers, in the space located immediately above the invention; but, above all, indispensable to avoid the formation of condensation and the onset of mould in the room where this drying takes place, characterized in that the drying air produced by this dehumidification apparatus does not pass through the drum of the washing machine but follows an independent path, so as to allow to carry out the washing of a load of laundry placed inside the drum of the invention and, simultaneously, to speed up the drying of another load of laundry previously washed placed outside the drum of the invention.

[0002] Even more specifically, the object of the present application belongs to the sector of washing and drying of clothes products for predominantly domestic use, i.e., a mini-laundry room located in the walkable surface of the house generally occupied only by the washing machine.

[0003] Therefore, the invention is inserted in the field of architecture and interior design, in particular in the field of building structures such as flats, houses or the like, and also tourist or service facilities, where the washing, drying and ironing of laundry, clothing or the like is required, such as hotels, laundromats, wellness centres, etc.

[0004] Obviously, there is no reason why the application of the invention cannot be extended to fields other than construction, such as, for example, the naval and railway fields or, in general, for all those fields or applications that require washing, drying and ironing a clothes product (sheets, tablecloths, towels, clothing, etc.).

[0005] The management of laundry is still a complex and laborious activity, given the fact that, except for the washing machine, which fully satisfies the needs of the family, technological development has not been able to provide adequate answers as regards drying and ironing of fabrics.

[0006] In Italy about 80% of families dry their laundry by folding the fabrics onto themselves on a taut line, as primitive human beings used to do; the only difference is that today that line has been broken into many small segments and inserted in a structure (drying rack) suitable to be located inside the house. The remaining 20 % is dried in the dryer.

[0007] Tumble dryers and dryers are two profoundly different products, but despite appearances, they use the same drying technique, a technique that is completely

wrong.

[0008] Laundry is always dried by transferring water from the fabrics to the air according to a law of physics called hygroscopy. But, as widely illustrated in a study carried out by the Englishman Tim Padfield in December 2004, "only the water molecules present on the surface of the fabrics, which are more unstable than the internal ones because they have greater kinetic energy, when they come into contact with air, receive further thermal energy from the same and, having overcome the cohesive force that binds them to the liquid state, disperse into the air in the form of vapour".

[0009] Understanding how the process of the transfer of water from fabrics to air works allows us to draw a first conclusion: "the larger the surface area of the fabric in direct contact with the air, the faster the drying time".

[0010] Since only the water molecules on the surface, in direct contact with the air, are able to escape by transforming into vapour, the quantity of these molecules depends directly on the surface of the fabric in direct contact with the air. Clothes horses are designed to dry laundry by folding the fabric onto itself, on a line, a completely wrong technique because, when the fabric is folded onto itself, the air can no longer lap its inner part and the surface in direct contact with the air is reduced by half, causing doubled drying times. This explains the excessively long drying times of laundry dried on drying racks.

[0011] Inside the dryer the laundry dries in the same way, again due to the passage of water from the fabrics to the air, thanks to the law of physics known as "hygroscopy". In order to speed up the drying of the laundry, the dryer introduces very hot air (up to 80°/90°) inside the drum and sends it onto the fabrics. This system allows to reduce considerably the drying time, because the air is an "elastic container" and its capacity to contain water increases as its temperature increases. Unfortunately, however, the fabrics piled up on top of each other, inside the drum, considerably reduces their surface in direct contact with the air, for this reason the dryer is forced to continuously send very hot air, which explains the high consumption of electricity of this household appliance.

[0012] Summarizing what has been said above, we can therefore say that the drying technique used by drying racks and dryers is the same and it is a wrong technique because it is contrary to the laws of physics concerning the drying of fabrics.

[0013] Drying laundry by folding the fabrics generates a second problem: the formation of creases the removal of which requires final ironing. Fabrics behave exactly like our hair, the shape it has after washing it does not depend on how we have washed it but on how we have dried it. If we want straight hair, we will dry it flat, without any styling, but if we want curly hair, we will do the so-called styling, folding it around the curlers. Once dried it will retain the shape acquired during drying.

[0014] The need to iron fabrics to remove creases is due to the wrong drying method used by drying rack and dryers, which method is responsible for a further third

problem: the formation of condensation and the consequent onset of mould inside the rooms where the laundry is dried.

[0015] Contrary to popular belief, in fact, the phenomenon of condensation is not caused by the saturation of the air inside the room, but by the lowering of the temperature thereof. It would seem logical to think that when the air reaches 100% humidity the laundry will continue to release water causing condensation. But no, thanks to the law of physics defined as "hygroscopic equilibrium", the air begins to transfer to the fabrics the excess humidity it receives. This means that for each molecule of water that passes from the fabrics into the air, another molecule does the reverse process, passing from the air into the fabrics. Obviously, under these conditions the drying of the laundry stops.

[0016] We have also said that air is an "elastic container" whose capacity varies as its temperature varies. When the air is saturated (100% humidity) and the temperature drops, as is the case at night, the "air container" shrinks and the excess water vapour condenses, turning back into liquid water: the droplets that can be seen on the window panes and those on the walls of the room that cannot be seen, because they are absorbed by the plaster.

[0017] The repetition of these conditions ends up giving rise to the onset of mould, as harmful to health as much as it is difficult to eliminate it.

[0018] The only way to avoid this unpleasant inconvenience, for those who are forced to dry laundry inside the house, is to be able to dry it in a short time by avoiding alternating day/night, or to contain the percentage of humidity in the air well below the saturation threshold. Unfortunately, drying racks are not able to produce either the one or the other condition, because, as we have explained, the fabrics, folded on their lines, dry in always too long times and release in the environment all their water.

[0019] The dryer, on the other hand, dries the laundry in a few hours and condenses most of the water removed from the fabrics, without releasing it into the environment, so it should be able to prevent the formation of condensation and the onset of mould, but no, things are quite different.

[0020] As we have said, to dry the laundry, the dryer sucks air from the environment in which it is located and introduces it into the drum, after heating it. The hot air, introduced into the drum, acquires part of the humidity present on the fabrics, is then recovered and sent to the condensation system that cools it, generating the condensation water, which is finally collected in the special containment tank. However, no dryer is able to condense all the water contained in the fabrics, the energy label, which shows the condensation efficiency class of the dryer, precisely indicates the percentage of water that it is able to condense.

[0021] Where does the uncondensed water end up? As can be seen on the website of a well-known manu-

facturer of dryers, the humid air that is dispersed into the environment by the dryer has a high temperature, and we also remark that the amount of water released, although in much smaller proportions than that released by the laundry folded on the drying rack, is released into the external environment (room) in a very limited amount of time (about two/three hours).

[0022] On average, 8 kilograms of laundry spun in a washing machine at 1,000 rpm contains about 3,500 grams of water. A dryer in condensation class "B" (in second place out of seven condensation efficiency classes, capable of condensing between 80% and 90% of the water contained in the laundry) releases an average of 500 grams of water (15% of 3,500) into the environment in just two hours, combined with air at high temperature (40/50°). Since, as we have seen, condensation is generated by decreases in air temperature, when said hot, humid (100%) air exits the dryer, it creates a bubble that immediately rises to the top. As it cools down, in contact with the coldest walls of the room (whose temperature generally does not exceed 20°), the water vapour condenses and turns back into water, favouring the onset of mould. Finally, we would like to point out that, if said dryer were located in a room of 24 square metres (mt. 3 x 3 x 2.7 high), capable of containing, under standard conditions (air temperature of 20° and relative humidity of 60%), a maximum of 210 grams of water, in a short time the air in the room would reach saturation, compromising the drying of the laundry and further encouraging the formation of condensation. In EP2660381, part of the state of the art, a washer-dryer capable of drying certain garments placed outside the drum is described. Aside from this feature, however, the washer-dryer of EP'381 operates essentially like the dryer described above in terms of drying laundry. Therefore, the same drawbacks remain, including poor energy efficiency.

[0023] The document WO 2018/217033 is also known in the state of the art. This document describes a drying apparatus for laundry, thus lacking a washing machine.

[0024] For all the above reasons, we assert that technology has not been able, up to now, to give satisfactory answers as far as laundry drying is concerned. In order to overcome the typical inconveniences of the current means for drying laundry (drying rack and dryer) we have designed and patented new products able to dry any type of fabric (from socks to the sheets for double beds) without ever folding it onto itself:

- "Hanging Tumble Dryer" Utility Model Patent granted on 6 March 2017 under number 283184.
- "Clothes horses-Hanging Tumble Dryer" Patent for Industrial Invention, the subject matter of our application No. 102016000066813, granted on 7 January 2019.

[0025] These products are able to solve all of the above problems except the last one, that of the formation of condensation. Unfortunately, our devices do not com-

prise apparatuses capable of dehumidifying the drying air of the environment in which they are located, therefore, they can also cause the formation of condensation and the consequent onset of mould.

[0026] In order to overcome this last problem, we have created two new products, a "Modular Drying Device" which is the subject matter of our last application for a Patent for Industrial Invention, filed on 14/04/2020 under number 1020200007822 and the "Device for Washing and Drying Clothes Product" which is the subject matter of this application. The combined use of these two devices allows to create the best home laundry room ever made, totally solving all the problems related to drying and ironing laundry. The "Modular Drying Device" is able to dry any kind of fabric without ever folding it onto itself, reducing drying times by more than 50% compared to drying racks with lines, without consuming any energy and without creating creases on the fabrics (ironing is no longer necessary). Said invention also envisages the use of devices for producing and heating the drying air that allow to further reduce the drying time of the laundry, however it is not able yet, to carry out the drying in very short times (3/4 hours) like those of the dryer, nor to totally avoid the formation of condensation.

[0027] The combination of the "Modular Drying Device" with the Device for Washing and Drying Clothes Product", subject matter of the present application, allows instead to dry the laundry in a very short time (5/6 hours) consuming little energy, much less than that needed by the dryer, without creating creases on the fabrics (ironing is no longer necessary) and, above all, allows to totally avoid the formation of condensation and the consequent onset of mould.

[0028] These are the first and main objects of the invention, obtained with a "Device for Washing and Drying Clothes Product" comprising at least one apparatus for dehumidifying the drying air produced by the "Modular Drying Device" patented by us, fixed to the wall, at a height of at least one hundred and ninety centimetres, preferably above the present invention.

[0029] As we have already said, drying fabrics without ever folding them onto themselves allows to cut drying times by 50% compared to drying racks. Sending an air flow from the top downwards on the fabrics hung to dry, by means of clothes holding hangers, on a clothes hanger arm placed immediately below the drying air production device, allows to further reduce the drying time by consuming very little electricity (about 20 watts for a whole drying cycle).

[0030] The invention, in a preferred embodiment thereof, envisages that its air dehumidification apparatus comprises a drying air inlet located immediately below the plane of the household appliance for washing clothes products, in such a way as to immediately intercept the air loaded with humidity sent from the top downwards by the "Modular Drying Device" fixed to the wall, above the invention, at a height of about one hundred and ninety centimetres from the ground. The humid air, intercepted

by the dehumidification apparatus, is sent inside the "Device for Washing and Drying Clothes Product" and, without passing through the drum, follows a completely independent path, where the condensation apparatus transforms the water vapour into liquid water, to be eliminated through the same drain channel of the washing apparatus. The dehumidified air is then expelled from a grille located on the rear part of the upper plane of the invention and advantageously oriented, so as to convey the dried air on the lower part of the fabrics hung to dry, the most difficult to dry because far from the sources of aeration and particularly loaded with humidity due to the force of gravity and the effect of ventilation itself that favour the descent of the water contained in the fabrics towards the lower part thereof.

[0031] The air dehumidification apparatus can contain a device (electric resistance, heat pump, etc.) able to heat the dehumidified air before it is expelled outside through the outlet grille, further increasing the drying efficiency of the invention. The advantageous combination of the air flow sent on the fabrics from the top downwards by the "Modular Drying Device" and the dehumidification apparatus, specially designed to intercept this flow of humid air, produces two great advantages:

- the condensation of all the humidity released by the fabrics during drying;
- the uniform distribution of humidity, not immediately condensed, over the entire volumetry of ambient air.

Which advantages, in turn, allow the laundry to dry in a very short time, totally avoiding the formation of condensation and the subsequent onset of mould.

[0032] We have carried out numerous tests on this subject, using a portable dehumidifier positioned above the washing machine and we have obtained very comforting results, such as the containment of ambient humidity below 70% and the drying of laundry in a very short time (7/8 hours). Note that our tests were carried out in a room of about 12 square metres, with an air temperature of 20° and relative humidity of 50%, while the tests of the dryers are carried out, by law, in much larger laboratories, with an air temperature of 23.5° and relative humidity of 40%.

[0033] The usefulness of the invention, subject matter of this application, goes beyond the advantageous combination with our "Modular Drying Device", in fact, the laundry is often dried in the room where the washing machine is located, it follows that providing the washing device (washing machine) with an apparatus for the dehumidification of the ambient air is always very useful, even for those who use traditional drying racks because it allows to reduce the drying time of the fabrics and avoids the formation of condensation. A similar result could be obtained with a portable dehumidifier but having such a device incorporated inside the washing machine is much more advantageous, it saves space and there is no need to empty the condensation water collection tank which is

automatically disposed of through the washing machine's drainpipe. Finally, when the washing machine is located in the bathroom, the invention can be useful to contain the humidity produced also by the vapours of the hot water used to have a shower.

[0034] A more complete version of the present invention envisages that the "Modular Drying Device", in all of its versions, but, in particular, in the version provided with the drying air production system and the retractable and expandable cabinet container, is built as a single piece with the "Device for Washing and Drying Clothes Product" subject matter of the present application, creating a complete domestic laundry room located in the space currently occupied by the washing machine only. This solution makes it possible to avoid having to drill holes in the wall in order to fix the "Modular Drying Device" since it is supported by the "Device for Washing and Drying Clothes Product".

[0035] A further great advantage of this solution is to be able to provide the invention with a centralized command and control system of all the devices present, capable of allowing the simultaneous switching on of the devices for drying (blowing means, dehumidification system, air heating means) and the devices for washing clothes products (washing machine) capable of controlling, managing and harmonizing their operation without exceeding a certain value of electricity absorption previously set by the user (e.g. 2.5 kWh), so as to avoid the intervention of the limiter in buildings with electricity supply contracts of only 3 kWh, most of those for domestic use. Solution that advantageously allows to dry a load of laundry, previously washed, while a second load of laundry is being washed.

[0036] Said centralized command and control system of all the drying and washing devices of the clothes products, present in the invention, can be advantageously designed to program and manage, in an automatic way and with weekly schedule, the washing and drying of the clothes products in compliance with the times (minutes, hour, day) of the end of washing and the end of drying, set by the user, washing and drying the clothes products with the lowest possible energy consumption.

[0037] This design can envisage that the invention is provided with sensors capable of detecting the temperature and the relative humidity of the ambient air, the relative humidity of the drying air, after this has lapped the clothes products hung up to dry and that the user can communicate to the program itself, by entering the relative values, some very important data for drying purposes, such as the volumetry (cubic metres of air) of the room where the finding is located, the number of physiological air exchanges in this room and the presence or absence of openings (external windows, internal doors, etc.).

[0038] These and other objects, which will become clear later, are achieved with a "Device for Washing and Drying Clothes Product" including at least one apparatus for dehumidifying the ambient air, external to the inven-

tion, characterized in that said air to be dehumidified does not pass through the drum, as is the case in the dryer, but follows a completely independent path, illustrated in the description below and in the annexed claims which form an integral part of said description.

[0039] Further features of the present invention will be better highlighted by the description of three preferred embodiments conforming to the patent claims and illustrated, purely by way of a non-limiting example, in the accompanying drawing tables, wherein:

- fig. 1 shows the basic version of the invention (1) including the fabric washing machine (10) and the air dehumidification system (11), with the front intake grille (12) of the air to be dehumidified and the rear expulsion grille (13), advantageously oriented to send the dried air to the area immediately above the invention;
- fig. 2 shows the invention (1) with the load-bearing structure (14) useful to accommodate and support the "Modular Drying Device" in all its embodiments, thanks to the presence of the slots (141) suitably positioned for this purpose;
- fig. 3 shows, on the left, the invention (1) with the load-bearing structure (14) in combination with the simplest embodiment of the "Modular Drying Device" (100), and, on the right, with a more complete configuration of the "Modular Drying Device" (100), including the drying air production apparatus (101) and the retractable and expandable cabinet container (102);
- fig. 4 shows three images of the invention (1) in its most complete embodiment: with the "Modular Drying Device" (100) including the retractable and expandable closet container (102), completely closed at rest, completely open and partially closed, to form a closet container, without roof and without base, with the laundry inside;
- fig. 5 shows a cut-out of this more complete configuration of the invention (1) where it can be noticed how the air flow (120) sent by the drying air production apparatus (101), from the top downwards, on the laundry hung to dry, is immediately intercepted, at the exit from the cabinet container, by the intake grille (12) of the dehumidification system. The dehumidified air (130) is expelled, through the outlet grille (13) of the dehumidification system, and sent directly to the lower part of the hung clothes products to dry. A doubly functional solution, able to maximize the effects of the dehumidification system and those of the drying system.

[0040] Nothing prevents the invention from being composed of a single body, comprising all the devices provided, or of several parts which can be combined with each other, as described above.

[0041] It is clear that in the practical implementation of the invention, numerous modifications and further vari-

ants may be envisaged, all falling within the same inventive concept; the various components, previously described, may be replaced by technically equivalent elements. The materials used for the construction of the invention can be of various types, alone or in combination with each other; the air dehumidification system, the drying air production sources and the drying air heating systems can vary in number and placement according to even more efficient solutions.

[0042] The characteristics of the invention are now described, making use of the references in the figures.

[0043] It is further clarified that any dimensional and spatial terms (such as "lower", "upper", "inside", "outside", "front", "rear", "vertical", "horizontal" and the like) refer to the position according to which the elements are substantially arranged under actual conditions.

[0044] Without any limiting intent, for the sake of descriptive simplicity, from here on the term clothes product is to be understood as any item made of natural fabric (cotton, linen, wool, etc.) or artificial fabric (viscose, polyamide, rayon, etc.) such as clothing and other garments.

[0045] The "Device for Washing and Drying Clothes Product" (1) according to the present invention, in the basic version, comprises a household appliance for washing clothes products (10) containing at least one device for dehumidifying (11) the air, in practice a washer-dryer, in which the air to be dehumidified follows a path completely independent from the drum, because the laundry is not dried inside the drum of the household appliance, but outside it and preferably above it, hung to dry, by means of clothes holding hangers, on the clothes hanger arm of the "Modular Drying Device", subject matter of our patent application no. 1020200007822 dated 14/04/2020.

[0046] The dehumidification device (11), according to a preferred embodiment, is located in the upper part of the household appliance and comprises an intake grille (12) of the air to be dehumidified, located in front of and immediately below the upper plane of the washing device (10); the best position to intercept the flow of humid air (120) sent from the top downwards by the "Modular Drying Device". The outlet grille (13) of the dehumidified air, of said dehumidification device (11), is instead positioned on the rear part, above the upper plane of the washing device (10), and advantageously oriented towards the front part, in order to send the flow of dehumidified air (130) directly on the lower part of the products, which is the most difficult part to dry because it is far from the sources of aeration and particularly full of humidity due to the force of gravity and the effect of the ventilation itself that favour the descent of the water contained in the fabrics towards the lower part thereof.

[0047] More complete versions of the invention are obtained by providing the invention with a load-bearing structure (14) capable of accommodating and supporting, by means of appropriate slots (141), other apparatus and devices useful for speeding up the drying of the just

washed laundry. Firstly, a device (100) specially designed to dry clothes products without ever folding them on themselves by hanging them, by means of clothes holding hangers, to a telescopic clothes hanger arm. An apparatus (101) for producing drying air, capable of sending a flow of air from top to bottom on the laundry hanging to dry on the telescopic clothes hanger arm. A retractable and expandable cabinet container (102) (Figure 4) that is able to hide the laundry hanging to dry from view, but, above all, to maximize the efficiency of the drying air production system by avoiding the dispersion of the air flow that, in this case, is completely sent to the fabrics closed in its inside. Even more advantageously said flow of humid air coming out (120) from the cabinet container (102) is immediately intercepted by the inlet grille (12) of the dehumidification system, thus maximizing the efficiency of this apparatus as well. The dehumidified air is then expelled (130) from the outlet grille (13) of the dehumidification apparatus (11) and sent directly on the lower part of the fabrics hung to dry inside the cabinet container (102), a solution that advantageously allows to avoid the dispersion of this second drying air flow as well. The dehumidification apparatus (11) may comprise devices (resistances, heat pump, etc.) that allow heating the dehumidified air, to be sent to the fabrics, further reducing the drying time of the laundry.

[0048] As we have already said, this last solution, the most complete one, allows a further great advantage, that of providing the invention with a smart centralized command and control system of all the devices present, capable of allowing the simultaneous switching on of the devices for drying (blowing means, dehumidification system, air heating means) and the devices for washing clothes products (washing machine) capable of controlling, managing and harmonizing their operation without exceeding a certain value of electricity absorption previously set by the user (e.g. 2.5 kWh), so as to avoid the intervention of the limiter in buildings with electricity supply contracts of only 3 kWh, most of those for domestic use. Solution that advantageously allows to dry a load of laundry, previously washed, while a second load of laundry is being washed.

[0049] Said smart centralized command and control system of all the drying and washing devices of the clothes products, present in the invention, is advantageously designed to program and manage, in an automatic way and with weekly schedule, the washing and drying of the clothes products in compliance with the times (minutes, hour, day) of the end of washing and the end of drying, set by the user, washing and drying the clothes products with the lowest possible energy consumption.

[0050] In this configuration, the invention is provided with sensors able to detect the temperature and the relative humidity of the ambient air, outside the cabinet container, and with sensors to detect the humidity of the clothes products hanging to dry. Said smart centralized command and control system envisages that the user

can communicate to the program, by entering the relative values, some very important data for drying purposes, such as the volumetry (cubic metres of air) of the room where the invention is located, the number of physiological air exchanges of said room and the presence or absence of openings (external windows, internal doors, etc.). These data are essential for the smart centralized command and control system of the devices, in order to correctly predict the drying times of the clothes products hung up to dry inside the room where the invention is located.

Claims

1. Device for washing and drying clothes products (1) comprising a washing machine (10) having a drum configured to receive the laundry to be washed; at least one dehumidification apparatus (11) associated with the machine (10) for speeding up the drying of a load of laundry placed outside the machine (10), **characterized in that** said dehumidification apparatus (11) is configured to direct all dehumidified air outside the machine (10) so as to dry said load of laundry while another load of laundry is being washed inside the drum.
2. Device (1) according to the preceding claim, wherein the dehumidification apparatus (11) comprises at least one air intake grille (12) located on the front wall of the machine (10), immediately below its upper plane and horizontally developed over its entire width.
3. Device (1) according to any one of the preceding claims, wherein the dehumidification apparatus (11) comprises at least one dried air outlet grille (13) located at the rear part of the upper plane of the machine (10), facing the front part thereof and oriented to send the flow of dried air on the immediately upper area of the machine (10).
4. Device (1) according to any one of the preceding claims, wherein the dehumidification apparatus (11) comprises heating means configured to heat the dehumidified air before it is expelled to the outside particularly via the outlet grille (13).
5. Device (1), according to any one of the preceding claims, **characterized in that** it comprises support means (100) of the clothes products configured to support the clothes products hanging by means of clothes hangers, at its telescopic arm fixed to the machine (10), by means of a load-bearing structure (14).
6. Device (1) according to the preceding claim, **characterized in that** it comprises at least one drying air

production device (101), fixed to the support means (100), configured to send an air flow from the top downwards on the clothes products hanging to dry underneath it through a clothes hanger arm.

7. Device (1), according to claim 5 or 6, **characterized in that** it comprises a retractable and expandable, roofless and base-less closet container (102) fixed to the load-bearing structure (14), configured to hide laundry hanging to dry therein and to retain drying air sent onto clothes products by the drying air production device (101).
8. Device (1), according to any one of the preceding claims, **characterized in that** it comprises a smart centralized command and control system of all the devices present, capable of allowing the simultaneous switching on of the devices for drying and the devices for washing clothes products capable of controlling, managing and harmonizing their operation without exceeding a certain value of electricity absorption previously set by the user (e.g. 2.5 kWh), so as to avoid the intervention of the limiter in buildings with electricity supply contracts of only 3 kWh.
9. Device (1), according to the preceding claim, **characterized in that** said smart centralized command and control system of all the devices for drying and washing the clothes products, present in the invention, is configured to program and manage, with weekly schedule, the washing and drying of the clothes products in compliance with the times (minutes, hour, day) of the end of washing and the end of drying, set by the user, washing and drying the clothes products with the lowest possible energy consumption.
10. Device (1), according to claim 8 or 9, **characterized in that** said smart centralized command and control system comprises sensors for detecting the temperature and relative humidity of the ambient air, sensors for detecting the humidity of clothes products hung up to dry, and is configured to acquire data relating to the volumetry (cubic metres of air) of the room where it is located, the number of physiological air exchanges of said room and the presence or absence of external or internal openings.

Fig. 1

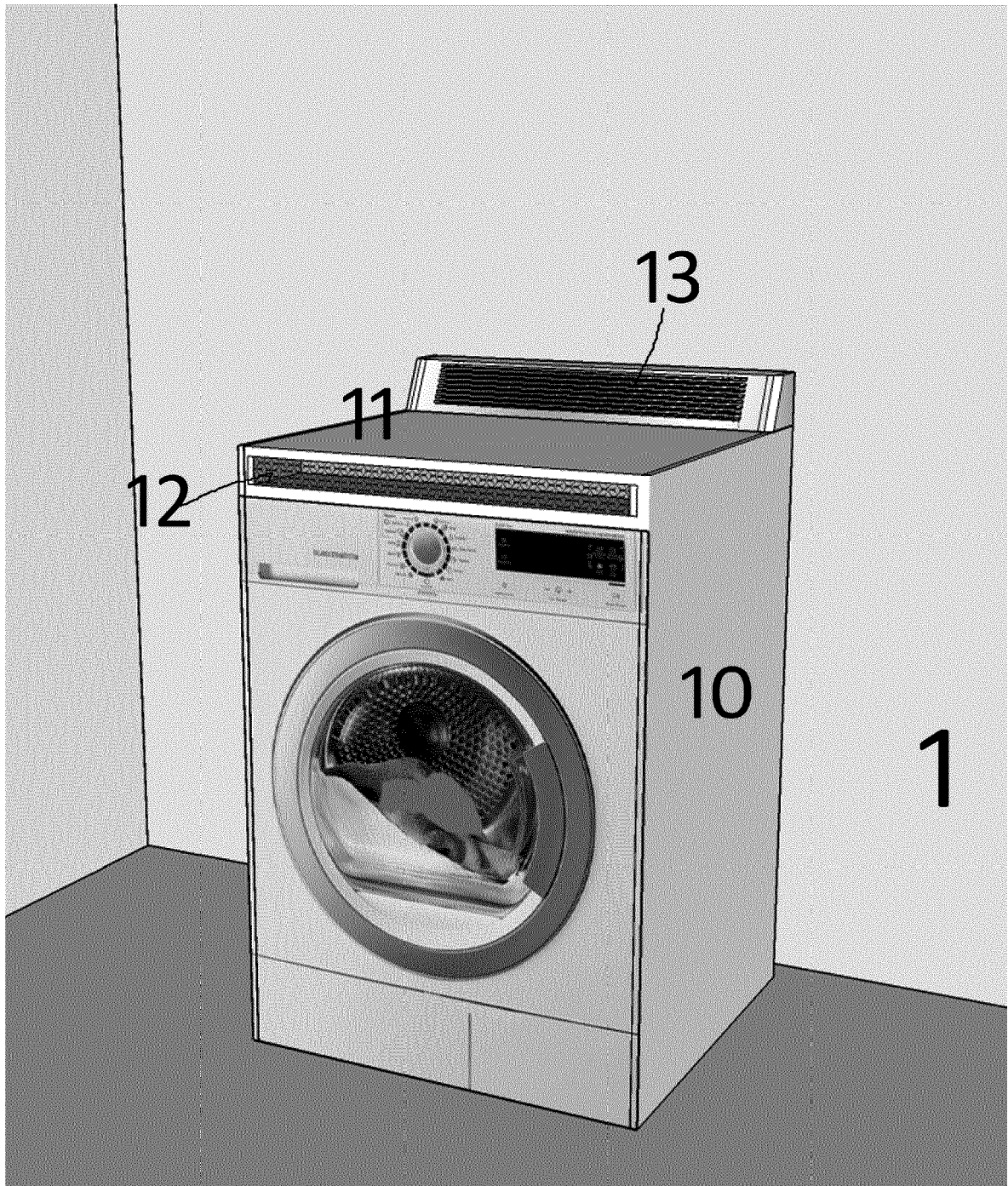


Fig. 2

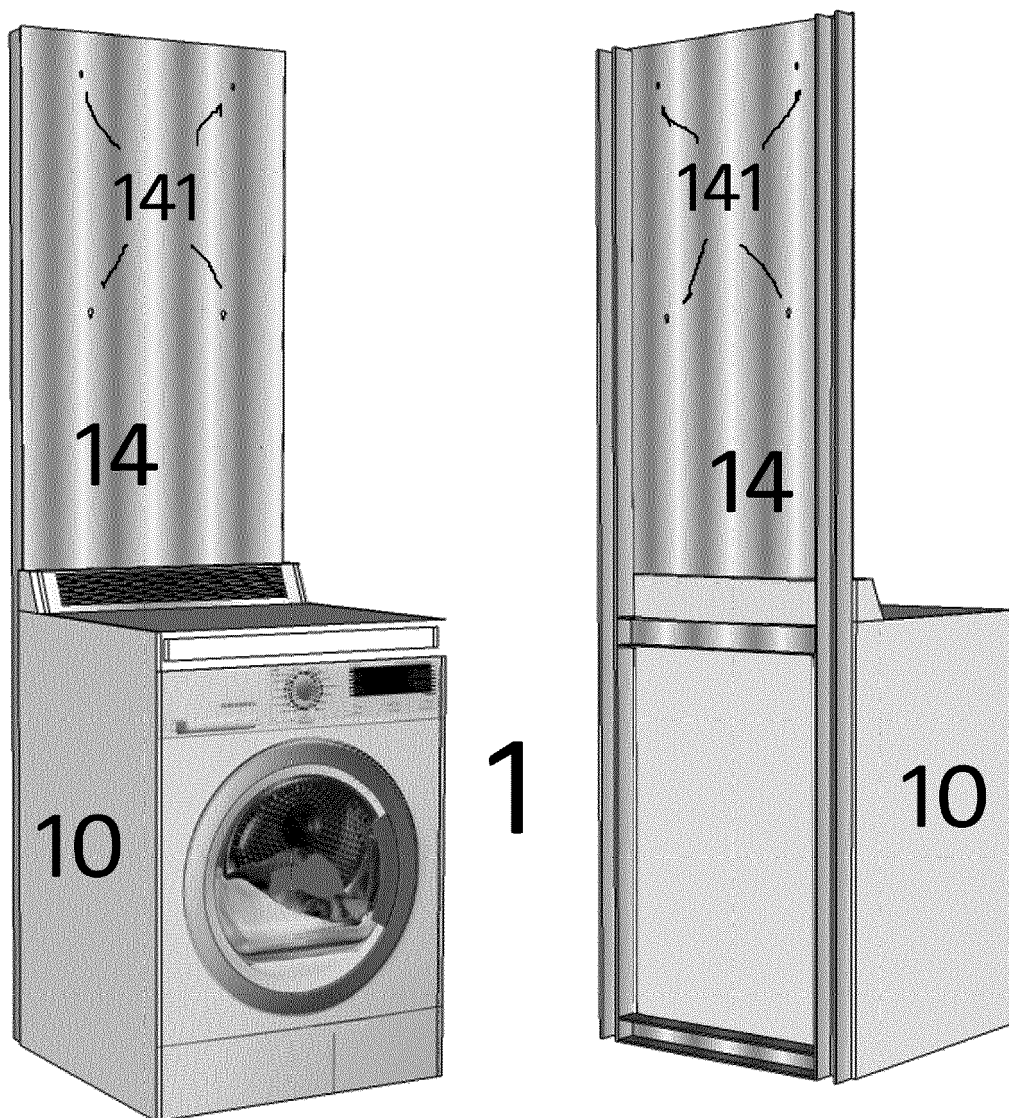


Fig. 3

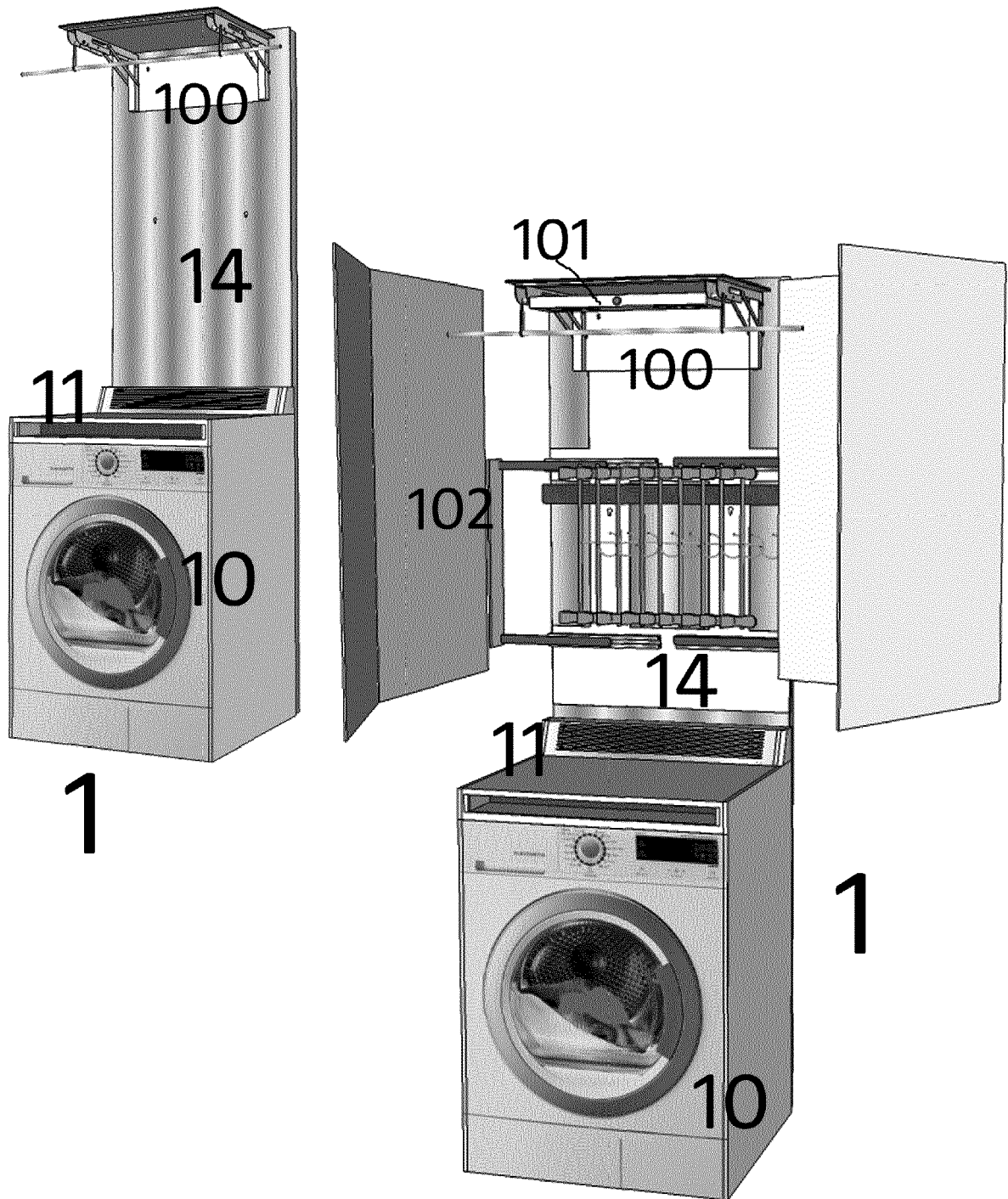


Fig. 4

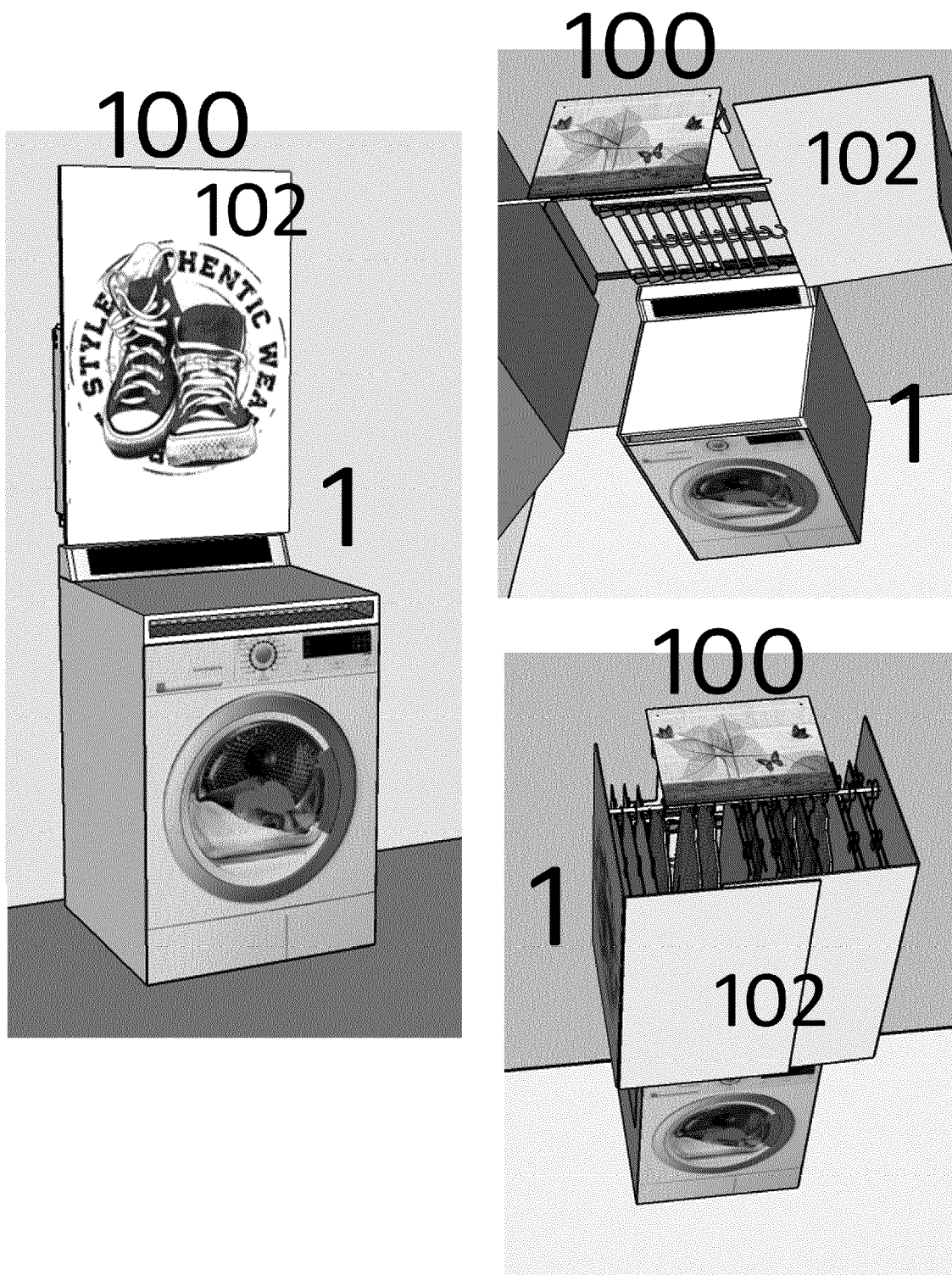
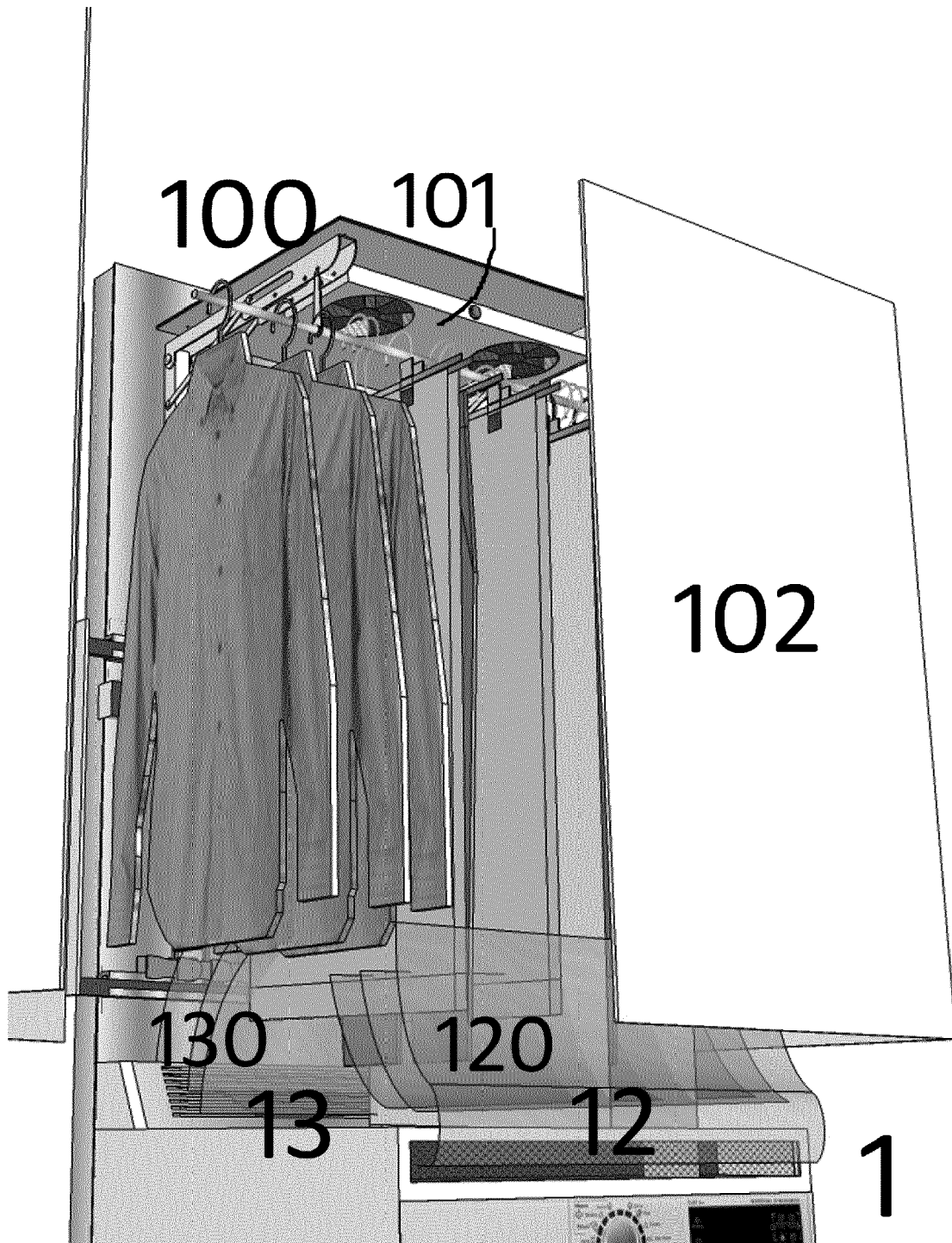


Fig. 5

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REFERENCES CITED IN THE DESCRIPTION

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