

Nov. 30, 1943.

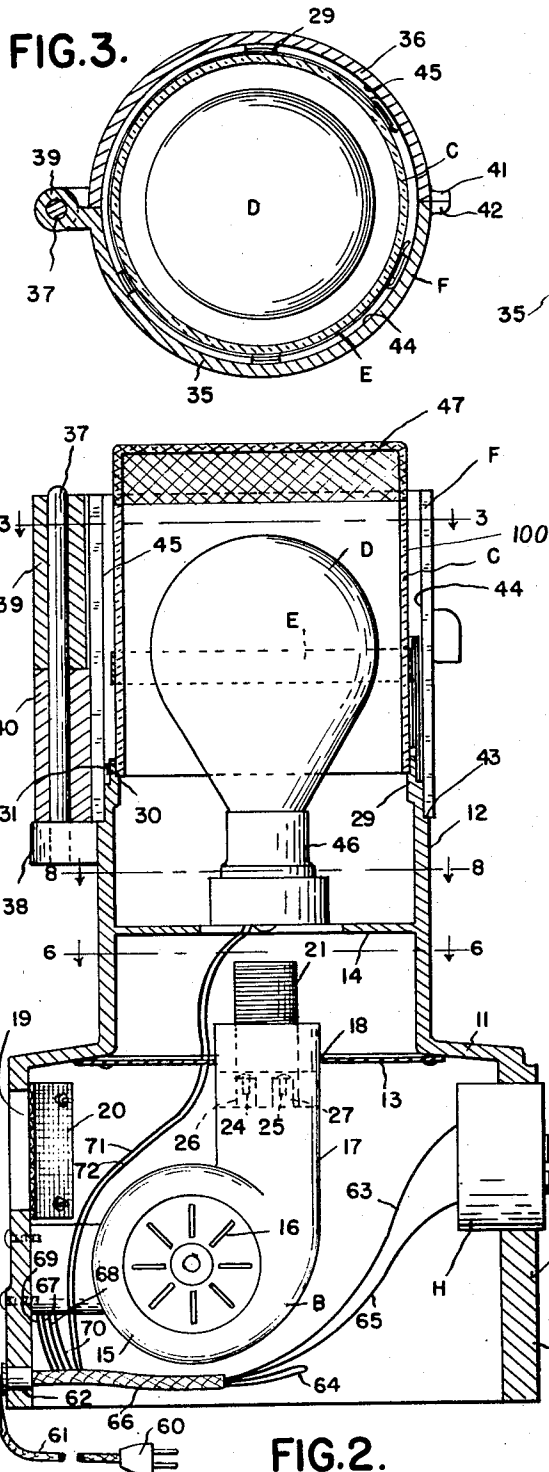
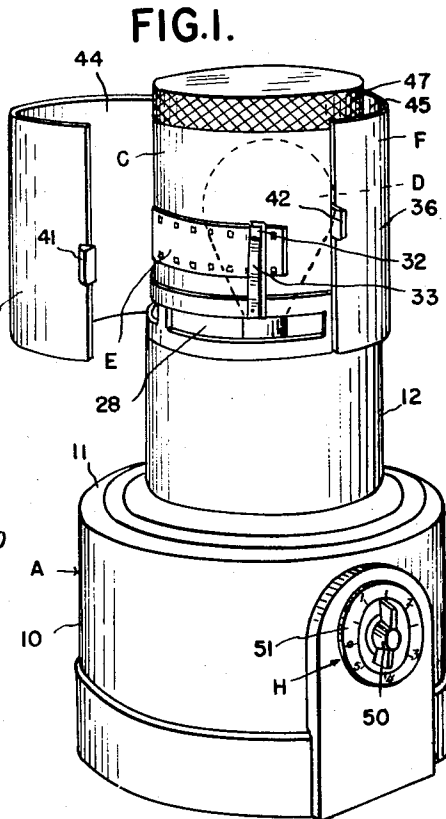
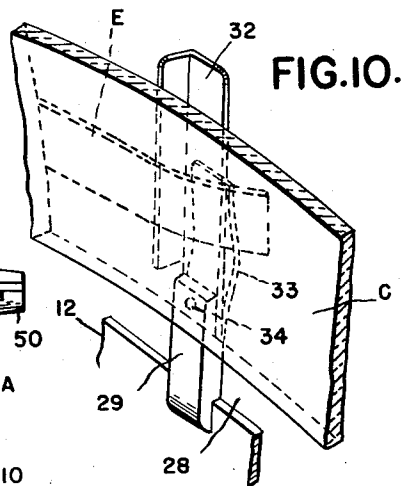
J. A. SCHUCH

2,335,798

DRIER

Filed Oct. 20, 1941

2 Sheets-Sheet 1



INVENTOR.

JOHN A. SCHUCH

BY

William H. Huber & Company
ATTORNEYS

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DRIER

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2 Sheets-Sheet 2

FIG. 4.

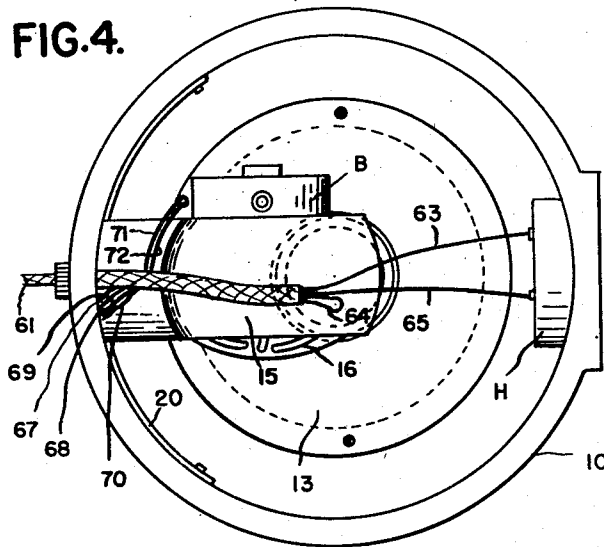


FIG. 8.

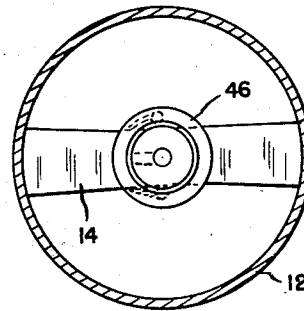


FIG. 5.

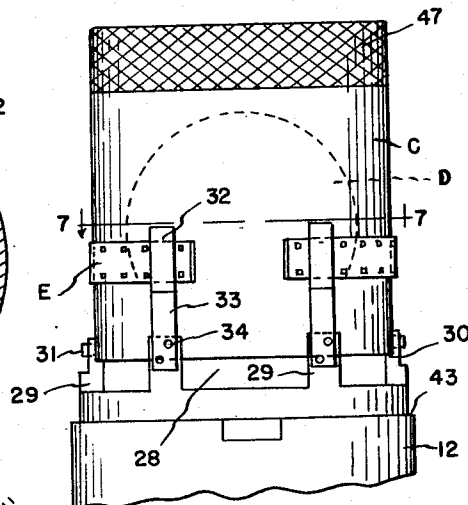


FIG. 6.

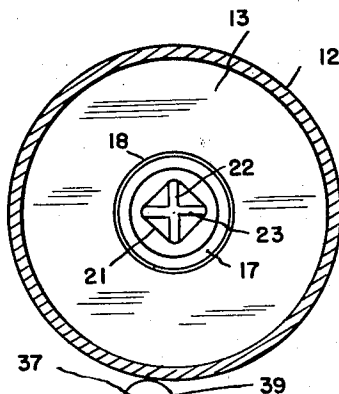


FIG. 7.

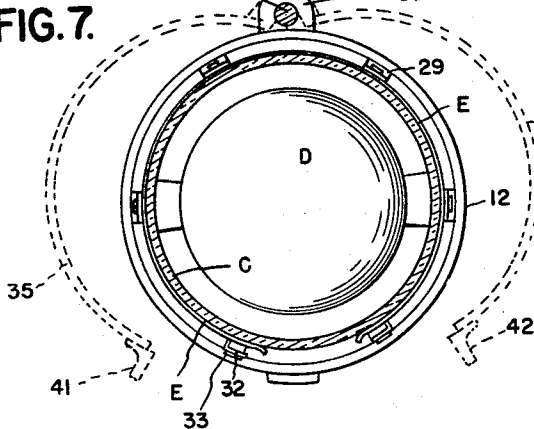
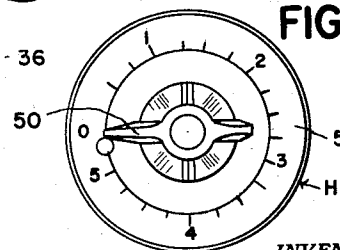


FIG. 9.



INVENTOR.

JOHN A. SCHUCH

BY

William H. Huber & Associates
ATTORNEYS

UNITED STATES PATENT OFFICE

2,335,798

DRIER

John A. Schuch, Wyandotte, Mich., assignor to
Harry W. Dietert, Detroit, Mich.

Application October 20, 1941, Serial No. 415,809

9 Claims. (Cl. 34—103)

This invention relates generally to driers and refers more particularly to electric driers for drying pliable sheet material such as photographic film and the like.

One of the essential objects of the invention is to provide a compact portable drier of this type wherein the sheet material is dried on a form which enables the sheet material to be flat when dried. By placing the sheet material on a form while being dried, it is possible to obtain a much flatter sheet than otherwise. This is particularly important when making a spectro analysis of a given sample as the flat photographic film facilitates accurate density measurements of the spectro lines from which the percentage of elements present in such sample are determined.

Another object is to provide a drier wherein currents of warm air and a heating element capable of giving off a large percentage of infra-red heat rays are employed with the form for drying the sheet material. Thus, it is possible to dry the sheet material rapidly.

Another object is to provide a drier wherein the form mentioned is provided with a sectional enclosure that may be opened to permit the sheet material to be placed upon or removed from the form and that is provided upon the inside thereof with a reflector for the heat rays.

Another object is to provide a drier wherein the sheet material is held on the form by suitable flexible means which cooperate with the form to prevent the sheet material from curling while being dried.

Another object is to provide a drier wherein the form and enclosure are constructed and arranged in such a way relative to the heating element that the rays from the heating element may pass through the form to the sheet material and enclosure and what are not used or dissipated strike the reflector of the enclosure and are reflected back onto the sheet material on the form. Thus, the maximum heating efficiency is obtained.

Another object is to provide a drier wherein the currents of warm air have relatively high velocity which increases the heat conductivity.

Another object is to provide a drier having a timer unit capable of cutting off automatically the heating element so that the blower may continue to blow unheated air against the sheet material to cool it to room temperature. This also improves the flatness of the sheet material.

Another object is to provide a drier wherein the form for the sheet material has an opaque

top portion that shields the light rays from the eyes of the operator.

Another object is to provide a drier that is simple in construction, economical to manufacture, and efficient in operation.

Other objects, advantages and novel details of construction of this invention will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view of a drier embodying my invention and showing one of the doors in open position;

Figure 2 is a vertical sectional view through the drier;

Figure 3 is a horizontal sectional view taken substantially on the line 3—3 of Figure 2;

Figure 4 is a bottom plan view of the drier;

Figure 5 is a fragmentary elevation of the housing, form and film in place upon the latter;

Figure 6 is a horizontal sectional view taken substantially on the line 6—6 of Figure 2;

Figure 7 is a sectional view taken substantially on the line 7—7 of Figure 5 and showing by dotted lines a partially opened position of the doors;

Figure 8 is a horizontal sectional view taken substantially on the line 8—8 of Figure 2;

Figure 9 is an elevation of the front of the timer unit;

Figure 10 is a fragmentary perspective view of the housing and form and showing a portion of the photographic film applied to the latter.

Referring now to the drawings, A is the housing, B is the blower or fan, C is the form for the sheet material, and D is the infra-red heating element of a drier embodying my invention.

As shown, the housing A has a hollow cylindrical base 10 provided at its upper end with an intumed annular flange 11, and has a hollow cylindrical portion 12 of smaller dimensions than the base extending upwardly from the inner edges of the intumed flange 11. A horizontal partition 13 is detachably secured to the underside of the flange 11, while a relatively narrow crossbar 14 extends diametrically across the cylindrical portion 12 in substantially parallel relation to said partition.

The blower or fan B has a motor housing 15 mounted within the base 10 and provided with inlet openings 16 for air, and has an upstanding tubular outlet portion 17 extending upwardly through an opening 18 in the partition 13. Air for the inlet openings 16 is admitted to the base 10 through an elongated opening 19 in one upright side thereof and such opening is preferably

provided with a suitable screen or metal filter cloth 20. Preferably the air handled by the blower B is heated by a suitable electric heating element 21 mounted within the tubular outlet portion 17 thereof. In the present instance, this heating element 21 is a nichrome wire wound upon crossed sheets 22 and 23, respectively, of mica and has at its lower end suitable electric terminals 24 and 25 that are plugged in electric sockets 26 and 27, respectively, therefor in the outlet portion 17 of the blower.

The form C for the sheet material is a hollow cylinder open at the bottom and closed at the top. Preferably this form is made of transparent material such as pyrex glass; however, it could be made from any other suitable material such as from other plastics or even from thin sheet metal. The cylindrical wall 100 of this form is adapted to be engaged by and constitute a seat for the sheet material, and as it is important that the sheet material be flat when dried, the exterior surface of such cylindrical wall is ground smooth. In the present instance, the form C constitutes a dome for the housing and is supported above the open upper end of the cylindrical portion 12 of the housing so that a space 28 constituting an outlet for air is provided therebetween. For this purpose there are a number of upstanding lugs 29 at circumferentially spaced points of the upper edge of the cylindrical portion 12 having upon their inner sides suitable shoulders 30 that constitute seats for the lower edge of the form C. Any suitable means such as the set screws 31 threadedly engaging the lugs may be used to hold the form C in position upon such seats.

The sheet material such as photographic film E is applied flat against the form C, as illustrated in Figures 1 and 7, and is held in this position by spring pressed clips 32 carried by the lugs 29. As shown, these clips are light sheet metal stampings of substantially L-cross section and have depending portions secured to the outer sides of the lugs 29. Leaf springs 33 are also carried by the lugs and urge the clips inwardly against the form C. In fact, screws 34 threadedly engaging the lugs 29 serve as a common anchorage means for the clips 32 and springs 33.

Substantially concentric with the form C and cooperating therewith to constitute an upwardly extending flue for air from the outlet 28 is a sectional enclosure F that preferably comprises a pair of doors 35 and 36, respectively, hingedly mounted upon an upright pin or post 37 carried by a horizontal lug 38 projecting radially outward from the cylindrical portion 12 of the housing. Preferably these doors have upright tubular portions 39 and 40, respectively, sleeved on the pin or post 37 and are provided at their free ends with finger pieces 41 and 42, respectively, by which they may be conveniently manipulated. When closed, the doors 35 and 36 engage a circular groove or recess 43 in the cylindrical portion 12 of the housing and constitute an upward extension thereof. Thus, air discharged from the outlet opening 28 into the space between the form C and the closed doors will be directed by the latter over the sheet material E on the outside of the form C. Moreover, the inside surfaces 44 and 45, respectively, of the doors are polished or provided with suitable means for reflecting heat against the sheet material E on the form.

The infra-red heating element D is upon the inside of the form C and preferably comprises a 375-watt infra-red lamp detachably engaging an

electric socket 46 on the crossbar 14 of the housing. To prevent the light rays from this lamp shining into the eyes of the operator, the top portion of the form C may be painted black or provided with any suitable opaque or dark covering 47. Such covering extends slightly below the upper edges of the doors 35 and 36 so as to cooperate therewith to shield the eyes of the operator from the light rays and to confine such rays to the inside of the enclosure F and thus obviate waste.

For controlling the operation of the drier and especially the electric heater 21 thereof, I have provided in an upright wall of the base 10 a timer unit H having a manually operable minute hand 50 movable over a dial 51 containing indicia representing minutes and quarters thereof. An electric switch (not shown) is within the timer unit and is associated with the minute hand 50 in such a way that the electric circuit to the other electric elements such as the electric heater 21, blower B or lamp D may be closed and opened as desired. The particular mechanism of this timer unit forms no part of the present invention and therefore need not be described. In the present instance, electric current from a suitable source such as an electric wall socket (not shown) may be obtained by an electric plug 60 at the free end of an electric cable 61 leading through an opening 62 in the base. The electric circuit of the drier includes a wire 63 from the cable 61 to the timer unit H, and wires 64 and 65, respectively, from the cable 61 and timer unit H to a splicing 66 which preferably includes wires 67 and 68, respectively, to and from the motor of the blower B, wires 69 and 70, respectively, to and from the sockets 26 and 27 for the heating element 21, and wires 71 and 72, respectively, to and from the lamp D or any other combination thereof depending upon the control desired.

In use, the switch of the timer H controls the heating cycle and will stop the heating operation at the end of a selected time interval. When the timer switch is closed, air will be discharged from the blower B and will be heated by the electric element 21. Such heated or warm air will flow upwardly in the housing past the crossbar 14 to the outlet 28 where it will be directed by the closed doors 35 and 36 over the wet sheet material such as the emulsion coated photographic film E on the form C. The clips 32 will effectively hold the film E on the form C and will cooperate with such form to maintain the film in flat condition. The rays from the lamp D will pass through the form C to the film E and what are not used or dissipated will strike the inner reflecting surfaces 44 and 45 of the doors and will be reflected back onto the film E. Thus, a fast drying period of forty-five seconds will suffice for drying the film, and as the latter is held flat against the form C, it will not curl when dried. After the heating cycle is over, the operator may allow the film E to remain on the form C for a predetermined period. If desired, the electric circuit mentioned may be such that the heating element 21 may be cut out so unheated air from the blower B may be blown onto the film E to cool it to room temperature and thereby improve the flatness thereof.

What I claim as my invention is:

1. A drier of the class described having an upright form for articles to be dried, said form being hollow and comprising a cylindrical wall of heat transmitting material, an infra-red lamp

within said form and adapted to radiate heat through the cylindrical wall of the form, an enclosure substantially concentric and cooperating with the cylindrical wall of the form to provide therebetween an annular flue for air, means within said flue for holding articles to be dried against the outer surface of the cylindrical wall of said form in the path of heat radiated from said lamp, said enclosure having means opposed to the outer surface of the cylindrical wall for reflecting heat radiated from said lamp toward the articles aforesaid to be dried, and means for forcing air through said flue to dry said articles.

2. A drier of the class described having an upright form for articles to be dried, said form being hollow and comprising a cylindrical wall of heat transmitting material, an infra-red lamp within said form and adapted to radiate heat through the cylindrical wall of the form, an enclosure substantially concentric and cooperating with said cylindrical wall to provide therebetween an annular flue for air, means within said flue for holding articles to be dried against the outer surface of the cylindrical wall of said form in the path of heat radiated from said lamp, and means for forcing air through said flue to dry the articles aforesaid.

3. A drier of the class described having an upright form for articles to be dried, said form being hollow and comprising a cylindrical wall of heat transmitting material, an infra-red lamp within said form and adapted to radiate heat through the cylindrical wall of the form, means for holding articles to be dried against the outer surface of the cylindrical wall of said form in the path of heat radiated from said lamp, a sectional enclosure for said form substantially concentric with and spaced from the cylindrical wall of the form so as to provide therebetween an annular flue for air, said enclosure having means for reflecting toward the articles on the cylindrical wall of the form the heat radiated from said lamp, one or more sections of said enclosure being movable relative to said form to afford access to said holding means and the articles held thereby, and means for forcing air through said flue to dry the articles aforesaid.

4. A drier of the class described having an upright form for the articles to be dried, said form being hollow and comprising a cylindrical wall of heat transmitting material, heating means within the form for radiating heat through the cylindrical wall of the form, a sectional enclosure substantially concentric and cooperating with the cylindrical wall of the form to provide an annular flue for air, means within said flue for holding articles to be dried against the cylindrical wall of the form in the path of heat radiated from the heating means, and means for forcing air through said flue to dry the articles held against the cylindrical wall of said form.

5. A drier of the class described having an upright form for the articles to be dried, said form being hollow and comprising a cylindrical wall of heat transmitting material, said form having a closed opaque top, heating means within the form for radiating heat through the cylindrical wall of the form, a sectional enclosure substantially concentric and cooperating with the cylindrical wall of the form to provide an annular flue for air, means within said flue for holding articles to be dried against the cylindrical wall of the form in the path of heat radiated from said heating means, one or more sections of the enclosure being movable relative to the form to afford access

to the holding means and articles held thereby, and means for forcing unsaturated air upwardly through the flue to dry articles held against the cylindrical wall of said form.

6. A drier of the class described having an upright form for the articles to be dried, said form being hollow and comprising a cylindrical wall of heat transmitting material, the outer surface of the cylindrical wall of the form constituting a seat for articles to be dried, an infra-red heating element within said hollow form in a position to radiate heat through the cylindrical wall of said form, an enclosure for the form substantially concentric with and spaced from the cylindrical wall of the form so as to provide therebetween an annular flue for air, said enclosure having means for reflecting the radiated heat toward the articles to be dried on said seat, means within the flue for holding articles to be dried on said seat, and means for forcing air through said flue to dry articles held on said seat.

7. A drier of the class described having an upright housing provided adjacent the bottom thereof with an air inlet, a hollow closed top form mounted on the housing and comprising a cylindrical wall of heat transmitting material, an enclosure substantially concentric and cooperating with the cylindrical wall of the form to provide a flue, an outlet for air from the housing to the flue being provided between the interior of the housing and the exterior of the form, an infra-red ray lamp within said hollow form and adapted to radiate heat through the cylindrical wall of said form, means in the flue in the path of heat radiated from the lamp for holding articles to be dried, and means in the housing for forcing air from the inlet through the outlet to the flue to dry articles being held in said flue.

8. A drier of the class described having an upright housing provided adjacent the bottom thereof with an air inlet, a hollow form mounted on the housing and comprising a cylindrical wall of heat transmitting material, an enclosure substantially concentric and cooperating with the cylindrical wall of the form to provide a flue, an outlet for air from the housing to the flue being provided between the interior of the housing and exterior of the form, an infra-red ray lamp within said hollow form and adapted to radiate heat through the cylindrical wall of said form, means in the flue in the path of heat rays from the lamp for holding the articles to be dried against the outer surface of the cylindrical wall of said form, and means within the housing for circulating air from the air inlet through the air outlet to the flue to dry articles being held on the cylindrical wall of the form.

9. A drier of the class described having a hollow housing provided adjacent the bottom thereof with an inlet for air, a hollow form mounted upon the housing and comprising an upright substantially cylindrical wall with which articles to be dried may be engaged, an enclosure spaced from and cooperating with the cylindrical wall to provide therebetween an upwardly extending flue, said hollow housing having an outlet for air communicating with the flue at the lower end thereof, means within the flue for holding articles to be dried against the cylindrical wall of the form, and means within the housing for circulating air from the inlet through said outlet to the flue to dry articles held against the cylindrical wall of the form.

JOHN A. SCHUCH.