Nov. 12, 1968 F. G. KONSTANDT 3,409,996

HEATING, DRYING AND VENTILATING APPARATUS

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Fig. 1

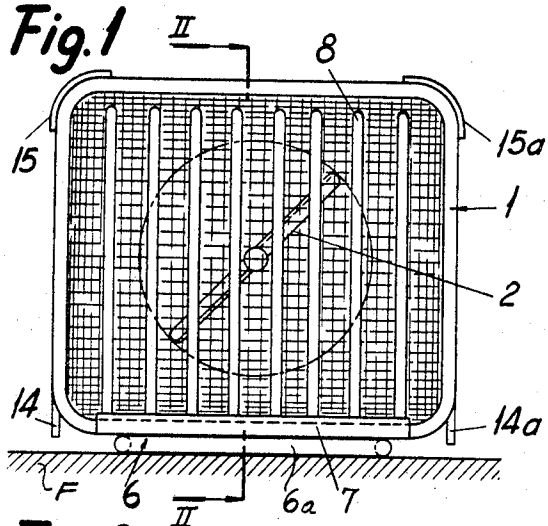


Fig. 2

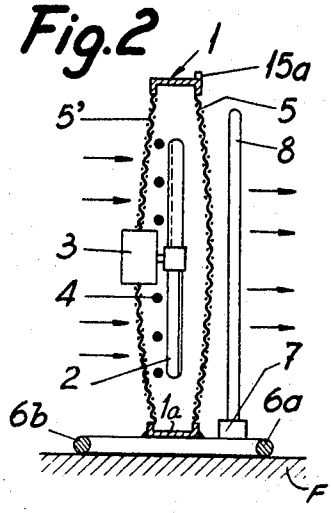


Fig. 3

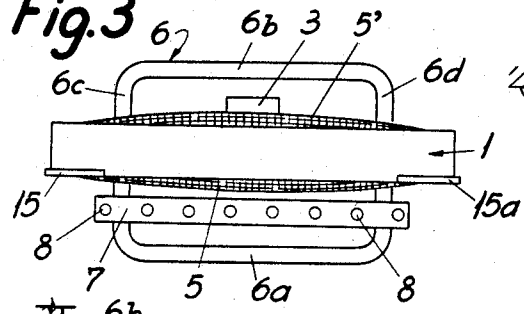


Fig. 6

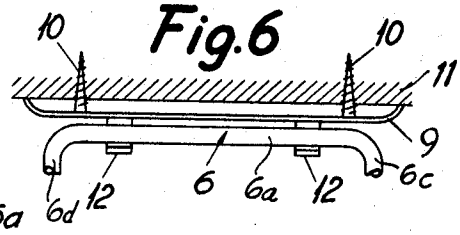


Fig. 4

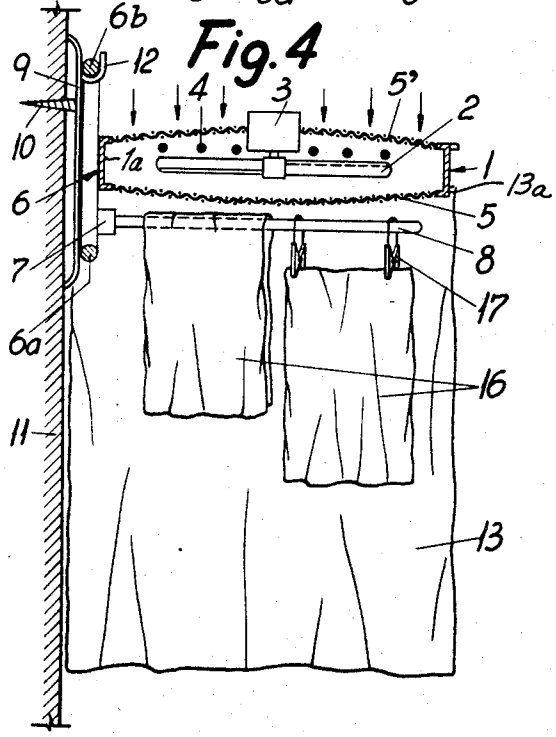
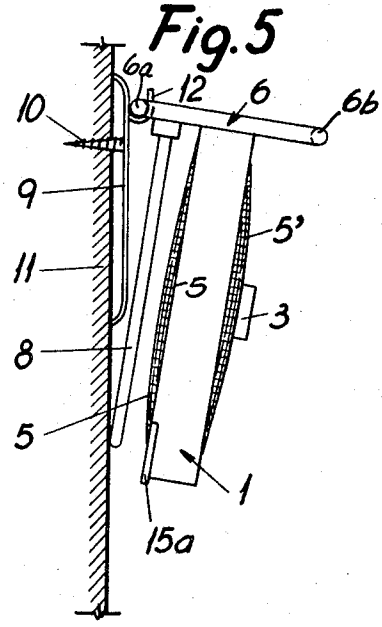


Fig. 5



INVENTOR.
FRANCISCO GOLDBERGER KONSTANDT

BY Michael S. Striker

his ATTORNEY

Nov. 12, 1968 F. G. KONSTANDT 3,409,996

HEATING, DRYING AND VENTILATING APPARATUS

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Fig. 7

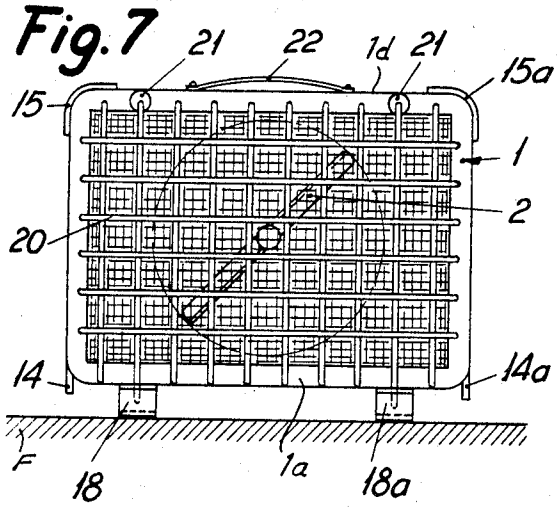


Fig. 8

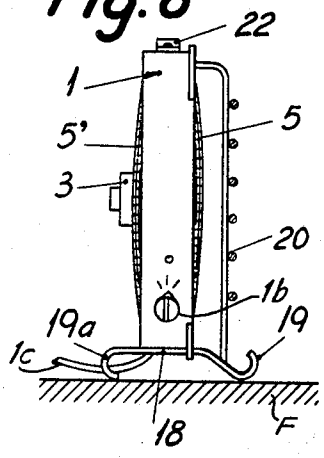


Fig. 9

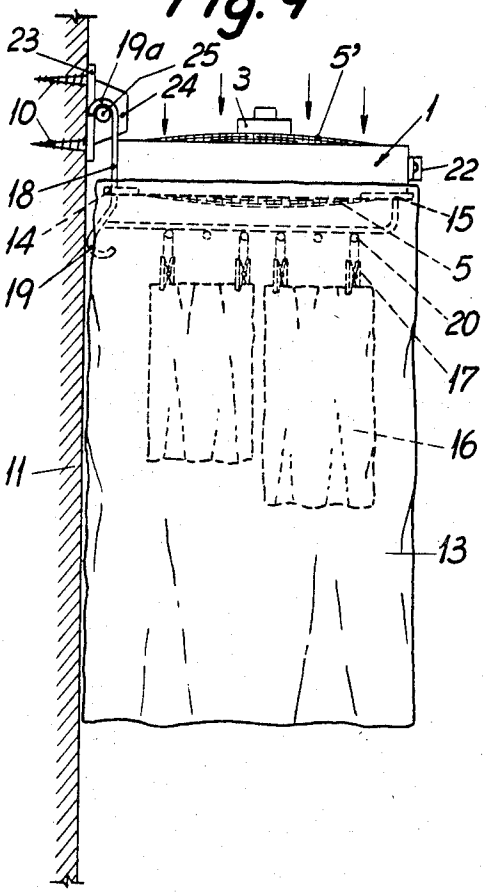
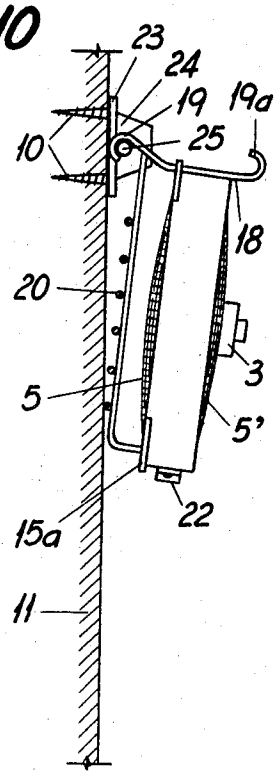


Fig. 10



INVENTOR
FRANCISCO GOLDBERGER KONSTANDT

BY Michael S. Striker

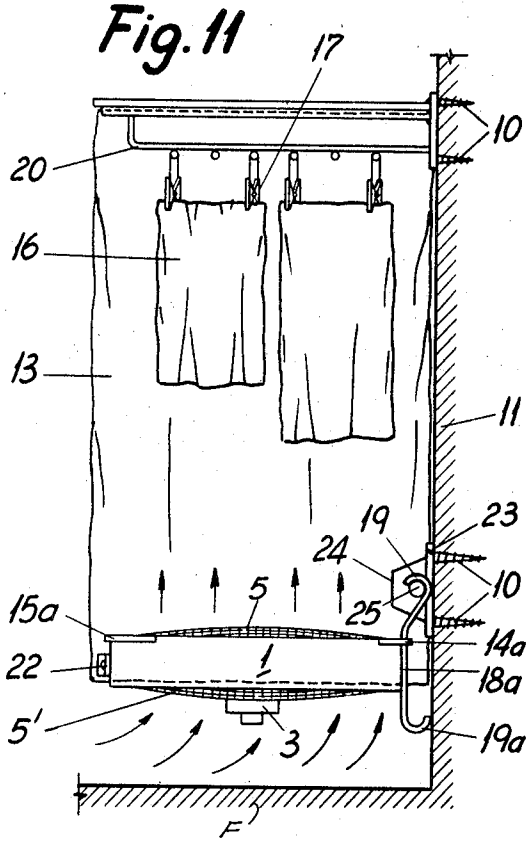
his ATTORNEY

Nov. 12, 1968 F. G. KONSTANDT 3,409,996

HEATING, DRYING AND VENTILATING APPARATUS

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Fig. 11



INVENTOR
FRANCISCO GOLDBERGER KONSTANDT
BY Michael S. Striker
his ATTORNEY

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HEATING, DRYING AND VENTILATING APPARATUS

Francisco Goldberger Konstandt, Seestrasse, Weggis, Canton Lucerne, Switzerland

Filed Aug. 10, 1965, Ser. No. 478,544
7 Claims. (Cl. 34—91)

ABSTRACT OF THE DISCLOSURE

A housing having a first and a second side through each of which air may pass. Blower means mounted in the housing to produce an air current which enters at the first side and leaves at the second side. An electric heating arrangement provided in the housing extending across the path of the air current to heat the same. And a base which is with the housing and arranged to maintain the housing in upright position when the base is placed onto a substantially horizontal suport and to maintain the housing in substantially horizontal position when the base is placed against and secured to a substantially vertical support.

The present invention relates to air circulating apparatus in general, and more particularly to an apparatus which may be used as a room heater or ventilator as well as a drier for articles of laundry or the like.

It is already known to utilize a relatively small air circulating apparatus as a domestic laundry drier which is designed to reduce the work of a housewife and is particularly suited for use in small homes or apartments. As a rule, such driers are permanently installed on a kitchen wall or on another vertical support and, when not used as laundry driers, may be turned on to heat the surrounding space or to simply circulate cool air. A drawback of wall-mounted driers is that they cannot be readily transported from room to room to circulate or heat air in any desired part of a dwelling. For example, the owner might wish to use the drier in his or her bedroom to circulate the air on hot summer nights, or to use the drier as a heater in a room other than the one where the articles of clothing or laundry are to be dried.

Accordingly, it is an important object of my present invention to provide a very simple, compact, relatively inexpensive, eye-pleasing and highly versatile air circulating apparatus which may be readily transported from room to room and which, though principally designed as a room ventilator or heater, may be rapidly and conveniently converted for use as a compact laundry drier.

Another object of the invention is to provide an apparatus of the just outlined characteristics which can be stored in a small area and on the same supporting structure which carries it when used as a laundry drier.

A further object of the invention is to provide an air circulating apparatus which may be used as a laundry drier in a number of ways, depending on the availability of space in a given room, on the desired level at which the apparatus is to be stored when not in use, and on certain other considerations.

An additional object of my instant invention is to provide a combined drier, heater and ventilator which can be readily manipulated by housewives and other unskilled persons, wherein all moving parts are properly confined to prevent injury to children or to a careless adult operator, and wherein certain components which are used solely for drying of laundry may be readily detached and stored away when the remainder of the apparatus is used as a room ventilator or heater.

A concomitant object of the invention is to provide a novel base for the use in an apparatus of the above outlined characteristics.

Still another object of the invention is to provide an air circulating apparatus which can be rapidly converted for use as a room heater or ventilator.

A further object of the invention is to provide an apparatus of the above outlined characteristics which may be used as a heater or ventilator even at such times when it is actually stored away and occupies a minimum of space.

An additional object of the invention is to provide an air circulating apparatus which can be furnished in many sizes, shapes and/or colors to constitute a decorative piece when in use and also when stored away.

Briefly stated, one feature of my invention resides in the provision of a combined heating, drying and ventilating apparatus which comprises a housing having a first and a second at least partially open side, blower means mounted in the housing to produce an air current which enters at the one side and leaves at the other side, electric heating means provided in the housing and extending across the path of the air current to heat the same when connected in circuit with a source of electrical energy, and a special base which is connected with the housing. The base is arranged to maintain the housing in upright position when placed onto a substantially horizontal support so that the air current flows substantially horizontally, and to maintain the housing in a substantially horizontal position when placed against and detachably secured to a substantially vertical support whereby the air current flows vertically and may dry articles of laundry or clothing which are suspended at a level above or below the housing.

In accordance with another feature of my invention, the base may be constructed in such a way that, when suspended on a vertical support in inverted position, the housing is held in a substantially vertical plane but upside down and is closely adjacent to the vertical support to occupy a minimum of space when not in actual use.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved air circulating apparatus itself, however, both as to its construction and the mode of operating and mounting the same, together with additional features and advantages thereof will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawings, in which:

FIG. 1 is a front elevational view of a combined heating, ventilating and drying apparatus which embodies one form of my invention;

FIG. 2 is a transverse vertical section as seen in the direction of arrows from the line II—II of FIG. 1;

FIG. 3 is a top plan view of the apparatus;

FIG. 4 is a transverse section through the apparatus with the base abutting against and suspended from a vertical support and with a curtain attached to and extending downwardly from the housing;

FIG. 5 illustrates the apparatus in inoperative position with the housing suspended on the vertical support of FIG. 4;

FIG. 6 is a fragmentary top plan view of the structure showin in FIG. 5;

FIG. 7 is a front elevational view of a modified apparatus having a different base which is placed on a horizontal support so that the apparatus is ready for use as a room heater or ventilator;

FIG. 8 is a side elevational view of the modified apparatus;

FIG. 9 illustrates the apparatus of FIGS. 7 and 8 in use as a clothes or laundry drier;

FIG. 10 illustrates the apparatus of FIGS. 7 to 9 in inoperative position; and

FIG. 11 illustrates the apparatus of FIGS. 7 to 10 in use as a clothes drier but with the clothes suspended at a level above the housing.

Referring first to FIGS. 1 and 2, there is shown an air circulating apparatus which is a combination drying, heating and ventilating device. It comprises a flat frame-like housing **1** which may be made of sheet metal or synthetic plastic material and has two parallel sides located in vertical planes. The housing **1** accommodates a rotary blower **2** which is driven by an electric motor **3** and serves to produce a current of air which flows in the direction indicated by arrows shown in FIG. 2. Thus, the air current enters through the left-hand side and leaves the housing through the right-hand side, as viewed in FIG. 2. The housing **1** further accommodates a series of electric resistance heaters **4** which extend across the path of the air current and heat the air when connected in circuit with a suitable source of electrical energy, not shown. In other words, the apparatus of FIGS. 1 and 2 can be used as a ventilator if the motor **3** is running but the heating elements **4** are disconnected from the source, or as a room heater when the electric circuit of the heating elements **4** is completed.

The open sides of the housing **1** accommodate suitable screens **5**, **5'** which may consist of wire mesh, of perforated metallic or nonmetallic plates, of intersecting metallic or plastic bars or similar bodies permitting the air current to enter through the screen **5'** and to leave through the screen **5**.

The bottom wall **1***a* of the housing **1** is connected with a specially configurated base **6** which rests on a horizontal support F, for example, on the floor of a room which is to be heated or ventilated by the apparatus of FIGS. 1 and 2. The base **6** extends laterally beyond the screens **5** and **5'** so as to insure that the housing remains stable in upright position in which its open sides are located in substantially vertical planes. Thus, when the base **6** rests on the floor F, the air current produced by the blower **2** flows horizontally.

As shown in FIG. 3, the base **6** is of rectangular outline and may consist of tubular metallic or plastic stock having two longitudinally extending longer sections **6***a*, **6***b* and two transversely extending shorter sections **6***c*, **6***d*. All of these sections will rest on the floor F when the apparatus is used as a room heater or ventilator. The sections **6***a*, **6***b* are parallel with the general plane of the housing **1** and the sections **6***c*, **6***d* are substantially normal to such plane.

The sections **6***c*, **6***d* are detachably connected with a horizontal carrier or bar **7** which is adjacent to the screen **5** (i.e., to the outlet side of the housing **1**) and is provided with a series of equidistant recesses or bores whose open ends face upwardly so that each such recess may receive the lower end portion of a vertical rod-shaped hanger **8**. The carrier **7** may support radially extending screws which can retain the hangers **8** in the respective recesses, or each such hanger may be secured to the carrier **7** by friction alone. The purpose of the hangers **8** is to support articles of clothing or laundry in a manner as shown in FIG. 4. When the base **6** rests on the floor F, the hangers **8** extend vertically upwardly and then merely serve as a decoration or as a protector for the screen **5**.

FIG. 4 illustrates a vertical support **11** which may constitute the wall of a kitchen, laundry room, den, basement or other chamber in a private home or apartment. The support **11** carries an attachment or fixture **9** which is secured thereto by screws **10** or analogous fasteners. The upper portion of the fixture **9** is provided with two horizontally aligned suspending hooks **12** which may support the section **6***a* or **6***b* of the base **6**. When the hooks **12** support the section **6***b*, the latter is located at a level above the housing **1** and the housing is then maintained in a substantially horizontal position because the sections **6***a*, **6***c*, **6***d* bear against the vertical support **11** (and more particularly against the fixture **9** which can be considered to constitute a component part of the support **11**). The motor **3** is located at a level above the blower **2** and the screen **5** is located below the screen **5'**, i.e., the air current will flow vertically downwardly and will dry articles **16** of laundry or clothing which are suspended on the hangers **8**. Such articles **16** may be placed directly over the hangers **8**, or the person in charge may utilize conventional laundry clamps **17**.

In order to prevent lateral escape of drying air which is heated by the electrical heating elements **4**, the user may attach to the housing **1** a suitable curtain **13** which defines a downwardly extending heating chamber or duct and insures that the air will rapidly dry the articles **16**. The cross-section of the heating chamber resembles the outline of the housing **1** which latter constitutes a cover at the upper end of this chamber. The upper edge of the curtain **13** is detachably affixed to suitable connectors provided on the walls of the housing **1**. Such connectors may assume the form of projections provided at the four corners of the housing **1** and capable of retaining suitable hooks, rings or other suspending elements secured to the upper edge of the curtain **13**. FIG. 1 shows two projections **14**, **14***a* which are adjacent to the base **6** and two projections **15**, **15***a* provided at the corners which are distant from the base **6**. The projections **15**, **15***a* will stretch the curtain **13** to keep it in requisite position, and the upper edge of the curtain may contain an elastic band **13***a* indicated in FIG. 4. The curtain **13** is detached and is stored separately when the apparatus of my invention is used in a manner as shown in FIGS. 1 and 2 or is stored in a manner as shown in FIGS. 1 and 2 or is stored in a manner as shown in FIG. 5.

It is clear that the hangers **8** may be permanently connected with the base **6** and/or with the housing **1**, and also that such hangers may be replaced with a network of rods or by a perforated plate whose openings are large enough to allow for convenient attachment of laundry clamps **17** or the like. When the apparatus is used as a drier, i.e., in a manner as illustrated in FIG. 4, the hangers **8** extend substantially at right angles to the vertical support **11** and will hold the articles **16** without slippage. The articles are accommodated in the drying chamber defined by the curtain **13** so as to be protected from dust and to be concealed from view if the user does not wish the room in which the device is installed to create the impression of a laundry room.

If the apparatus is to be stored away, the position of the longer sections **6***a*, **6***b* of the base **6** is reversed in a manner which will be readily understood by comparing FIGS. 4 and 5. Thus, the user then places the section **6***a* into the hooks **12** so that the base **6** extends away from the exposed surface of the vertical support **11** and the housing **1** extends downwardly, i.e., upside down. If the hangers **8** remain attached to the carrier **7**, their free ends will abut against the support **11** and will thus protect the housing **1** and screen **5** against damage. Also, the hangers **8** then cooperate with the hooks **12** to prevent oscillation of the apparatus whose center of gravity is located outwardly of the hangers **8** so that the base **6** tends to turn by gravity and in a clockwise direction, as viewed in FIG. 5 to maintain the tips of the hangers in abutment with the support **11**. In such suspended position, the apparatus of FIGS. 1 to 6 occupies a minimum of space, and the base **6** is preferably suspended at a level which is sufficiently high to be located above the head of a normal person standing on the floor below the fixture **9**.

Of course, the shape of the base **6** may be varied as desired without departing from the spirit of my invention. For example, this rectangular base **6** may be replaced with a hexagonal, rhomboidal or other polygonal base. Also, the base may be of rounded or oval shape, as long as two of its sections can be suspended in a manner as

shown in connection with the sections **6***a*, **6***b* and as long as the base can support the housing **1** in upright position when placed onto the floor F or a similar substantially horizontal support. Thus, all that counts is to provide the housing **1** with a base which will maintain the housing in upright position when the apparatus is used as a room heater or ventilator, which will maintain the housing **1** in a substantially horizontal plane when the apparatus is used as drier for articles of laundry, and which preferably maintains the housing in a substantially vertical plane adjacent to avertical support when the apparatus is to be put away for storage so that it occupies a minimum of space.

At least that side of the housing **1** which accommodates the screen **5** has an area which approximates the maximum cros-sectional area of the housing so that the air current passing through the screen **5** can reach all articles of clothing or laundry which are suspended in the drying chamber.

The combined heating, drying and ventilating apparatus of FIGS. 7 and 8 again comprises a rectangular frame-like housing **1** having open sides provided with screens **5**, **5'** and accommodating a rotary blower **2** which is driven by the coaxial output shaft of an electric motor **3**. The heating elements (not shown) may be mounted in the same way as described in connection with FIGS. 1 and 2. The lower horizontal wall **1***a* of the housing **1** is attached to a different base which comprises two substantially S-shaped strips **18**, **18***a* consisting of suitably bent flat stock and each having two hooked end portions **19**, **19***a*. When the base including the strips **18**, **18***a* rests on the horizontal support F, the end portions **19***a* face downwardly and the end portions **19** face upwardly, see particularly FIG. 8. The housing **1** is then held in upright position and the apparatus is ready for use as a room heater or ventilator. The switch **1***b* shown in FIG. 8 is preferably constructed in such a way that it completes the circuit of the motor **3** when moved to a first position, that it completes the circuit of the motor **3** and of the heating elements when moved to a second position, and that it opens both circuits when moved to a third position. The cable which connects the device to a source of electrical energy is shown at **1***c*. The upwardly curved end portions **19** of the strips **18**, **18***a* are located at the outlet side of the housing **1**, namely, at that side from which the air current issues when the blower **2** is driven by the motor **3**. It is clear that the strips **18**, **18***a* may be replaced by a one-piece plate-like base having curled edge portions which replace the end portions **19** and **19***a*.

The strips **18**, **18***a* carry a specially configurated grid-like hanger structure **20** which consists of intersecting rods and replaces the rod-like hangers **8** of the apparatus shown in FIGS. 1 to 6. This hanger structure **20** is detachably secured to the strips **18**, **18***a* and also to the housing **1**. The detachable connections between the housing **1** and two of the vertically extending rods of the hanger structure **20** are shown at **21** in FIG. 7. A handle **22** is secured to the top wall **1***d* of the housing to facilitate transportation of the apparatus from room to room. The hanger structure **20** may be attached only to the housing **1** or only to the strips **18**, **18***a*.

When the apparatus of FIGS. 7 and 8 is to be used as a clothes drier or laundry drier, the hooked end portions **19***a* are suspended on a horizontal bar **25** forming part of an attachment or fixture **23** which is secured to a vertical support **11** by means of screws **10** or similar fasteners. The fixture **23** preferably resembles a plate which is provided with outwardly extending bearing brackets or lugs **24** for the horizontal bar **25**. It will be noted that, in contrast to the showing of FIG. 4, the hooked end portions **19***a* are provided on the base rather than on the fixture. The brackets **24** may constitute forwardly bent terminal portions of the plate **23** which may consist of sheet metal or the like.

When the end portions **19***a* are suspended on the bar **25**, the end portions **19** bear against the exposed surface of the plate **23** or against the exposed surface of the support **11** and maintain the housing **1** in a substantially horizontal position so that the current of air produced by the blower **2** will flow downwardly. The user then attaches the curtain **13** in the same way as described in connection with FIG. 4, see the projections **14**, **14***a*, **15** and **15***a*, and suspends the articles **16** on clamps **17** which are attached to the rods of the hanger structure **20**. The air current flowing downwardly through the drying chamber defined by the curtain **13** will rapidly dry such articles and the curtain conceals them from view provided, of course, that it consists of opaque material. The curtain may be applied prior or after suspension of articles **16** on the hanger structure **20**.

When the apparatus of FIGS. 7 to 9 is not in actual use, it may be suspended in a manner as shown in FIG. 10, i.e., the end portions **19** will straddle the rod **25** and the housing **1** then extends downwardly in a substantially vertical plane to occupy a minimum of space. The hanger structure **20** comes into actual abutment with the exposed surface of the vertical support **11** and protects the screen **5**.

If the user wishes to suspend the articles **16** at a level above the housing **1**, he or she may proceed in a manner as shown in FIG. 11. Thus, the plate **23** is then mounted at a level close to the floor F and the end portions **19** of the strips **18**, **18***a* are introduced from below. The end portions **19***a* bear against the exposed surface of the vertical support **11** and maintain the housing **1** in a horizontal plane but with the motor **3** located below the screen **5**. Therefore, the current of air produced by the blower **2** will flow upwardly and through a vertically extending drying chamber defined by a curtain **13** whose upper edge is suspended on a second fixture formed by the hanger structure **20** which latter is disconnected from the housing **1** and from the strips **18**, **18***a* to be secured to the support **11** at a desired level above the housing.

The same procedure may be followed in connection with the apparatus of FIGS. 1 to 6, i.e., the carrier **7** may be disconnected from the base **6** and may be secured to the vertical support **11** by means of a fixture located at a level above the housing **1**. In such instances, the hooks **12** will support the longer section **6***a* of the base **6** so that the current of air produced by the blower **2** of the apparatus shown in FIGS. 1 to 6 will travel upwardly and will expel moisture from articles **16** which are suspended on the hangers **8**. The upper edge of the curtain **13** is then connected to a suitable frame which may be affixed to the carrier **7**.

Furthermore, it is clear that the structure including the carrier **7** and hangers **8** shown in FIGS. 1 to 6 may be replaced by the hanger structure **20** of FIGS. 7 to 11, or vice versa.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of my contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is:

1. A combined heating, drying and ventilating apparatus, comprising, in combination, a housing having opposite open sides so as to permit passage of air; blower means mounted in said housing to produce an air current which enters through one of said opposite open sides and leaves through the other of said opposite open sides; electric heating means also provided in said housing and arranged for heating said air current; a base secured to said housing and adapted to support the same on a horizontal surface in vertical poistion with said air current passing through said housing in substantially horizontal direction,

said base having a pair of strip-shaped sections extending transversely of said housing and each having hook-shaped end portions extending to the respective opposite open sides; attaching means for attaching said housing at will of a user to a vertical wall in such manner that said housing extends from said vertical wall in substantially horizontal position and said air current passes through said housing in substantially vertical direction, said attaching means comprising a horizontal bar provided on said vertical wall and the hook-shaped end portions on either of said sides being adapted to releasably engage said bar; and combined guard and suspension means mounted on said base and located adjacent said other of said opposite open sides of said housing so as to serve as a guard when said base supports said housing in vertical position and to serve as suspension means for moist articles to be dried by said air current when said housing is attached to a vertical wall extending therefrom in substantially horizontal position.

2. A combined heating, drying and ventilating apparatus, comprising, in combination, a housing having opposite open sides so as to permit passage of air; blower means mounted in said housing to produce an air current which enters through one of said opposite open sides and leaves through the other of said opposite open sides; electric heating means also provided in said housing and arranged for heating said air current; a base secured to said housing and adapted to support the same on a horizontal surface in vertical position with said air current passing through said housing in substantially horizontal direction; stationary mounting means adapted to be secured on a vertical wall; first and second attaching means located on opposite sides of said base for attaching said housing at the will of the user to a vertical wall either by engagement of said first attaching means with said stationary moutning means in a first position in which said housing extends from said vertical wall in substantially horizontal direction and said air current passes through said housing in substantially vertical direction, or by engagement of said second attaching means with said stationary mounting means in a second position in which said housing extends in substantially vertical direction along said wall; and combined guard and suspension means mounted on said base and located adjacent said other of said opposite sides of said housing so as to serve as guards when said housing is supported by said base in vertical position and to serve as suspension means for moist articles to be dried by said air current when said housing is attached to said stationary mounting means by said first attaching means extending in a substantially horizontal direction.

3. An apparatus as defined in claim 2, wherein said base comprises a pair of hook-shaped portions, each outwardly adjacent to one of said opposite sides of said base and respectively constituting said first and second attaching means.

4. An apparatus as defined in claim 2, wherein said combined guard and suspension means comprises a carrier secured to said base and a plurality of rods mounted on said carrier and disposed in a plane located in front of but spaced from said other of said oposite open sides.

5. An apparatus as defined in claim 2, wherein said combined guard and suspension means comprises a carrier secured to said base and a plurality of intersecting rods mounted on said carrier and disposed in a plane located in front of but spaced from said other of said opposite open sides.

6. An apparatus as defined in claim 2; and further comprising a curtain detachably secured to said housing in said first position thereof and defining a drying chamber extending downwardly from said other open side of said housing so that articles to be dried and suspended from said suspension means are surrounded by said curtain.

7. An apparatus as defined in claim 6, wherein said curtain comprises an elastic edge portion which surrounds said housing and is detachably secured thereto.

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FREDERICK L. MATTESON, JR., *Primary Examiner.*

H. B. RAMEY, *Assistant Examiner.*