Nov. 6, 1956 W. J. ASHWORTH 2,769,248

DRIER

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FIG. 1.

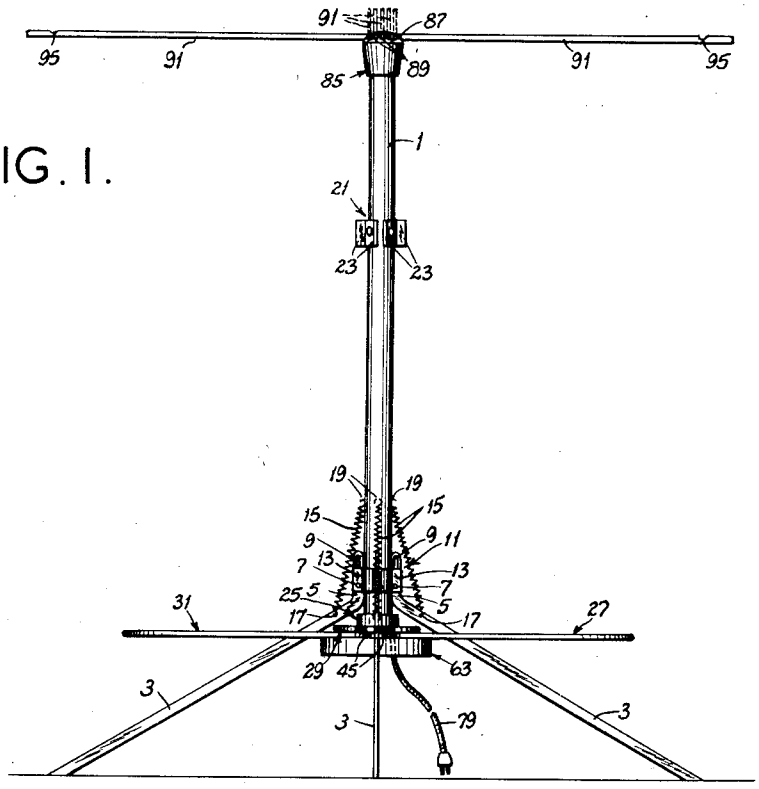
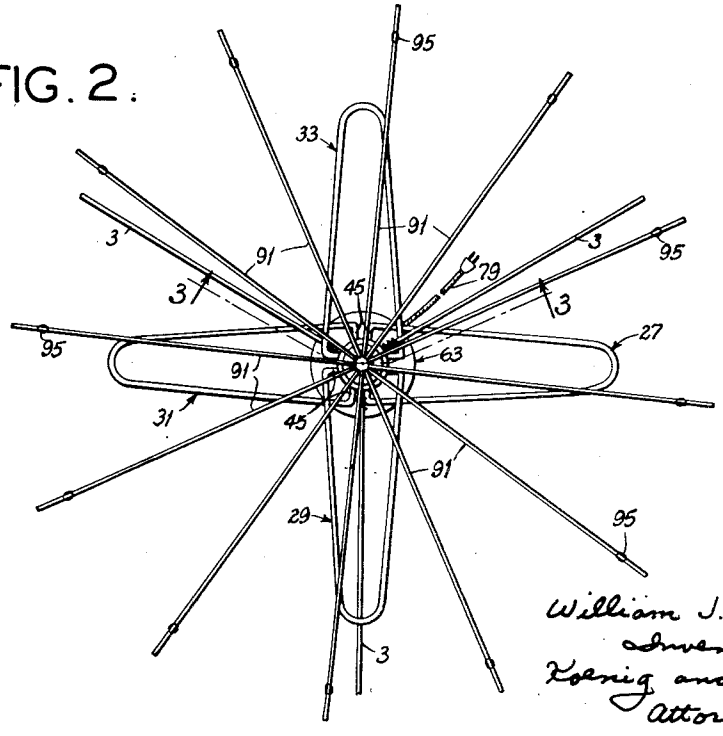


FIG. 2.



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FIG. 3.

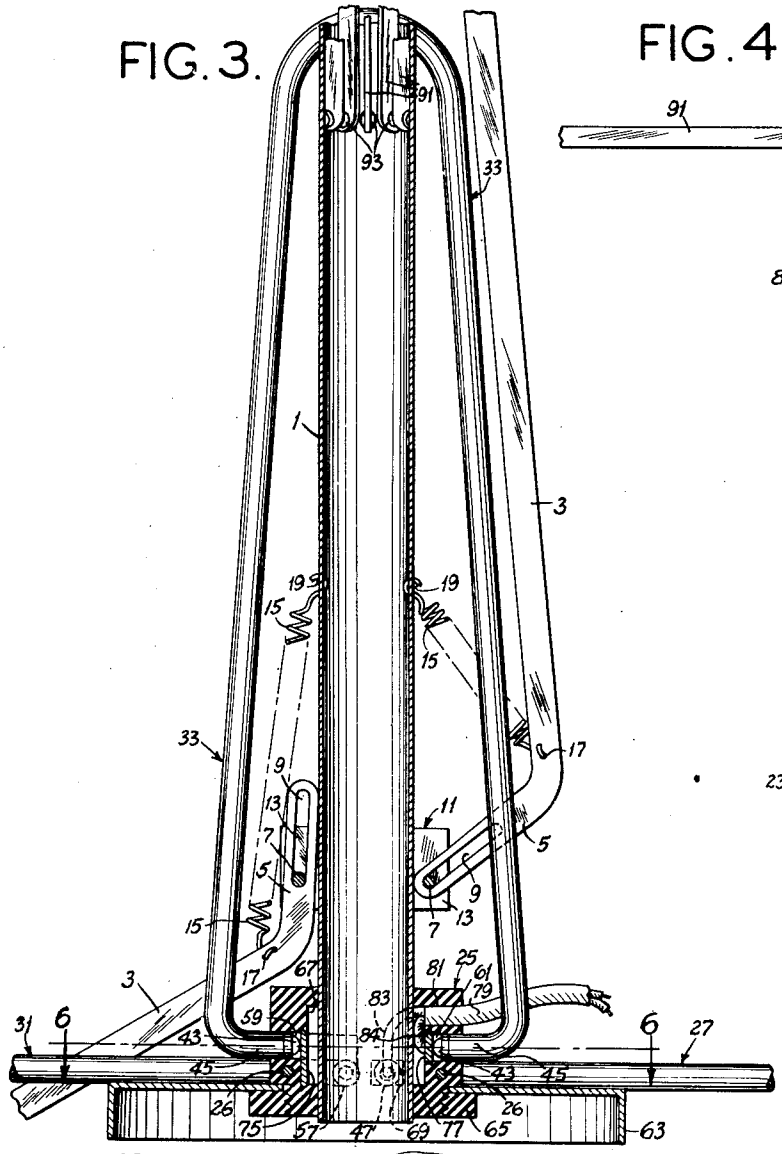


FIG. 4.

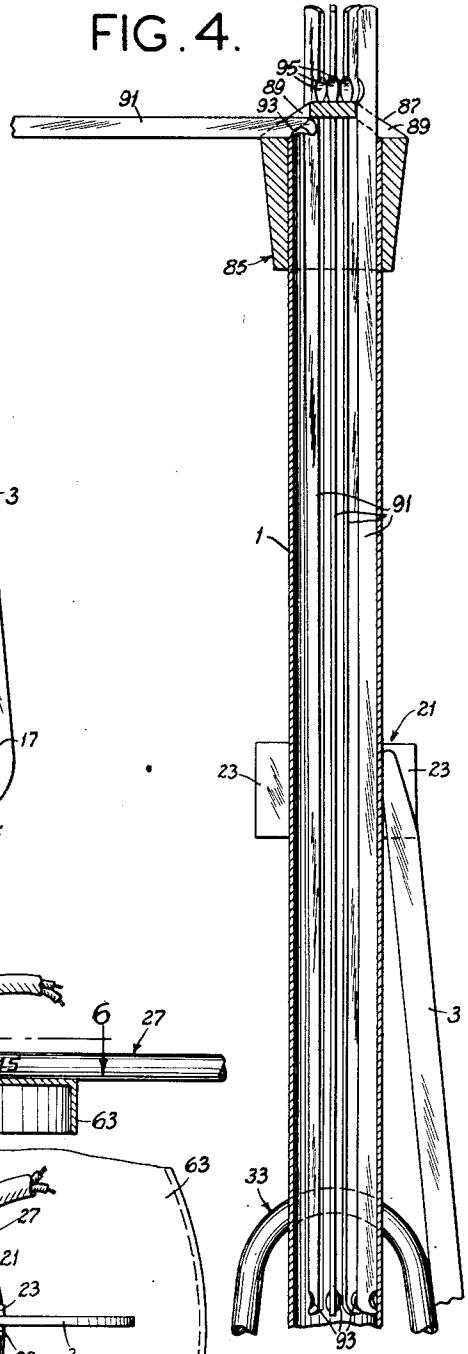
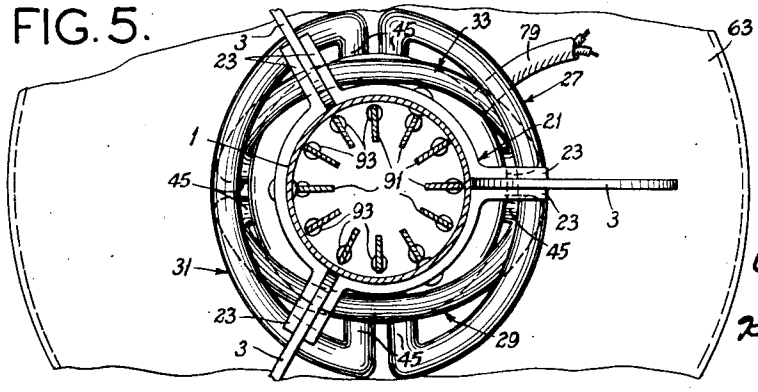


FIG. 5.



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FIG. 6.

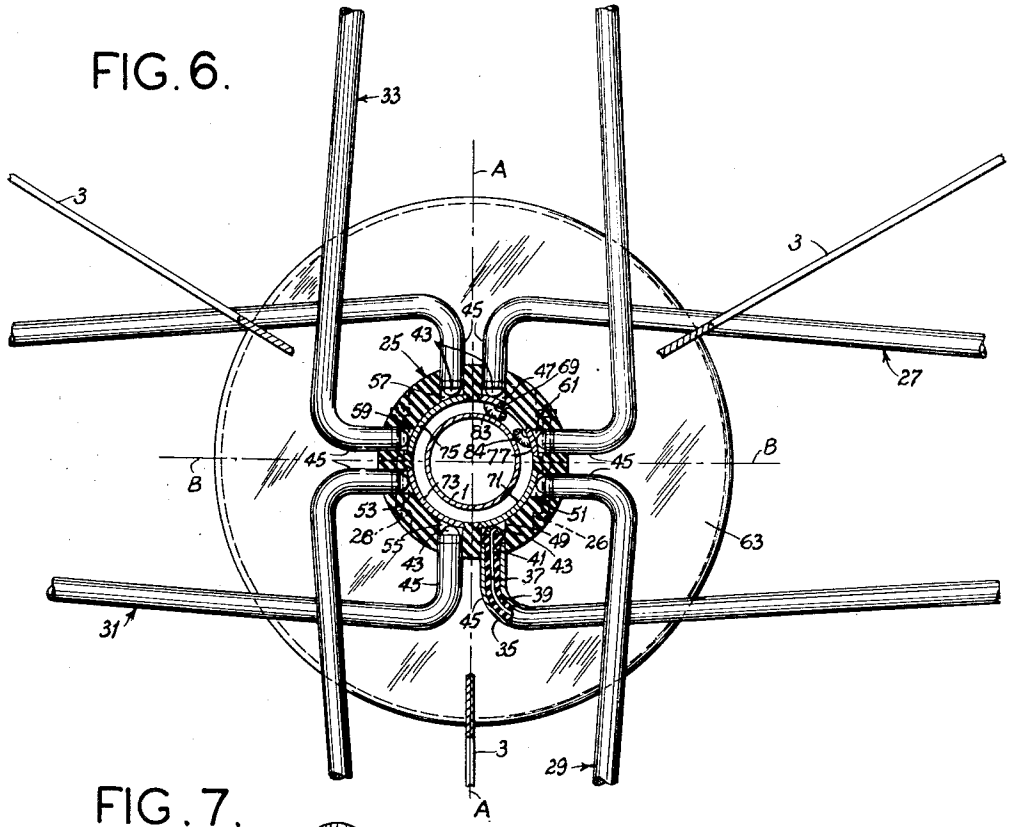
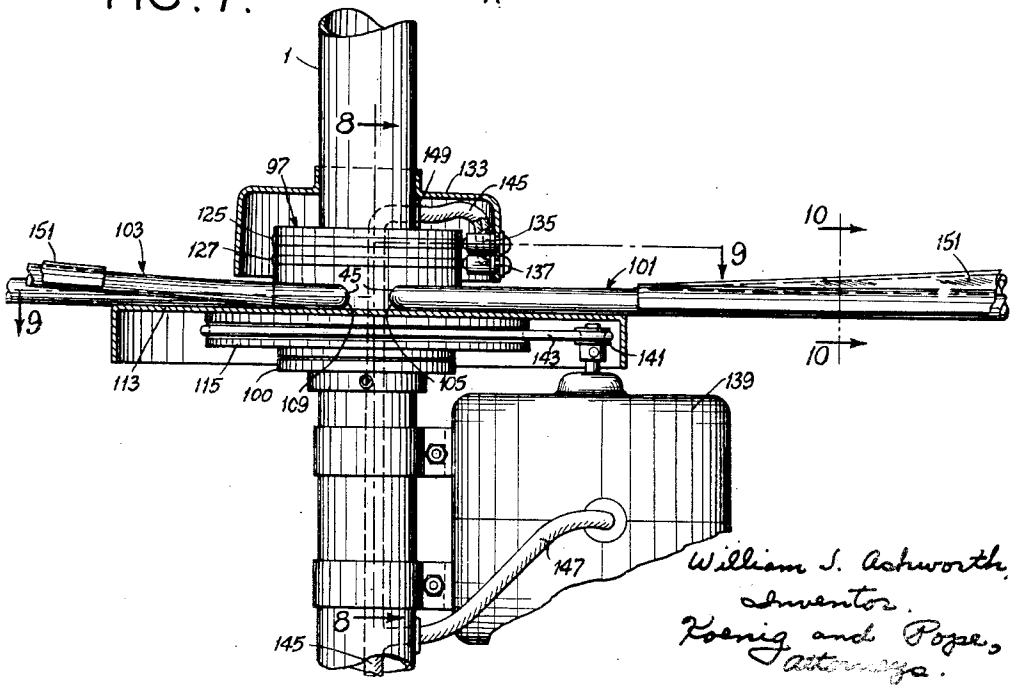


FIG. 7.



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FIG. 8.

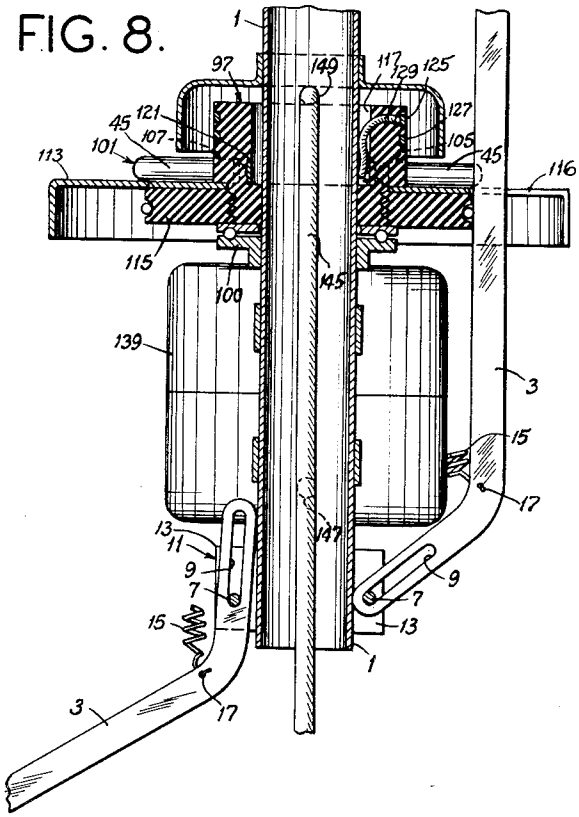


FIG. 10.

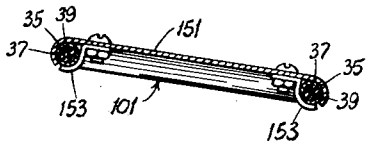
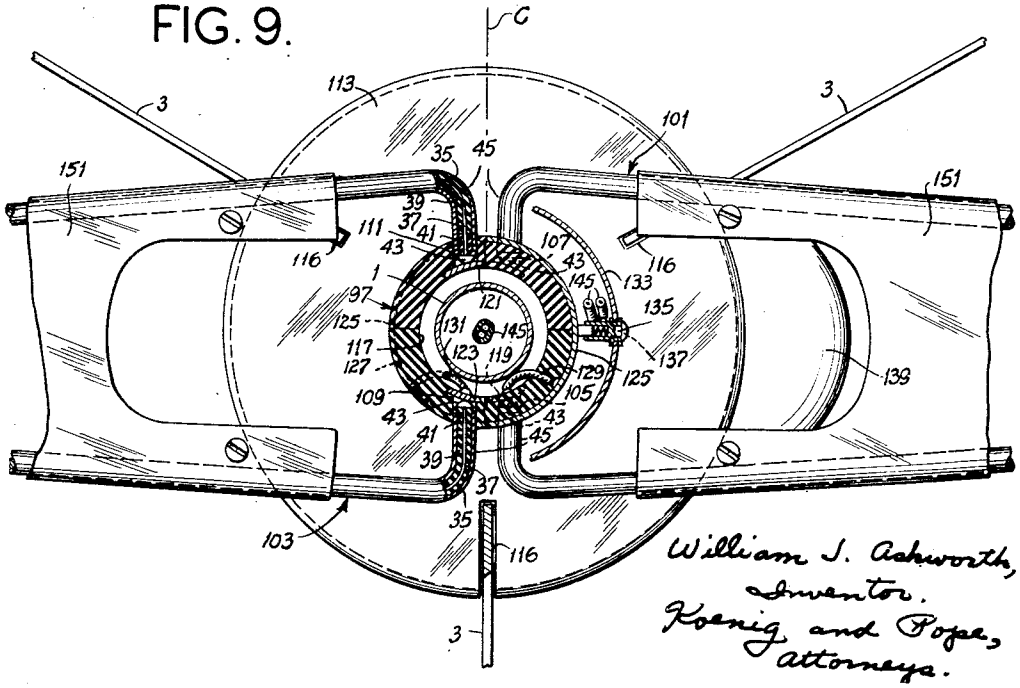


FIG. 9.



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United States Patent Office 2,769,248 Patented Nov. 6, 1956

2,769,248

DRIER

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Application November 10, 1954, Serial No. 468,022

8 Claims. (Cl. 34—163)

This invention relates to driers, and more particularly to collapsible and portable apparatus for drying clothes and the like.

Among the several objects of the invention may be noted the provision of improved apparatus of the class described having means for hanging articles to be dried and means for heating them for rapid drying, the heating means consisting of heating elements which are adapted to occupy an extended drying position located under the articles; the provision of apparatus of this class, component parts of which, including the heating elements, may be collapsed readily for storing the drier away when not in use, the parts being extended readily for use; the provision of apparatus of this class in which the heating elements are rotary and carry fan blades for causing a flow of air for decreasing drying time; and the provision of apparatus such as described which is economical to manufacture and easy to use. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which several of various possible embodiments of the invention are illustrated,

Fig. 1 is a view in elevation of a drier constructed in accordance with this invention, certain arms and heating elements of the drier being shown in extended position;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is an enlarged vertical cross section of the lower part of the drier taken on line 3—3 of Fig. 2, showing one leg and one heating element of the drier in collapsed position;

Fig. 4 is an enlarged vertical cross section of the upper part of the drier, showing all the arms except one in retracted position and showing the one leg in collapsed position;

Fig. 5 is an enlarged plan view showing all the arms in retracted position and showing all the heating elements in their collapsed position;

Fig. 6 is an enlarged horizontal cross section taken on line 6—6 of Fig. 3;

Fig. 7 is a view similar to Fig. 3 showing a modification;

Fig. 8 is a vertical cross section taken on line 8—8 of Fig. 7;

Fig. 9 is a horizontal cross section taken on line 9—9 of Fig. 7; and,

Fig. 10 is a vertical cross section taken on line 10—10 of Fig. 7.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, Figs. 1–6 show a first embodiment of this invention comprising a slender tubular standard 1 having collapsible legs 3 for supporting it in vertical position. The standard is shown as having three legs, at 120° intervals. Each leg has a short integral end portion 5 at an angle to the remainder of the leg. The angled end portion 5 of each leg has a pin and slot connection with the standard above but adjacent the lower

end of the standard. As to each leg, the pin and slot connection comprises a horizontal pin 7 mounted on the standard and spaced outward from the standard, and an elongate slot 9 in the angled end portion 5 of the leg receiving the pin. As shown, the pins 7 are mounted on the standard by providing three spider members 11 on the standard having outwardly directed flanges 13 provided with pin-receiving openings, each pin being constituted by a rivet. Each leg 3 is adapted to occupy a standard-supporting position extending downward and outward away from the standard 1 with its angled end portion 5 extending upward in engagement with the standard, and with the respective pin 7 at the lower end of the respective slot 9 (see Fig. 1 and the leg at the left in Fig. 3). Engagement of the angled end portion 5 with the standard locks the leg against swinging upward. To collapse any leg, it is first moved downward relative to the standard to the point where the upper end of the respective slot 9 engages the respective pin 7. This frees the leg to be swung upward to a collapsed position extending upward alongside the standard (see the leg at the right in Fig. 3).

As shown, a tension spring 15 is provided for biasing each leg in upward direction. Each spring 15 has one end connected to the respective leg adjacent the angled end portion of the leg, as indicated at 17, and its other end connected to the standard as indicated at 19 above the pins. The springs serve the dual purpose of holding the legs either in their standard-supporting position or in their collapsed position. Toward its upper end, the standard is provided with three spider members 21 having outwardly directed flanges 23 forming recesses for receiving the upper ends of the collapsed legs. The flanges may be made to serve as spring clips for the upper ends of the collapsed legs, if so desired.

Fixed on the lower end of the standard below the spider members 11 is a hub 25 made of electric insulation material. As shown, the hub is made in two parts held together by screws 26, which also serve to clamp the hub on the standard. The hub serves for mounting four heating elements 27, 29, 31 and 33 which are all identical. Each comprises a length of metal tubing 35, such as aluminum, steel or copper tubing. Housed in the tubing is a resistance wire 37, such as a Nichrome wire (see Fig. 6). The wire is insulated from the tubing as indicated at 39. It extends from one end of the length of tubing to the other. At the ends of the length of tubing are insulation bushings 41. End portions of the wire extend through these bushings to exterior contact buttons 43. The length of tubing is bent into a hairpin-like loop, with end portions 45 of the length of tubing bent to extend toward one another.

Each one of the heating elements 27, 29, 31 and 33 is mounted on the hub 25 for pivotal movement on a horizontal axis by entering its opposed end portions 45 into a pair of holes provided in the hub for that purpose. The holes for element 27 are designated 47 and 49, those for element 29 are designated 51 and 53, those for element 31 are designated 55 and 57, and those for element 33 are designated 59 and 61. Holes 47 and 49 are located on one side of the diametrical plane of the hub indicated at A in Fig. 6, the axis of the holes being horizontal and parallel to this plane. Holes 55 and 57 are located on the other side of plane A, their axis being parallel to the axis of holes 47 and 49. Holes 51 and 53 are located on one side of the diametrical plane of the hub indicated at B in Fig. 6 which is at right angles to plane A, the axis of these holes being parallel to plane B. Holes 59 and 61 are located on the other side of plane B, with their axis parallel to the axis of holes 51 and 53. Holes 47, 49, 55 and 57 are located in a horizontal plane toward the lower end of the hub. Holes 51, 53, 59 and 61 are

located in a horizontal plane above the plane of holes 47, 49, 55 and 57.

The heating elements are adapted for swinging movement between a collapsed position extending upward from the hub 25 alongside the standard 1 and an extended position extending laterally outward from the standard. The extended position of the elements 27 and 31 is determined by their engagement with a horizontal plate 63 secured to the lower part of the hub as by means of a nut 65. The extended position of elements 29 and 33 is determined by their engagement with the extended arms 27 and 31. One leg 3, when extended, reaches between extended elements 27 and 33 and another leg reaches between elements 31 and 33. The third leg extends through the element 29, both in its extended and collapsed positions.

The hub is formed with an internal annular groove 67 providing a space around the standard 1. At the inner end of hole 47 is provided a contact plate 69 for engagement by contact button 43 at the end of portion 45 of element 27 received in the hole 47. Around the periphery of the groove 67 there are provided three conductive bridge strips 71, 73 and 75. Strip 71 extends from the inner end of hole 49 to the inner end of hole 51 for engagement by contact buttons 43 at the ends of portions 45 of elements 27 and 29 received in these holes. Strip 73 extends from the inner end of hole 53 to the inner end of hole 55 for engagement by contact buttons 43 at the ends of portions 45 of elements 29 and 31 received in these holes. Strip 75 extends from the inner end of hole 57 to the inner end of hole 59 for engagement by contact buttons 43 at the ends of portions 45 of elements 31 and 33 received in these holes. At the inner end of hole 61 is provided a contact plate 77 for engagement by contact button 43 at the end of portion 45 of element 33 received in the hole 61. A two-wire electric cord 79 extends into the space provided by groove 67 around the standard through a hole 81 in the hub. One wire 83 of the cord is connected to contact plate 69. The other wire 84 of the cord is connected to contact plate 77. The end portions of the looped elements 27, 29, 31 and 33 are entered in the respective holes by spreading their inner end portions 45 apart to clear the hub, then releasing them for springing entry of end portions 45 in the holes. The resilience of the looped elements not only holds their end portions 45 in the holes, but also provides for good electrical contact between buttons 43 and contact plates 69 and 77 and bridge strips 71, 73 and 75. The arrangement is such that the resistance wires 37 of the four heating elements 27, 29, 31 and 33 are connected in series in a circuit between contact plates 69 and 77 as follows: from contact plate 69 through wire 37 in element 27, bridge strip 71, wire 37 in element 29, bridge strip 73, wire 37 in element 31, bridge strip 75, and wire 37 in element 33 to contact plate 77.

Slidably telescoped on the upper end of the standard 1 is a head 85 having a frusto-conical upper end 87 provided with a plurality of radial slots 89 in its conical part. Slidable in each of the slots is a clothes-supporting arm 91. Each arm is held captive with respect to the head by having upset inner and outer end portions 93 and 95. Each arm is adapted to occupy a retracted position in which it hangs vertically downward inside the standard 1, being held in said position by the engagement of its upset outer end portion 95 with the head (see Fig. 4). Each arm is adapted to be pulled upward out of the head and then angled to a horizontal position extending laterally outward from the head for hanging clothes or the like thereon (see Figs. 1 and 2 and the one arm shown extended in Fig. 4). The arm is held in its extending position by engagement of its inner upset end portion 93 with the inside of the head.

For drying clothes and the like, the drier is set up as shown in Figs. 1 and 2, and the arms 91 are pulled out from within the standard and angled to their laterally extending position for hanging articles to be dried thereon.

The heating elements 27, 29, 31 and 33 are swung downward to their operative position extending laterally outward from the standard. The cord 79 is plugged in to supply current to the heating elements. This effects heating of the articles for drying by convection and radiation. It may be desirable to provide a canopy of plastic material or cloth to cover the articles being dried, the canopy being open at the bottom to allow heated air to rise from the heating elements into the space enclosed by the canopy. The head 85 is rotary on the upper end of the standard, allowing for rotation of arms 91 to facilitate hanging the articles.

When the drying has been completed, the drier is collapsed for being stored away by returning arms 91 to their retracted position inside the standard, swinging heating elements 27, 29, 31 and 33 to their collapsed position extending upward alongside the standard, and swinging legs 3 upward to their collapsed position as described.

Figs. 7–10 show a second embodiment of the invention wherein the heating elements are adapted to act as fan blades and are mounted for rotation on the vertical axis of the standard, and wherein an electric motor is provided on the standard for rotating the heating elements. A standard 1 corresponding to the standard employed in the first embodiment is used. The standard has legs 3, corresponding to those of the first embodiment and having the same pin and slot connections to the standard. The second embodiment also corresponds to the first in using head 85 carrying arms 91.

The second embodiment also includes a hub 97 made of electrical insulation material somewhat like the hub 25 of the first embodiment, but in this case the hub 97 is rotary on the standard and located above the spider members 11. It is retained on the standard by a thrust bearing 100 press-fitted on the standard. The hub 97 serves for mounting two heating elements 101 and 103, each of which is made essentially like the elements 27, 29, 31 and 33 above described. Each of the heating elements 101 and 103 is mounted on the hub for pivotal movement on a horizontal axis by entering its opposed end portions 45 into a pair of holes provided in the hub for that purpose. The holes for element 101 are designated 105 and 107, and those for element 103 are designated 109 and 111. Holes 105 and 107 are located on one side of the diametrical plane of the hub indicated at C in Fig. 9, the axis of the holes being horizontal and parallel to this plane. Holes 109 and 111 are located on the other side of the plane C, their axis being parallel to the axis of holes 105 and 107.

As in the first embodiment, heating elements 101 and 103 are adapted for swinging movement between a collapsed position extending upward from the hub alongside the standard 1 and an extended position extending laterally outward from the standard in opposite directions. The extended position of the elements is determined by their engagement with a horizontal plate 113 corresponding to plate 63 and secured to the lower part of the hub as by means of a threaded member 115. Member 115 is formed as a pulley. Plate 113 has radial slots 116 which accommodate the legs 3 when the legs are collapsed.

The hub is formed with an internal annular groove 117 providing a space around the standard. At the inner end of the hole 105 is provided a contact plate 119 for engagement by contact button 43 at the end of portion 45 of element 101 received in the hole 105. At the periphery of the groove 117 there is provided a conductive bridge strip 121 extending from the inner end of hole 107 to the inner end of hole 111. The bridge strip 121 is engaged by contact buttons 43 at the ends of portions 45 of elements 101 and 103 received in the holes 107 and 111. At the inner end of hole 109 is provided a contact plate 123 for engagement by contact button 43 at the end of portion 45 of element 103 received in the hole 109. On the outer periphery of the

hub are two slip rings **125** and **127**. A wire **129** connects slip ring **125** to the contact plate **119**, and another wire **131** connects slip ring **127** to the other contact plate **123**.

Mounted on the standard in position surrounding the hub is a guard **133**. This guard carries brushes **135** and **137** cooperable with the slip rings **125** and **127**. Mounted on the standard below the hub is a low-speed electric motor **139**. This has its shaft extending vertically and projecting above the upper end of the motor. On the upper end of the shaft is provided a pulley **141**. A spring belt **143** is trained around this pulley and the pulley member **115**. Pulley **115** is relatively large and pulley **141** is relatively small to provide for a speed reduction as between the motor and hub. At **145** is indicated an electric cord. The cord has a connection to the motor as indicated at **147**. It extends upward into the standard and then out through a hole **149** in the standard for connection of the two wires thereof to the brushes **135** and **137**.

After the heating elements **101** and **103** have been mounted by entering their end portions **45** in the holes provided therefor in the hub, sheet-metal fan blades **151** are mounted on the heating elements as by means of clips **153** (see Fig. 10). The heating elements are bent to provide the pitch for the blades (see Fig. 10).

For drying clothes and the like, the second embodiment is set up in much the same manner as the first embodiment, legs **3** being extended, heating elements **101** and **103** being extended, and arms **91** placed in their article-hanging position. The cord **145** is plugged in to supply current to motor **139** and heating elements **101** and **103**. The resistance wires **37** of the two heating elements **101** and **103** are connected in series in a circuit between the contact plates **119** and **123** as follows: from contact plate **119** through wire **37** in element **101**, bridge strip **121**, and wire **37** in element **103** to contact plate **123**. The hub and the heating elements are rotated and an upward flow of heated air results, drying the clothes. When drying has been completed, the drier is collapsed for being stored away by returning arms **91** to their retracted position, swinging heating elements **101** and **103** to their collapsed position extending upward alongside the standard, and swinging the legs **3** upward to their collapsed position.

In either one of the two above-described embodiments of the invention, a thermostat may be connected in the electrical circuit for the heating elements and mounted on the standard or elsewhere for controlling the temperature of the heating elements, if so desired. A timer-controlled switch may be used in the electrical circuit in either of the two embodiments for automatically controlling the period of operation. This may be mounted on the standard or elsewhere.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A collapsible and portable drier for clothes and the like comprising a standard, collapsible legs for supporting the standard in vertical position, a hub on the standard adjacent its lower end, a plurality of electrical resistance heating elements pivotally attached to the hub for swinging movement between an operative position extending laterally outward from the standard and a collapsed position extending upward alongside the standard, each heating element being in the form of a loop having inwardly directed end portions received in holes in the hub, and a plurality of arms carried by the standard for movement between a retracted position and a position extending laterally outward from the standard at its upper end.

2. A collapsible and portable drier as set forth in claim 1 wherein the hub is fixed to the standard.

3. A collapsible and portable drier as set forth in claim 1 wherein the hub and the heating elements are mounted for rotation on the vertical axis of the standard, wherein the heating elements have fan blades mounted thereon, and wherein an electric motor is provided on the standard for rotating the hub and heating elements.

4. A collapsible and portable drier as set forth in claim 1, wherein each heating element comprises a length of tubing and a resistance wire extending through the tubing and electrically insulated therefrom.

5. A collapsible and portable drier for clothes and the like comprising a standard, collapsible legs for supporting the standard in vertical position, a hub on the standard adjacent its lower end, a plurality of electrical resistance heating elements pivotally attached to the hub for swinging movement between an operative position extending laterally outward from the standard and a collapsed position extending upward alongside the standard, each heating element comprising a length of metal tubing bent into the form of a loop with inwardly directed opposed end portions, contact buttons at the ends of the tubing insulated from the tubing, a resistance wire extending through the tubing from one contact button to the other and insulated from the tubing, the hub having pairs of holes receiving the opposed end portions of the respective heating elements, the hub further having a contact plate at the inner end of the hole for one end portion of one heating element engaged by the respective contact button, a second contact plate at the inner end of the hole for one end portion of another heating element engaged by the respective contact button, electrically conductive bridge means extending between the inner ends of others of the holes and engaged by the contact buttons on the end portions of the heating elements received in the respective holes for connecting the resistance wires of the heating elements in series between said contact plates, and a plurality of arms carried by the standard for movement between a retracted position and a position extending laterally outward from the standard at its upper end.

6. A collapsible and portable drier as set forth in claim 5 wherein the hub is fixed to the standard.

7. A collapsible and portable drier as set forth in claim 5 wherein the hub and the heating elements are mounted for rotation on the vertical axis of the standard, wherein the heating elements have fan blades mounted thereon, and wherein an electric motor is provided on the standard for rotating the hub and heating elements.

8. A collapsible and portable drier for clothes and the like comprising a standard, collapsible legs for supporting the standard in vertical position, a plurality of electrical resistance heating elements in the form of arms pivotally attached to the standard adjacent its lower end for swinging movement between an operative position extending laterally outward from the standard and a collapsed position extending upward alongside the standard, and a plurality of arms carried by the standard for movement between a retracted position and a position extending laterally outward from the standard at its upper end, the heating elements being adapted to act as fan blades and being mounted for rotation on the vertical axis of the standard, and an electric motor on the standard for rotating the heating elements.

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