Nov. 24, 1959 W. M. BOCK, JR 2,914,308

EVAPORATING DEVICE

Filed July 25, 1955

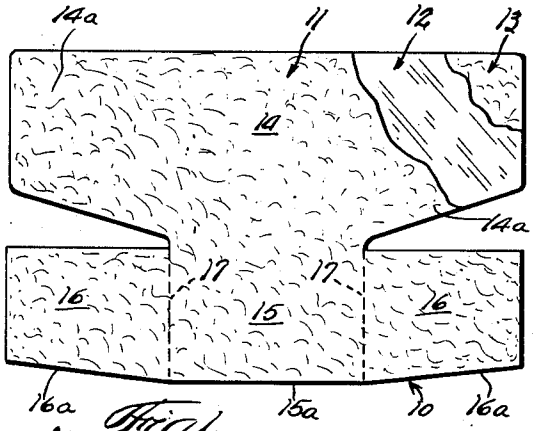


Fig. 1.

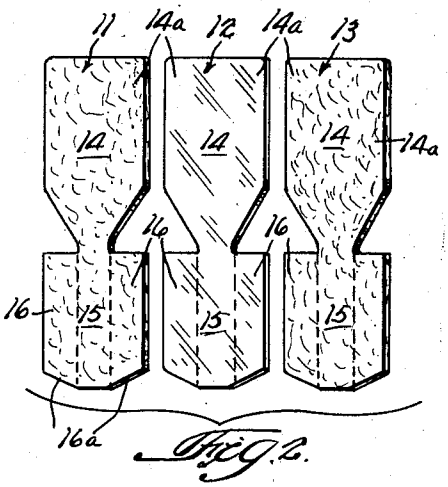


Fig. 2.

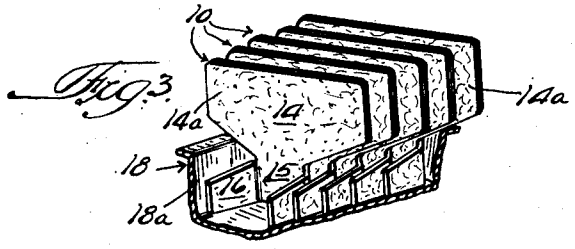


Fig. 3.

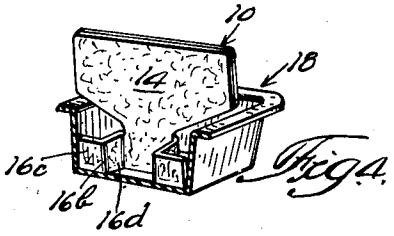


Fig. 4.

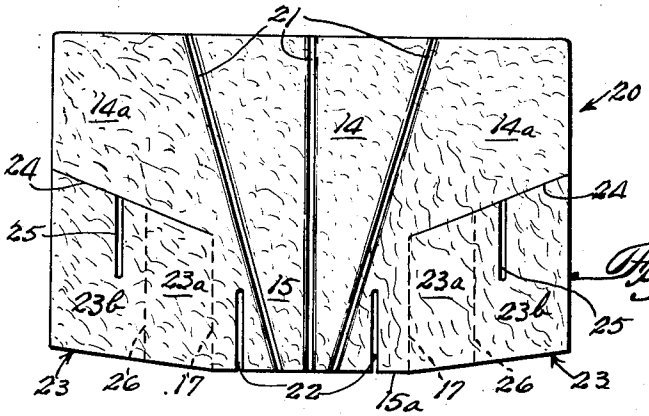


Fig. 5.

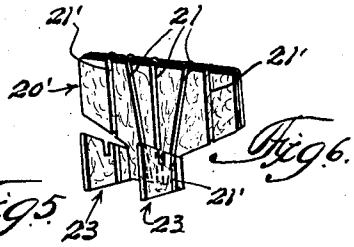


Fig. 6.

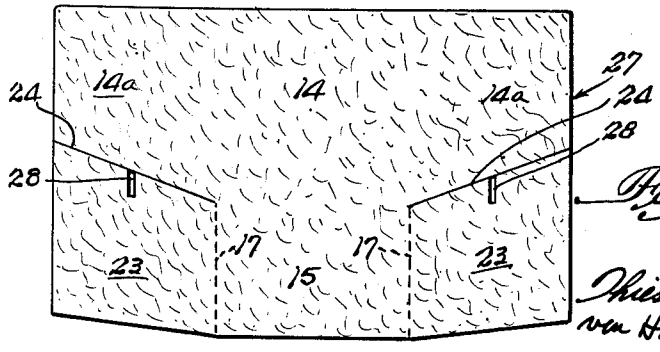


Fig. 7.

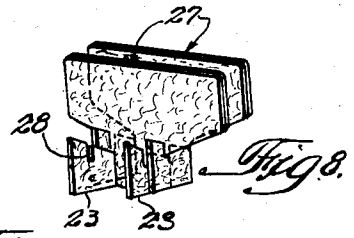


Fig. 8.

INVENTOR.
William M. Bock Jr.

BY.
Theiss, Olsen, Mecklenburger, von Holst & Coltman.

United States Patent Office 2,914,308 Patented Nov. 24, 1959

2,914,308

EVAPORATING DEVICE

William M. Bock, Jr., Milwaukee, Wis.

Application July 25, 1955, Serial No. 523,981

3 Claims. (Cl. 261—104)

This invention relates to an evaporating device adapted primarily for use in humidifying apparatus employed in forced air heating systems.

The need for proper control of humidity in homes, as well as commercial establishments, where forced air heating systems are utilized, has long been recognized as an important contributing factor in the preservation of personal property and human health as well.

The majority of humidifiers of this type, presently in use, utilize removable evaporating devices such as plates, which are partially immersed within a reservoir of liquid, such as water, and are adapted to provide more effective evaporation of the liquid from the reservoir.

Various types of evaporating devices have heretofore been proposed which have met with but limited success, because they are fragile and costly in construction, are difficult to install within or remove from the humidifying apparatus, are susceptible to encrustation caused by mineral deposits after a short period of time, which seriously impair the capillarity of the device for the liquid, and/or are adapted for use in only one given design or style of apparatus.

Thus, it is one of the objects of this invention to provide an evaporating device which effectively overcomes the aforementioned difficulties associated with prior evaporating devices.

It is a further object of this invention to provide an evaporating device which is self-supporting within the reservoir and capable of conforming substantially to the interior shape of such reservoir.

It is a further object of this invention to provide an evaporating device which has a greater liquid-evaporating area than prior devices of substantially the same size, thereby resulting in more effective liquid evaporation.

It is a further object of this invention to provide an evaporating device which is capable of interlocking with another device of like design, whereby the interlocking devices are retained in proper-spaced relation with respect to one another.

It is a still further object of this invention to provide an evaporating device which is simple, lightweight and durable in construction.

Further and additional objects will appear from the description, accompanying drawings, and appended claims.

In accordance with one embodiment of this invention, a laminated evaporating device is provided in which one of the laminations is formed of a heat-conductive material and a second lamination, bonded to the first lamination, is formed of a material wettable by the liquid in which the device is partially immersed. The laminations form a relatively stiff planar body having an upper liquid-evaporating section, a lower liquid-immersible section integral therewith, and a liquid-immersible side section foldably connected to one side of said lower section. The side section, when in folded relation, cooperates with the lower section to form a support for the device, whereby the device is self-supporting.

For a more complete understanding of this invention, reference should be made to the drawing, wherein

Fig. 1 is a layout or unfolded view of one form of the improved evaporating device;

Fig. 2 is a perspective, exploded view of the laminations forming the device of Fig. 1;

Fig. 3 is a reduced, fragmentary, perspective view of a plurality of devices of the type shown in Fig. 1, assembled within the reservoir for the liquid;

Fig. 4 is similar to Fig. 3 but showing only one device with the side sections thereof folded to provide a spacer for a like evaporating device to be positioned in front of the device shown;

Fig. 5 is similar to Fig. 1 but showing a modified form of the improved evaporating device;

Fig. 6 is a reduced perspective view of a modified form of the device of Fig. 5, shown with the side sections thereof in folded relation;

Fig. 7 is similar to Fig. 1 but showing another modified form of the improved evaporating device; and

Fig. 8 is a reduced perspective view of a pair of devices of Fig. 7, shown in assembled relation.

Referring now to the drawings, and more particularly to Figs. 1–3, one form **10** of the improved evaporator device is shown which, in this instance, is formed of three laminations, **11**, **12** and **13**. The center lamination **12** is formed of a heat conductive material, for example, a thin-gauged aluminum sheet, and the outer laminations **11** and **13**, which are bonded to the opposite surfaces of lamination **12**, are formed of a thin-gauge material, for example, 100 to 140 lb. paper stock which is readily wettable in the liquid in which the device is to be partially immersed. The laminations **11—13**, when bonded together by a suitable adhesive material, form a relatively stiff body having an upper liquid-evaporator section **14** and a lower section **15**, the latter being integral with section **14** and in substantially coplanar relation therewith and being adapted to be immersed in source of liquid. Foldably connected to opposite sides of lower section **15** is a pair of side sections **16** which, when in folded relation, cooperate with section **15** to provide a support or footing for the device **10**. It will be noted in Fig. 1 that the lower edges **16***a* of side sections **16** are angularly disposed with respect to the lower edge **15***a* of section **15** so that when the side sections are folded relative to section **15** along fold lines **17**, lower edges **16***a* and **15***a* will form a plane which is disposed at an acute angle with respect to the front side or surface of sections **14** and **15**. The purpose of this angularity is that, when the device is assembled within a suitable reservoir **18**, the latter forming a part of the humidifying apparatus, the upper section **14** of the device will have a greater portion of the surface area thereof acting as a deflector of the forced air produced in the heating system and thus result in more rapid evaporation of the liquid from the upper section **14**. By way of further explanation of the advantage obtained by reason of tilting of the device, assume that the air current through the plenum chamber is in an upward direction substantially normal to the base of reservoir **18**. If the devices disposed within the reservoir were not angularly postioned to the air current, then the air current would be obstructed by only the edges of the devices, that is to say, the thickness of material of which the devices are made. Upon inclination of the devices, however, the air current strikes more than just the narrow edges of the devices and is deflected to a greater extent by the devices, causing greater air turbulence, which results in more effective evaporation of the moisture from the devices. The reservoir **18** is adapted to be normally installed in the bonnet or plenum chamber of the furnace, so that the flow of air is in a substantially vertical direction from beneath the reservoir.

Upper section **14**, in this instance, is provided with laterally extending shoulders **14***a* which, when the device is assembled within the reservoir **18**, see Fig. 3, protrude above and outwardly from the open end of the reservoir and thereby provide a relatively large liquid-evaporating area. The side sections **16** are adapted to be immersed in the liquid contained in reservoir **18** and when in folded relation with respect to the lower section **15**, as seen in Fig. 3, frictionally engage the upwardly extending sides **18***a* of the reservoir and thereby retain the device in a substantially fixed position within the reservoir. In Fig. 4, the side sections **16** have been folded along a second fold line **16***b*, which is disposed intermediate the outer edge of the side section and fold line **17** so as to form two side-section portions **16***c* and **16***d*. The portion **16***d*, which is bounded by fold lines **17** and **16***b*, serves as a spacer between two adjacent devices and thereby maintains the devices in proper-spaced relation so that forced air may readily pass between adjacent devices. Portion **16***c*, on the other hand, extends angularly outwardly and frictionally engages the side **18***a* of the reservoir **18**.

Figs. 5 and 6 show a second and third form **20** and **20'**, respectively, of the improved evaporator device wherein the upper and lower sections **14** and **15**, respectively, thereof are substantially the same configuration as sections **14** and **15** of device **10**. Sections **14** and **15** in device **20** are held in coplanar relation with respect to one another by a plurality of stiffening ribs or beads **21** which extend from the lower edge **15***a* of section **15** to the upper edge of section **14**. In addition, form **20'** includes elongated stiffening ribs **21'** disposed in the laterally extending shoulders **14***a* of section **14**. If desired, the ribs **21'** may also extend into side sections **23**. Lower section **15** is also provided with a pair of spaced, substantially parallel, open-end slots **22** which extend upward from lower edge **15***a*. The slots **22** are also parallel to the fold lines **17** which connect lower section **15** with side sections **23**. The side sections **23**, in this instance, are struck out or severed from shoulders **14***a* of upper section **14** by lines **24**, see Fig. 5, which extend angularly downwardly toward lower section **15** and terminate at fold lines **17**. Each side section **23** is also provided with an elongated open-end slot **25** having the open end thereof terminating along the edge of the section formed by line **24**. Each side section **23** is provided, in this instance, with a second fold line **26** spaced from fold line **17** and substantially parallel thereto so as to form side-section portions **23***a* and **23***b*. When both side sections are folded along lines **17** and **26**, portions **23***a* will extend substantially convergently from lower portion **15**, and portions **23***b* will be in substantially parallel relation with respect to one another. The purpose of the relative disposition of portions **23***a* and **23***b* is that when device **20** is assembled with other devices of like configuration, the slots **25** formed in side sections **23** are adapted to interlock with the slots **22** formed in lower section **15** of the device positioned in front thereof. If desired, the folding of each side section **23** along fold line **26** may be omitted, and each section instead folded only along line **17** so that side sections are convergent with respect to one another, thereby enabling the slots **25** of one device to interlock with slots **22** of the second device. When the modified device **20** or **20'** is assembled within a suitable reservoir **18**, the upper portions of the side sections **23** will extend above the liquid level in the reservoir and provide additional liquid-evaporating surfaces for the device and thereby result in more efficient liquid evaporation without increasing the physical size of the device.

Another modified form **27** of the evaporating device is shown in Figs. 7 and 8, wherein the upper and lower sections **14** and **15**, respectively, thereof are of substantially the same configuration as the corresponding sections of device **10**, heretofore described. The side sections **23** are similar in configuration to the corresponding sections of modified device **20** with the exception that a relatively short open-end slot **28** is formed in each side section in place of the elongated slot **25** of device **20**. Slots **28** are adapted to accommodate a portion of the underside of the laterally extending shoulders **14***a* of a device **27** positioned in front thereof, as seen in Fig. 8, and thereby effect retention of the pair of devices **27** in proper-spaced relation with respect to one another so as to readily permit the forced air to pass between the plates.

While several forms of the improved evaporator device have heretofore been described and illustrated, it is to be understood, of course, that the invention is not to be limited thereto as the shape of the various sections may be varied so as to conform more specifically to the particular style of reservoir utilized for holding the liquid to be evaporated. For example, in certain instances it might be desirable for the device to be provided with only one shoulder and side section in place of the two, as shown. The laminations **11**, **12** and **13**, as heretofore mentioned, are of thin gauge material and by reason of this fact are readily fabricated to the desired shape. Furthermore, each lamination, in this instance, is of substantially the same configuration; however, if desired, the center lamination **12** might be slightly smaller in size than the outer laminations **11** and **13**. The outer laminations **11** and **13**, as heretofore mentioned, may be formed of paper material formed of long fibers and possessed of a high degree of capillarity and wet strength.

Thus, it will be seen that an evaporator device has been provided which is inexpensive and lightweight in construction, compact and durable and may be readily installed within or removed from the reservoir, which forms a part of the humidifying apparatus. In addition, by reason of one of the laminations being possessed of a high heat conductivity, more uniform evaporation of the liquid is effected throughout the device. The side sections of the device may be readily folded relative to the remainder of the device so as to more readily conform to the interior shape of the reservoir.

While several embodiments of this invention are shown above, it will be understood, of course, that the invention is not to be limited thereto, since many modifications may be made, and it is contemplated, therefore, by the appended claims, to cover any such modifications as fall within the true spirit and scope of this invention.

I claim:

1. An evaporating device adapted to be partially immersed in a source of liquid, said device comprising a pair of laminations bonded together to form a planar relatively stiff body, one of said laminations being formed of heat conductive material, and the other lamination being formed of a material wettable in such liquid; said body including an upper liquid-evaporating section, a lower liquid-immersible section integral with said upper section, said lower section having an elongated slot formed therein extending upwardly from the lower edge of said section, a liquid-immersible side section foldably connected to said lower section and being provided with an elongated slot spaced from the line of fold between said side and lower sections, said slot extending downwardly from the upper edge thereof and adapted, when said side section is in folded relation, to interlock with the slot formed in the lower section of a second device of like configuration and retain said like devices in a predetermined spaced relation.

2. An evaporating device adapted to be partially immersed in a source of liquid, said device comprising a pair of laminations bonded together to form a planar relatively stiff body, one of said laminations being formed of heat conductive material and the other lamination being formed of a material wettable in such liquid; said body including an upper liquid-evaporating section having a laterally extending shoulder, a lower liquid-immersible section integral therewith, and a side section foldably connected to said lower section and being pro-

vided with a slot formed in the upper edge thereof for receiving, when said side section is in folded relation, a portion of a second device of like configuration and effect retention of said devices in a predetermined spaced relation.

3. An evaporating device adapted to be partially immersed in a source of liquid, said device comprising a plurality of laminations bonded together to form a planar relatively stiff body, said body including a center lamination of heat conductive material, and outside laminations disposed on opposite sides of said center lamination and being formed of a material wettable in such liquid; said body including an upper liquid-evaporating section having laterally extending shoulders, a lower liquid-immersible section extending from said upper section and disposed in substantially coplanar relation therewith, and side sections foldably connected to opposite sides of said lower section and adapted, when in folded relation, to co-

operate with said lower section to form a support for said device; each side section being provided with an open-end slot formed in the upper edge thereof for accommodating a portion of a shoulder formed in a second device of like configuration and effect retention of said device in a predetermined spaced relation.

References Cited in the file of this patent

UNITED STATES PATENTS

1,329,143	Rogers	Jan. 27, 1920
1,522,018	Lodge	Jan. 6, 1925
1,606,472	Kieffer et al.	Nov. 9, 1926
1,727,658	Matteson	Sept. 10, 1929
2,161,834	Seeley	June 13, 1939
2,443,645	Turan	June 22, 1948
2,678,235	Perlman	May 11, 1954