

May 13, 1958

W. J. ASHWORTH

2,834,122

DRIER

Filed Oct. 22, 1954

5 Sheets-Sheet 1

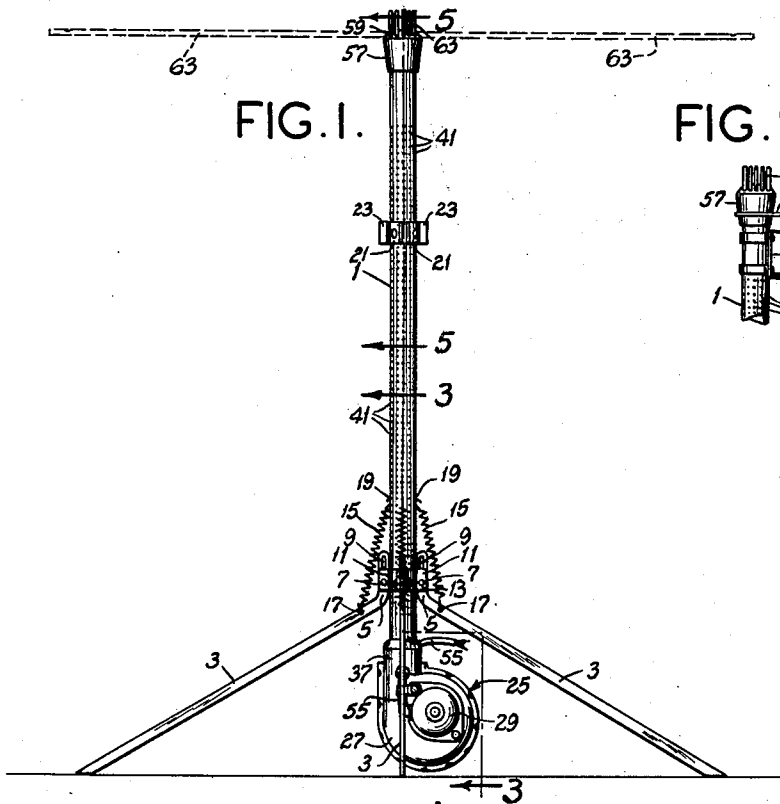


FIG. 1.

FIG. 9.

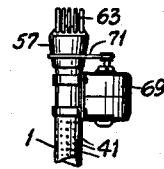
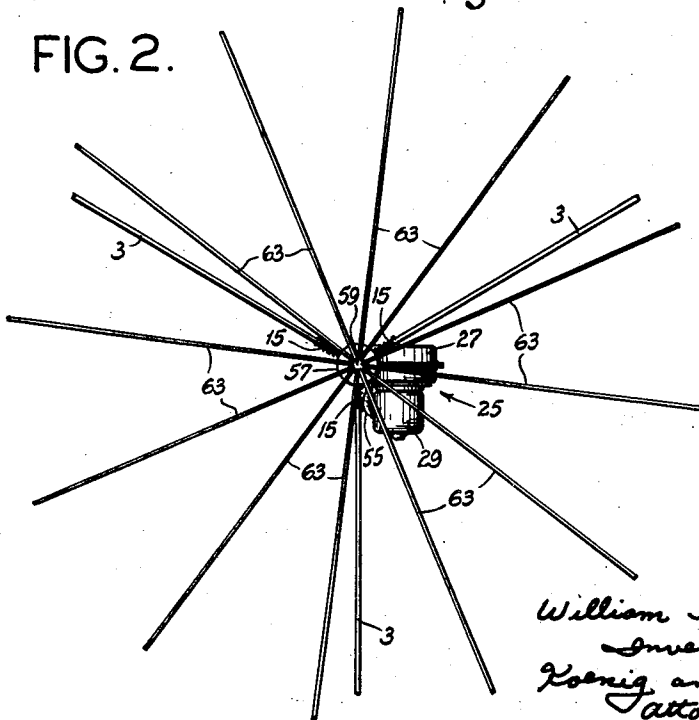


FIG. 2.



William J. Ashworth,
Inventor.
Koenig and Pope,
Attorneys.

May 13, 1958

W. J. ASHWORTH

2,834,122

DRIER

Filed Oct. 22, 1954

5 Sheets-Sheet 3

FIG. 7.

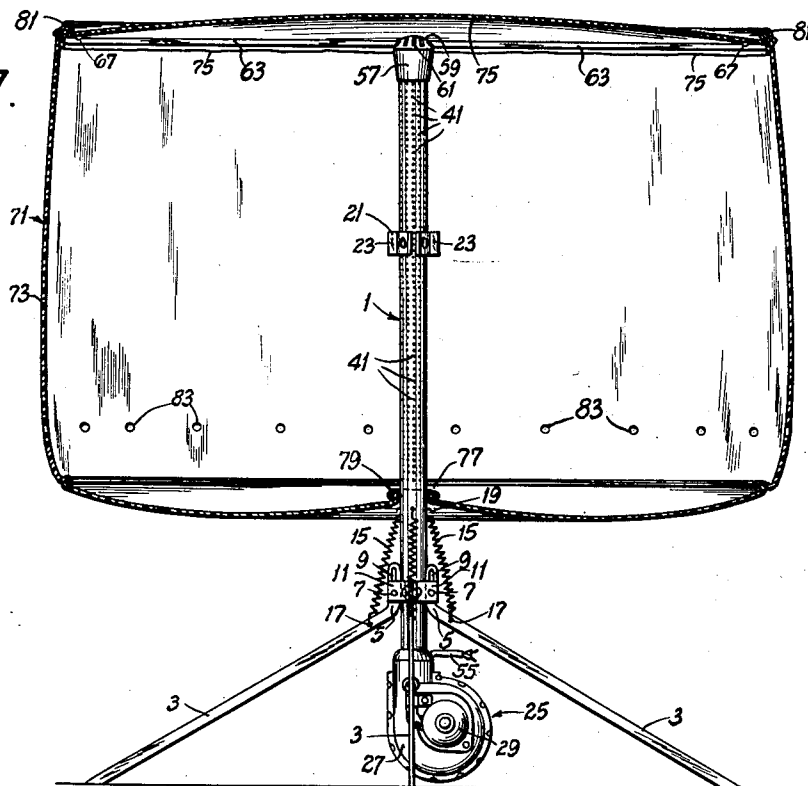
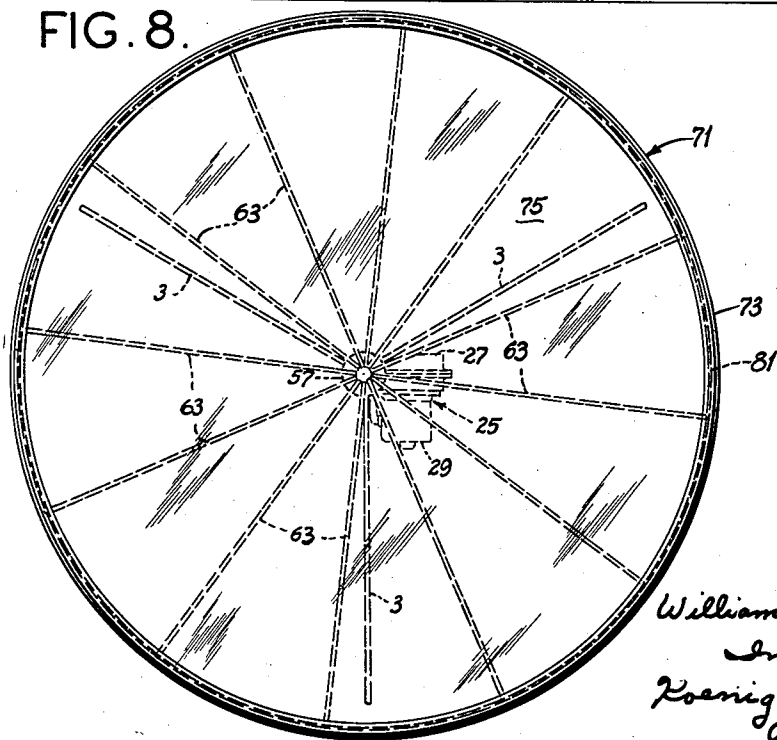


FIG. 8.



William J. Ashworth,
Inventor.
Koenig and Pope,
Attorneys.

May 13, 1958

W. J. ASHWORTH

2,834,122

DRIER

Filed Oct. 22, 1954

5 Sheets-Sheet 4

FIG. 10.

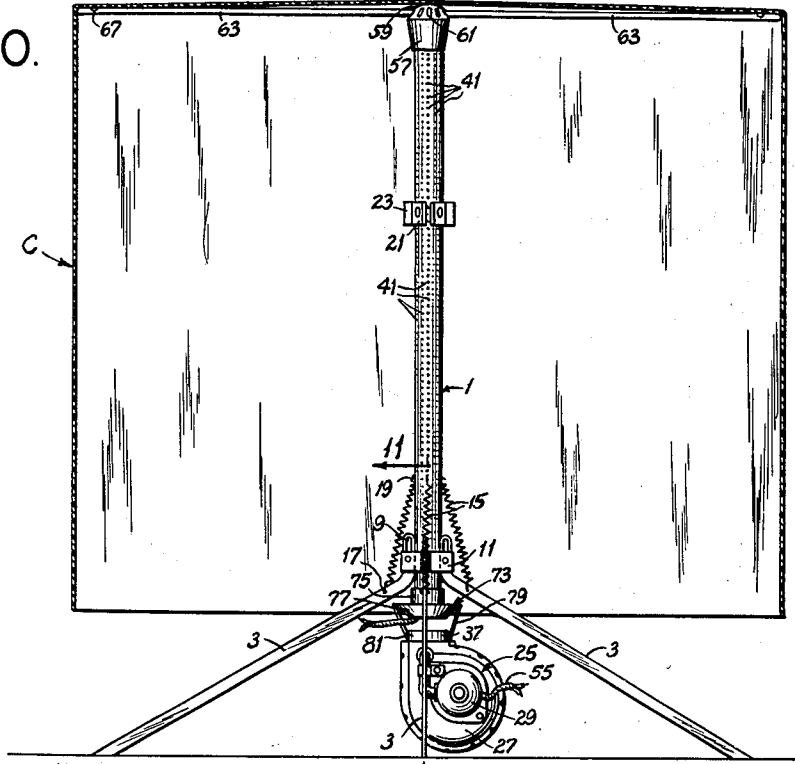


FIG. 11.

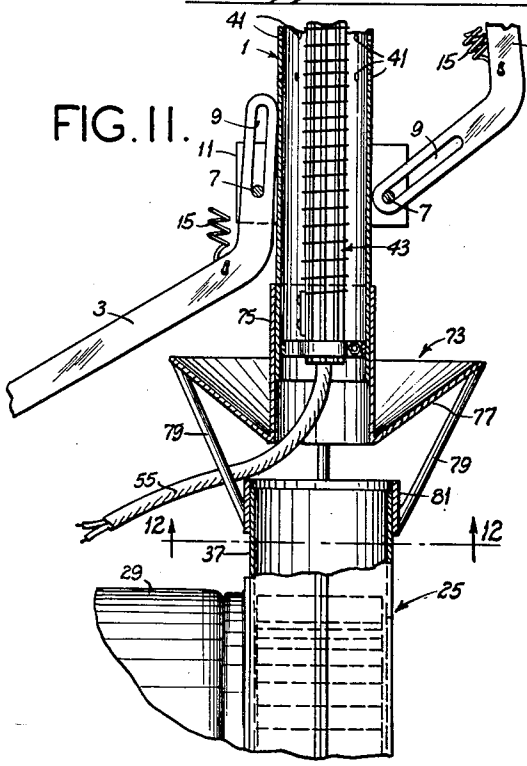
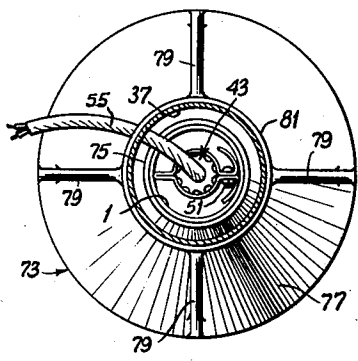


FIG. 12.



William J. Ashworth,
Inventor.
Koenig and Pope,
Attorneys.

May 13, 1958

W. J. ASHWORTH

2,834,122

DRIER

Filed Oct. 22, 1954

5 Sheets-Sheet 5

FIG. 13.

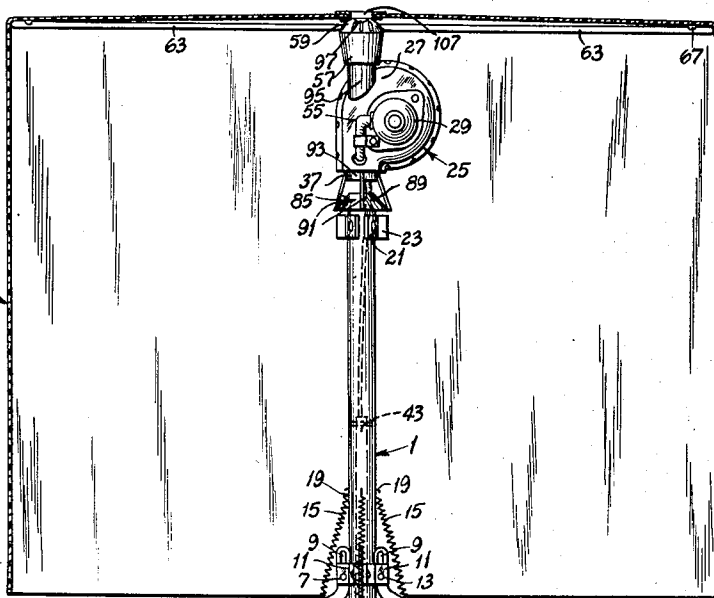


FIG. 14.

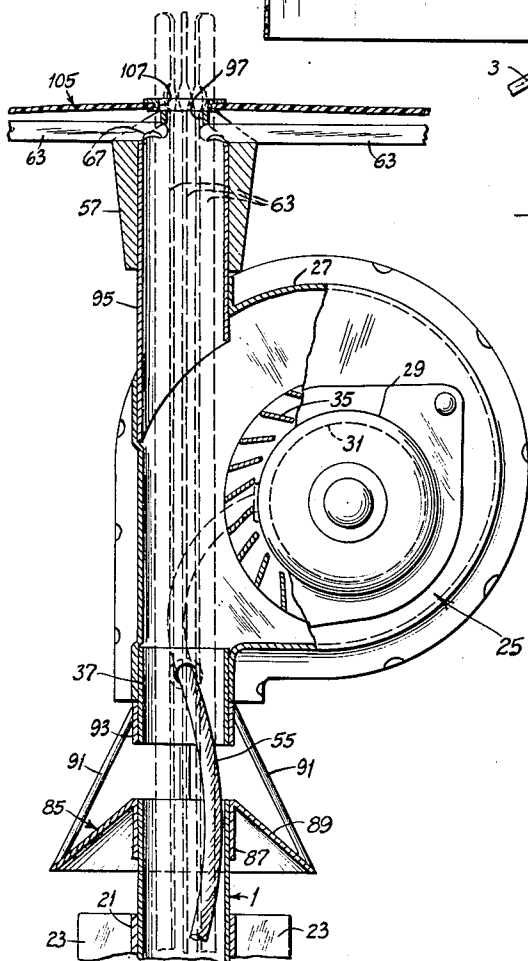
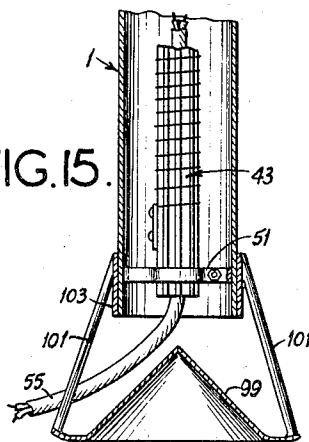


FIG. 15.



William J. Ashworth,
Inventor.
Koenig and Pope,
Attorneys.

1

2,834,122

DRIER

William J. Ashworth, Memphis, Tenn., assignor to Mechanical Patents, Inc., Memphis, Tenn., a corporation of Tennessee

Application October 22, 1954, Serial No. 463,993

9 Claims. (Cl. 34-163)

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

This application is a continuation-in-part of my copending application entitled Clothes Drier, Serial No. 416,026, filed March 15, 1954, now abandoned.

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 for rapidly drying the articles by means of heated air; the provision of apparatus of this class which may be readily collapsed for being stored away in a minimum of space when not in use, and which may be readily set up for use; the provision of apparatus of this class which has a relatively large capacity for articles to be dried; the provision of apparatus of this class with means for accomplishing substantially uniform drying action; the provision of an improved collapsible leg construction for a drier of this class; 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 as it appears when set up, certain arms of the drier being shown in retracted position in full lines, and in extended position in dotted lines;

Fig. 2 is a plan of Fig. 1, showing the arms in extended position for hanging clothes or the like thereon;

Fig. 3 is an enlarged vertical cross section taken on line 3-3 of Fig. 1, showing one leg of the drier in collapsed position;

Fig. 4 is an enlarged horizontal cross section taken on line 4-4 of Fig. 3;

Fig. 5 is an enlarged vertical cross section taken on line 5-5 of Fig. 1, showing one leg in collapsed position as in Fig. 3, and showing one arm extended;

Fig. 6 is an enlarged horizontal cross section taken on line 6-6 of Fig. 5;

Fig. 7 is a view similar to Fig. 1 showing the drier set up and with its arms extended, and showing in section a cover applied thereto;

Fig. 8 is a plan of Fig. 7;

Fig. 9 is a view showing a first modification;

Fig. 10 is a view similar to Fig. 7 showing another modification of the drier, and a different cover which is used therewith;

Fig. 11 is an enlarged vertical section taken on line 11-11 of Fig. 10;

Fig. 12 is a horizontal section taken on line 12-12 of Fig. 11;

Fig. 13 is a view similar to Figs. 7 and 10 showing still

2

another modification of the drier, and a different cover which is used therewith;

Fig. 14 is an enlarged vertical section of the upper end of Fig. 13; and,

Fig. 15 is an enlarged vertical section taken on line 15-15 of Fig. 13.

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

Referring to the Figs. 1-8 of the drawings, a first form of drier constructed in accordance with this invention is shown to comprise 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 along side 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.

At 25 is indicated a centrifugal fan comprising a scroll housing 27 having an electric motor 29 mounted on one side and having an air inlet opening 31 in its other side. The motor shaft 33 extends into the scroll housing and has a fan wheel 35 mounted thereon in the housing. The housing has a tangential air outlet throat 37 which is connected to the lower end of the standard 1 as by means of a screw 39 so that the air delivered by the fan is delivered upward into the standard through its lower end. With the housing having its tangential throat 37 connected to the lower end of the standard, the motor shaft 33 is horizontal. The length and inclination of the legs 3 when extended is such as to allow room for the fan under the standard when the legs are in standard-supporting position and the drier is standing on the floor (see Fig. 1). The standard has a multiplicity of small holes 41 throughout its height for lateral exit of air.

Mounted inside the standard extending upward from its lower end is an electrical resistance heating element generally designated 43 for heating air delivered into the

3

standard by the fan. It also heats the standard. It is shown as comprising a core 45 of insulating material, such as a ceramic core, having a resistance wire 47 coiled therearound. The heating element 43 is held in position extending axially inside the standard as by means of upper and lower clamp members 49 and 51 clamped to the core 45 at its ends, the upper clamp being secured to the standard by means of a screw 53. At 55 is indicated an electric cord for supplying current to the motor and the heating element.

Slidably telescoped on the upper end of the standard 1 is a head 57 having a frusto-conical upper end 59 provided with a plurality of radial slots 61 in its conical part. Slidable in each of the slots is a clothes-supporting arm 63. Each arm is held captive with respect to the head by having upset inner and outer end portions 65 and 67. 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 67 with the head. The upper end of the heating element 43 is below the lower ends of the retracted arms. 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 Fig. 2 and the one arm shown extended in Fig. 5). The arm is held in its extending position by engagement of its inner upset end portion 65 with the inside of the head.

For drying clothes and the like, the drier is set up as shown in Fig. 1, and the arms 63 are pulled out from within the standard and angled to their laterally extending position (see Figs. 2, 7 and 8) for hanging articles to be dried thereon. The cord 55 is plugged in to supply current to the motor and the heating element. This heats the standard and causes a flow of heated air out through the holes in the standard to dry the articles hung on the arms by heat radiated from the standard and by the flow of heated air. The head 57 is rotary on the upper end of the standard, allowing for rotation of arms 63 to facilitate hanging the articles.

Figs. 7 and 8 show a cover 71 in place on the drier for enclosing articles (not shown) hung on the extended arms 63 for obtaining a more uniform drying action. The cover comprises a bag 73 and a top closure 75 for the bag. Both the bag and the closure may be made of flexible sheet plastic material, for example. The top closure 75 is circular, having a diameter corresponding to the diameter of the circle defined by the ends of the extended arms 63. The bag has a central opening 77 in its bottom for receiving the standard. The margin of the bag around the opening 77 may be made resiliently stretchable as by puckering the bag material and providing an elastic band 79 surrounding the opening. This enables the opening to be enlarged for passage of the head 57 (arms 63 being retracted) and members 21 in applying the bag to the standard. It also provides for making a sliding seal with the standard. The diameter of the bag is slightly larger than the diameter of the circle defined by the ends of the extended arms 63 and the bag is adapted to surround the extended arms and the articles hung thereon for drying. The upper end of the bag is made resiliently stretchable, as by puckering the bag material and providing an elastic band 81, so that in its unstretched condition it bounds a smaller area than the area of the top closure 75. The bag has a row of holes 83 in its peripheral wall adjacent its bottom.

The bag is mounted on the standard 1 as shown best in Fig. 7 with the standard received in the central bottom opening 77 of the bag. After the arms 63 have been extended, and articles to be dried hung thereon, the top closure 75 is placed in position overlying the arms (and the articles). Then the upper end of the bag is stretched and drawn around the ends of the extended arms and allowed to contract over the margin of the top closure. This suspends the bag from the arms. Air delivered through

4

the holes in the standard establishes some degree of pressure inside the bag. This pressure causes the closure to bulge out, thereby establishing a tight seal between the margin of the closure and the inwardly contracted upper end of the bag. The hot air circulates and is evenly distributed within the resultant enclosure for uniform drying action, humid air exiting through the holes 83 in the bag. Any water dripping from the articles hung on the arms 63 is caught in the bottom of the bag.

When the drying has been completed, the bag 73 is pulled down, the closure 75 removed, and the dried articles taken off the arms 63. The drier may then be collapsed for storage by returning the arms 63 to their retracted position inside the standard, and swinging the legs 3 upward to their retracted position in the manner described. The bag may be removed from the standard, or allowed to remain on the standard and wrapped around it in umbrella-like fashion.

Fig. 9 illustrates a modification in which the head 57 is positively rotated to shorten the drying time, as by means of a low-speed electric motor 69 mounted adjacent the upper end of the standard, with a spring belt drive 71 to the head, the latter having an annular groove receiving the belt. Otherwise, the Fig. 9 modification is the same as shown in Figs. 1-8.

Figs. 10-12 illustrate another form of drier of this invention which is the same as the drier shown in Figs. 1-8 with the exception that the fan 25 is mounted with the end of its tangential air outlet throat 37 spaced below the lower end of the standard 1, the diameter of the throat being greater than the diameter of the standard; also, a deflector 73 is provided at the lower end of the standard for deflecting part of the air delivered by the fan laterally outward with respect to the standard. As shown, the deflector 73 comprises a sleeve 75 fitted on and secured to the lower end of the standard, the sleeve being provided with a flange 77 of inverted cone-shape. The fan is mounted in the stated position by means of suspension rods 79 secured at their upper ends to the flange 77 and at their lower ends to a sleeve 81 in which is secured the end of the throat 37. A different type of cover from that shown in Figs. 7 and 8 is used. This cover, designated C, simply comprises a bag-like canopy which is placed in position surrounding articles hung on the arms 63 in the manner shown in Fig. 10. In the operation of the drier shown in Figs. 10-12, part of the air delivered by the fan passes up through the standard, is heated, and exits through the holes 41 in the standard. Part of the air is diverted laterally outward and upward by the flange 77 and strikes the heated air delivered through the holes in the standard to cause a turbulent air action within the cover C which improves the drying action.

Figs. 13-15 illustrate still another modification in which the fan 25, instead of being mounted at the lower end of the standard 1 for blowing air upward into the standard, is mounted at the upper end of the standard for blowing air downward into the standard. The diameter of the tangential air outlet throat 37 is again larger than the diameter of the standard. The end of the throat 37 of the fan is spaced above the upper end of the standard, and a deflector 85 is provided at the upper end of the standard for deflecting part of the air delivered by the fan laterally outward with respect to the standard. The deflector 85 comprises a sleeve 87 fitted on and secured to the upper end of the standard, the sleeve having a flange 89 of upright cone-shape. The fan is supported by means of rods 91 secured at their lower ends to the flange 89 and at their upper ends to a sleeve 93 in which is secured the downwardly directed throat 37 of the fan. The fan in this case is modified by providing its scroll housing 27 with an upwardly extending tube 95 aligned with the throat 37 and the standard. The head 57 is mounted on the upper end of this tube 95. Arms 63, when retracted, hang down from the head 57, extending

5

through the tube 95 and the fan housing past the fan wheel 35 (see Fig. 14). The head 57 in this case is provided with a central opening 97 in its upper end. The standard as shown in Figs. 13-15 does not have holes 41, although such holes may be provided if desired. A cone-shaped deflector 99 is provided at the lower end of the standard for deflecting laterally outward the air exiting from the lower end of the standard. This deflector is carried by suspension rods 101 which extend downward from a sleeve 103 fixed on the lower end of the standard. In other respects, the drier shown in Figs. 13-15 is similar to the drier shown in Figs. 1-8 and the drier shown in Figs. 10-12. A cover 105 similar to that shown in Fig. 10 is used in conjunction with the Fig. 13 drier, with the exception that the cover 105 has a central opening 107 which registers with the opening 97 in the head 57.

In the operation of the drier shown in Figs. 13-15, part of the air delivered by the fan passes downward through the standard, is heated by the heater 43, and the heated air is deflected laterally outward by the lower deflector 99 and rises into the cover 105 (see Figs. 13 and 15). The inlet of the fan is inside the cover, and hence the fan recirculates air within the cover. Part of the air delivered by the fan is deflected laterally outward by the upper flange 89 into the upper portion of the space enclosed by the cover (see Figs. 13 and 14). This air tends to hold down the hot air rising up into the cover, thereby tending to keep the temperature in the lower portion of the space enclosed by the cover higher than in the upper portion of this space. This is conducive toward uniform drying, since the moisture in the articles hung on the arms 63 tends to run toward the lower ends of the articles. Relatively cool and dry outside air is introduced by suction through the openings 107 and 97 in the cover 105 and the head 57 and is continually mixed with the air being recirculated by the fan. This forces out some of the moist air from within the cover through the open bottom of the cover. The lower deflector 99 may be omitted, in view of the natural tendency of the hot air exiting from the lower end of the standard to rise, if the temperature of the air is not so high that it might scorch the floor or a rug on which the drier is placed.

It will be understood that in any one of the above-described embodiments of the invention a thermostat may be connected in circuit with the heating element and mounted on the standard or elsewhere for controlling its temperature, if so desired. It will be further understood that a timer may be used in conjunction with the motor and heating element, likewise mounted on the standard or elsewhere, for automatically controlling the period of operation.

In each embodiment, the standard, being slender, is easy to handle and occupies minimum space when the drier is in storage. The centrifugal fan provides a relatively large volume of air. The motor, being mounted horizontally, does not require any end thrust bearing.

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 tubular standard; collapsible legs on the standard for supporting it in vertical position, each of said legs being adapted to be moved from a standard-supporting position extending laterally outward and downward from the standard to a collapsed position extending upward alongside the standard; a centrifugal fan

6

comprising a scroll housing having a tangential air outlet mounted at the lower end of the standard for blowing air into the lower end of the standard, an electric motor mounted on one side of the housing with its shaft extending horizontally into the scroll housing; and a fan wheel on the shaft inside the housing; an electrical resistance heating element for heating air blown into 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 standard having holes for lateral exit of heated air therefrom, and said legs, when in standard-supporting position, holding the standard with its lower end spaced above the floor a distance greater than the overall height of the centrifugal fan.

2. A collapsible and portable drier as set forth in claim 1 wherein the fan is mounted with the end of its tangential air outlet spaced below the lower end of the standard, and wherein a deflector is provided at the lower end of the standard for deflecting part of the air delivered by the fan laterally outward with respect to the standard.

3. A collapsible and portable drier for clothes and the like comprising a tubular standard; legs pivotally connected to the standard above its lower end, each of said legs being adapted to be swung from a standard-supporting position extending laterally outward and downward from the standard to a collapsed position extending upward alongside the standard; a centrifugal fan comprising a scroll housing having a tangential air outlet mounted at the lower end of the standard, an electric motor mounted on one side of the housing with its shaft extending horizontally into the scroll housing, and a fan wheel on the shaft inside the housing; an electrical resistance heating element for heating air blown into 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 standard having holes for lateral exit of heated air therefrom, and said legs, when swung to standard-supporting position, holding the standard with its lower end spaced above the floor a distance greater than the overall height of the centrifugal fan.

4. A drier as set forth in claim 3, wherein each leg has an angled end portion with a pin and slot connection between said angled end portion and the standard, each leg having a standard-supporting position in which the pin of its pin and slot connection is at one end of the slot and the angled end portion of the leg extends upward alongside the standard and in engagement with the standard to lock the leg against swinging upward, each leg being movable relative to the standard to the point where the pin is at the other end of the slot, whereupon the leg may be swung upward to a collapsed position extending upward alongside the standard.

5. A drier as set forth in claim 3, wherein each leg has an angled end portion, said angled end portion having a slot, horizontal pins, one for each leg, mounted on the standard and spaced outward from the standard, each pin extending through a respective slot, each leg having a standard-supporting position in which the respective pin is at the lower end of the respective slot and the angled end portion of the leg extends upward alongside the standard and in engagement with the standard to lock the leg against swinging upward, each leg being movable downward relative to the standard to the point where the pin is at the upper end of the slot, whereupon the leg may be swung upward to a collapsed position extending upward alongside the standard.

6. A drier as set forth in claim 5, further comprising spring means for biasing the legs upward.

7. A collapsible and portable drier for clothes and the like comprising a tubular standard; legs pivotally connected to the standard above its lower end, each of said legs being adapted to be swung from a standard-support-

7

ing position extending laterally outward and downward from the standard to a collapsed position extending upward alongside the standard; a centrifugal fan comprising a scroll housing having a tangential air outlet mounted at the lower end of the standard for blowing air into the lower end of the standard, an electric motor mounted on one side of the housing with its shaft extending horizontally into the scroll housing, and a fan wheel on the shaft inside the housing; an electrical resistance heating element for heating air blown into the standard and located toward its lower end; a head at the upper end of the standard having radial slots, and arms slidable in the slots, each arm having means toward its ends for holding it captive with respect to the head, and being adapted for movement between a retracted position hanging down from the head inside the standard and a position extending laterally outward from the head; the standard having holes for lateral exit of heated air therefrom, and said legs, when swung to standard-supporting position, holding the standard with its lower end spaced above the floor a distance greater than the overall height of the centrifugal fan.

8. A drier as set forth in claim 7 wherein the heating element comprises an insulation core in the standard toward the lower end of the standard having a resistance wire coiled therearound, the upper end of the heating element being below the lower ends of the retracted arms.

8

9. A collapsible and portable drier for clothes and the like comprising a tubular standard, collapsible legs on the standard for supporting it in vertical position, a fan mounted at the lower end of the standard for blowing air upward into the standard, said fan being spaced below the lower end of the standard, a deflector at the lower end of the standard for deflecting part of the air delivered by the fan laterally outward with respect to the standard, a heater for heating air blown into the standard, said standard having holes for lateral exit of heated air therefrom, 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.

References Cited in the file of this patent

UNITED STATES PATENTS

1,072,089	Connelly	Sept. 2, 1913
1,863,756	Lufkin	June 21, 1932
1,893,096	Michaud	Jan. 3, 1933
2,402,458	Smith, Jr.	June 18, 1946
2,597,215	Wright et al.	May 20, 1952
2,621,802	Stover	Dec. 16, 1952
2,701,921	Strongson	Feb. 15, 1955

FOREIGN PATENTS

683,288	Great Britain	Nov. 26, 1952
---------	---------------	---------------