

May 28, 1940.

W. D. SMITH

2,202,235

AIR COOLER AND/OR HUMIDIFIER

Filed Sept. 12, 1938

3 Sheets-Sheet 1

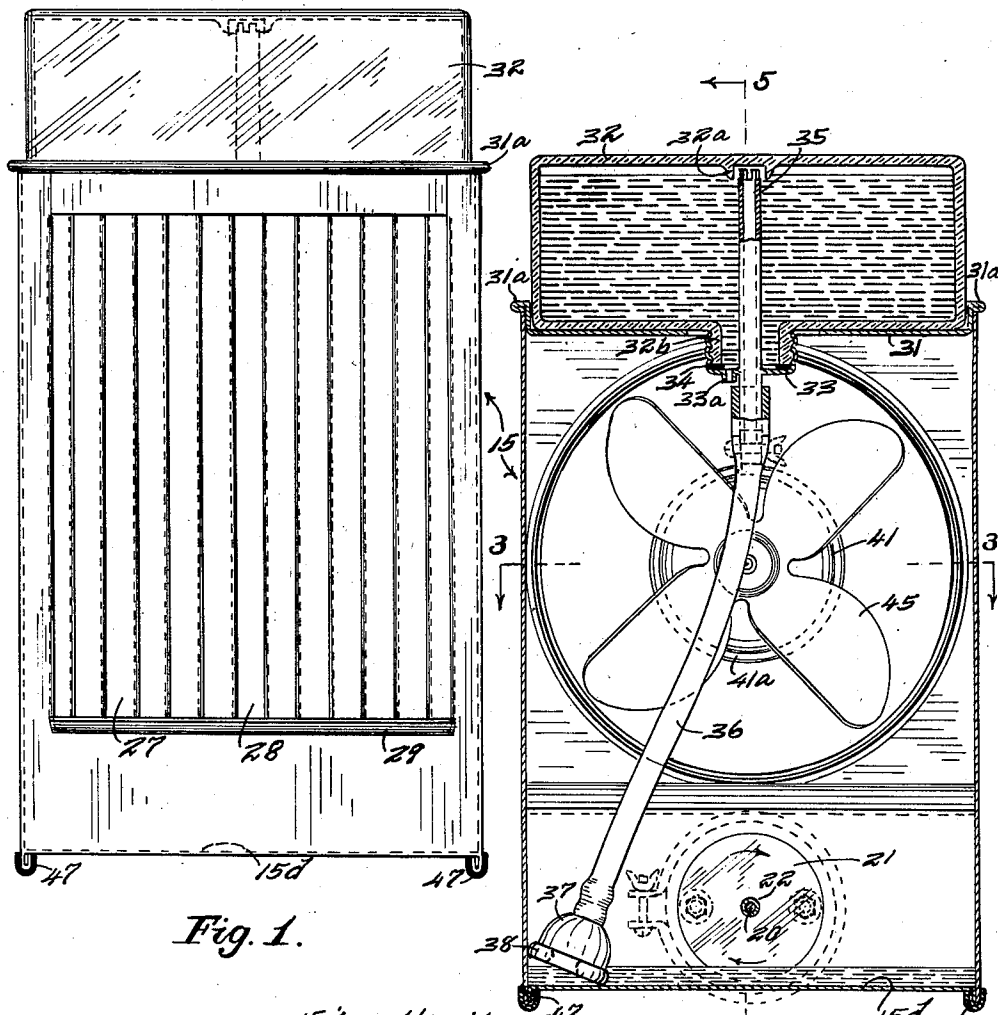


Fig. 1.

Fig. 2.

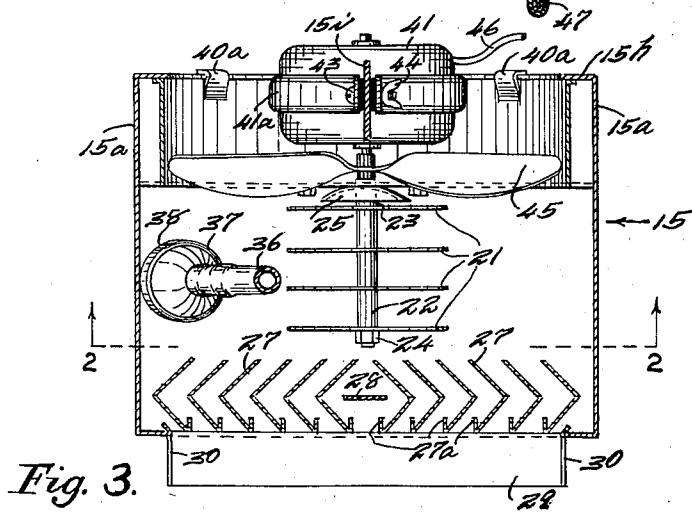


Fig. 3.

Inventor  
WEBSTER D. SMITH

By *Chas. C. Reif*  
Attorney

May 28, 1940.

W. D. SMITH

2,202,235

AIR COOLER AND/OR HUMIDIFIER

Filed Sept. 12, 1938

3 Sheets-Sheet 2

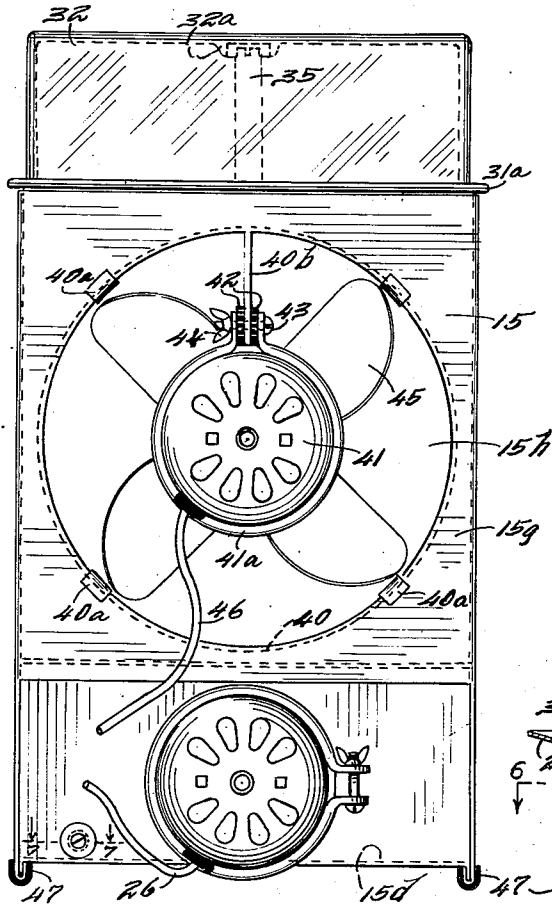


Fig. 4.

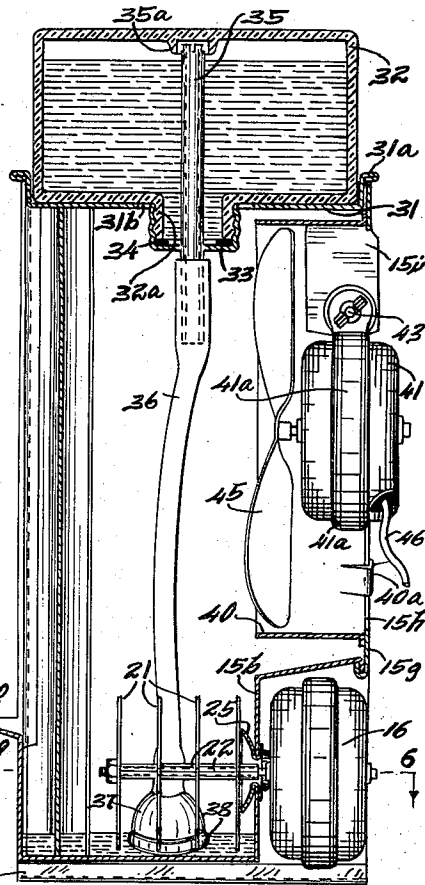


Fig. 5.

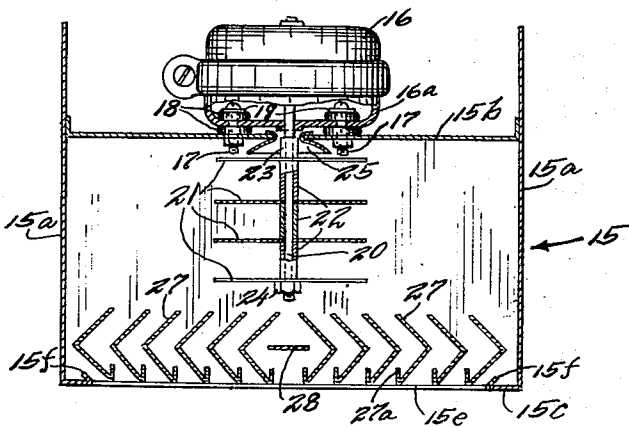


Fig. 6.

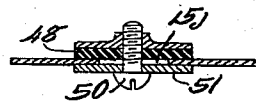


Fig. 7.

Inventor  
WEBSTER D. SMITH.

By *Chas. C. Reif*  
Attorney

May 28, 1940.

W. D. SMITH

2,202,235

AIR COOLER AND/OR HUMIDIFIER

Filed Sept. 12, 1938

3 Sheets-Sheet 3

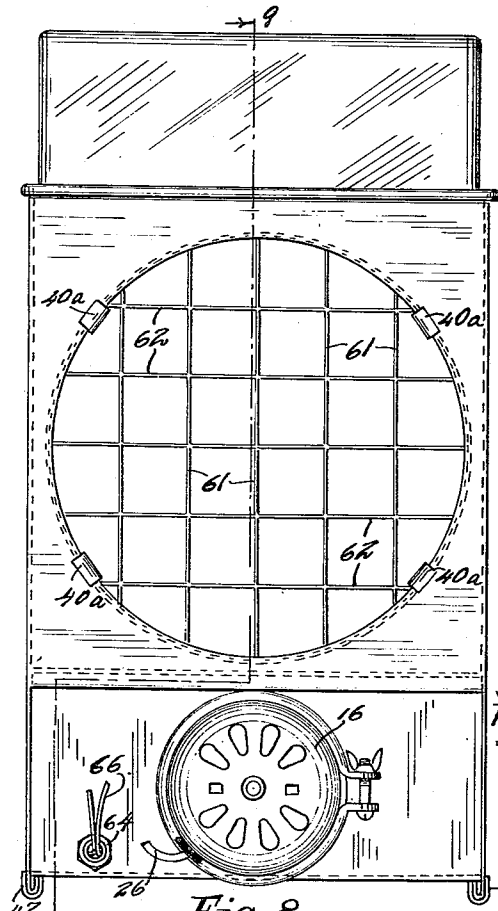


Fig. 8.

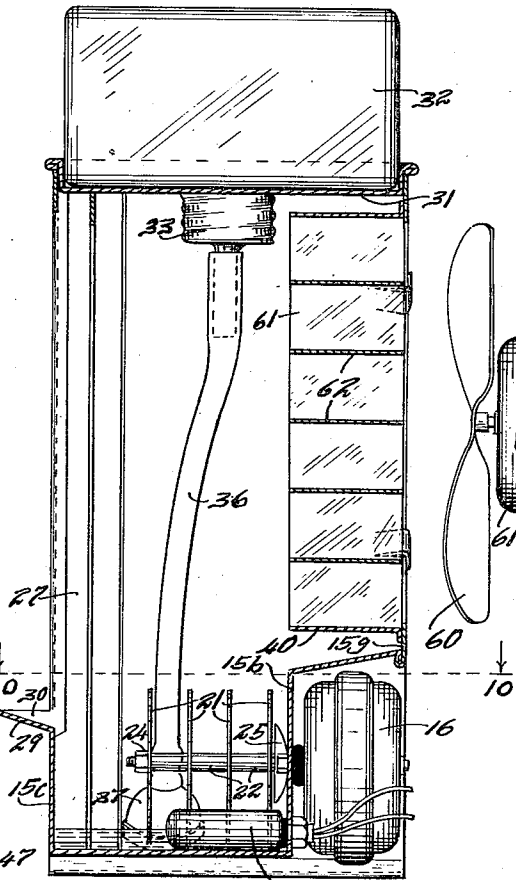


Fig. 9.

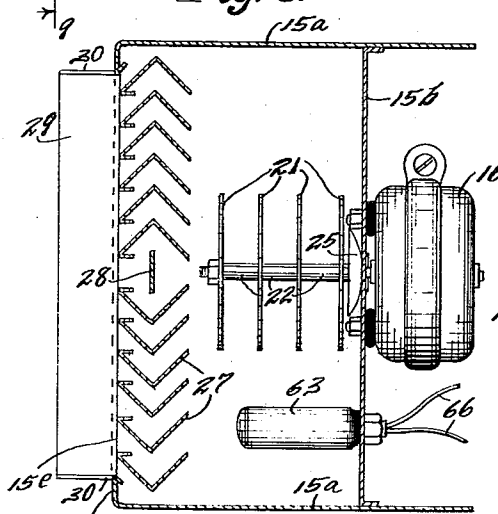


Fig. 10.

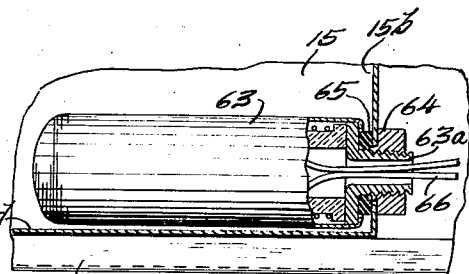


Fig. 11.

Inventor  
WEBSTER D. SMITH  
By *Chas. C. Reif*  
Attorney

# UNITED STATES PATENT OFFICE

2,202,235

## AIR COOLER AND/OR HUMIDIFIER

Webster D. Smith, Minneapolis, Minn.

Application September 12, 1938, Serial No. 229,400

2 Claims. (Cl. 261—30)

This invention relates to an air cooler and humidifier and while the invention may have various applications, it is particularly illustrated in the form of a comparatively small portable device suitable for use in rooms of a dwelling or office. It is now universally recognized that it is desirable and beneficial to keep the humidity of the air above a certain point. It is desirable during the hot periods to have a current of air in the room and to have the air cooled. If a fan is used which merely blows the dry air of the room over the occupants, discomfort and stiffness of the muscles results. This objection is avoided if the air which is moved carries a certain amount of moisture.

It is an object of this invention therefore, to provide a simple, compact, portable and efficient device for cooling and humidifying the air and one which may be placed at various points in a room.

It is a further object of the invention to provide an air cooler and/or humidifier comprising a casing having water therein and an opening in one wall together with one or more rapidly rotated disks or disk-like members which project a fine spray upwardly in said casing with means for causing a current of air to pass through said spray and out at said opening.

It is another object of the invention to provide such a device as set forth in the preceding paragraph, said casing preferably having an open top into which fits a removable water container having means extending therefrom downwardly into said casing for maintaining a level therein, said container being removable and portable so that said means may be used in connection with a faucet to fill said container.

It is still further an object of the invention to provide an air cooler and/or humidifier comprising a casing in which are mounted one or more disk-like members, a shaft to which said members are secured, a motor being resiliently mounted on said casing at the outer side thereof for driving said shaft and rotating said members at high speed together with means for preventing water from passing out of said casing about said shaft.

It is also an object of the invention to provide an air cooler and humidifier comprising a casing having a front wall with an opening therein, means for producing a spray in said casing, efficient baffle means for preventing particles of water from passing out of said casing, means for passing a current of air through said spray and

out of said opening together with a drain and air deflecting means.

It is another object of the invention to provide an air cooler and humidifier comprising a casing adapted to contain water in its lower portion and having an open upper end with means adjacent said upper end for supporting a removable water container which may be made of metal or glass and which forms the top part of said casing.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a view in front elevation of the device;

Fig. 2 is a vertical section taken on line 2—2 of Fig. 3 as indicated by the arrows;

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 2 as indicated by the arrows;

Fig. 4 is a view in rear elevation of said device;

Fig. 5 is a vertical section taken on line 5—5 of Fig. 2 as indicated by the arrows;

Fig. 6 is a horizontal section taken on line 6—6 of Fig. 5 as indicated by the arrows;

Fig. 7 is a horizontal section taken on line 7—7 of Fig. 4 as indicated by the arrows;

Fig. 8 is a rear view of a modified form of the device;

Fig. 9 is a vertical section taken on line 9—9 of Fig. 8 as indicated by the arrows;

Fig. 10 is horizontal section taken on line 10—10 of Fig. 9 as indicated by the arrows; and

Fig. 11 is a partial view similar to Fig. 9, some parts being broken away and others shown in vertical section and shown on an enlarged scale.

Referring to the drawings a device is shown comprising a casing 15. While this casing might take various forms, in the embodiment of the invention illustrated it is shown as being substantially rectangular in horizontal cross section, the same having side walls 15a, a rear wall 15b and a front wall 15c. While these walls may be variously formed and joined together in any suitable manner, rear wall 15b, as shown in Fig. 6, is illustrated as having right angle bends at its ends and being secured to the side walls 15b by welding or similar means. Said casing also has a bottom wall 15d which also has end portions bent at right angles which engage side walls 15a and are secured thereto by welding or other suitable means. A small motor 16 is

secured to rear wall 15b, the same being shown as having spaced holes in its casing 16a through which pass headed and nutted bolts 17, washers 18 of resilient material being disposed at either side of casing 16a and one pair of these engaging the outer side of wall 15b. The nuts on bolts 17 engage the inner side of wall 15b and the heads of bolts 17 engage washers 19 overlying the outer washers 18. Motor 16 drives a shaft 20 extending through wall 15b and having secured thereto within the lower part of casing 15 a plurality of disks or disk-like members 21. Spacing sleeves 22 surround shaft 20 between disks 21 and a short sleeve 23 is secured to shaft 20 at the rear side of the rear disk 21 or the disk adjacent rear wall 15b. Sleeve 23 is secured to shaft 20 in any suitable manner preferably by silver soldering. The free end of shaft 20 is threaded to receive a nut 24 clamping sleeves 22 in place. A cup shaped member 25 surrounds sleeve 23 and has its small end extending through an opening in the rear wall 15b through which shaft 20 passes, said rear end of said cup being crimped onto wall 15b. Motor 16 is provided with a common conducting cord 26 which will be equipped with a plug to be connected with any convenient electric circuit to supply current to motor 16.

Casing 15 is provided with an opening 15e in the front wall 15c, which opening is disposed some distance above the bottom of said casing. A plurality of baffle plates 27 are provided, the same being shown as of angular shape in horizontal cross section, the angle thereof approximating a right angle, said plates being arranged in parallel vertically extending relation and oppositely disposed at either side of the center of the opening 15e. Said plates also have an inwardly extending lip 27a disposed substantially perpendicularly to wall 15c. Wall 15c at either side of opening 15e is provided with an inwardly extending lip 15f extending substantially parallel to the adjacent portion of baffle plate 27. The vertical plate 28 extends across opening 15e from top to bottom thereof, the same being disposed in a plane substantially parallel to front wall 15c and being disposed between and centrally of the baffle members 27 at either side of the center of opening 15e. At the bottom portion of opening 15e a drain and air deflecting plate 29 extends outwardly and upwardly. At each end of plate 29 a side plate or portion 30 extends to front wall 15c, the top thereof being horizontal and flush with the outer upper edge of plate 29.

The upper end of casing 15 is provided with a plate or flange 31, said plate having a peripheral vertical portion fitting within the walls of casing 15 and having an outwardly extending flange 31a resting on top of said walls. Plate 31 is provided with an opening 31b. A water container 32 is provided and while this may be of various forms, in the embodiment of the invention illustrated it is shown as substantially rectangular in horizontal and vertical cross section and of a size to fit within the vertical portion of plate 31 and rest on the horizontal part of said plate. While container 32 may be made of various materials it preferably is made of glass or other rigid transparent material. As illustrated, said container 32 has a downwardly extending spout 32a provided with threads on its outer side to receive a threaded cap member 33. A gasket 34 is shown as disposed between the lower edge of spout 32a and the inner side of cap 33. Cap 33 has secured thereto a rigid tube 35 which extends upwardly

in container 32 to a plane quite close to the top thereof and said tube at its top portion is provided with a plurality of open slots 35a. Container 32 is preferably provided with a circular downwardly extending flange 32b surrounding the upper end of tube 35. Cap 33 is also provided at its end portion and at one side of tube 35 with a small apertured spout 33a. A flexible tube 36 such as a rubber tube, is fitted over the lower end of tube 35 below cap 33, said tube 36 extending downwardly and laterally in casing 15, the same at its lower end being provided with a member 37. Member 37 is of general cup shape having a hollow stem over which tube 36 fits and having a central opening in its lower side surrounded by a resilient washer 38 also having a central opening therein. As shown in Figs. 2 and 5, the lower surface of member 37 extends at an angle to bottom plate 15d.

Rear wall 15b as shown in Fig. 5, extends rearwardly and slightly upwardly over motor 16 and has a downwardly bent edge received in a reversely and upwardly bent lower portion of a plate 15g forming the rear part of the upper portion of casing 15. Plate 15g is provided with a central circular opening 15h and a cylindrical member 40 extends inwardly about said opening. Member 40 engages the inner side of plate 15g and is held in place by a plurality of circumferentially spaced lugs 40a extending through opening 15h and bent along the outer side of plate 15g. Member 40 has a central plate or fin 40b which depends vertically of opening 15h and a motor 41 is secured to the lower end of said fin. Said motor is supported by an encircling band 41a, the ends of which extend parallel to fin 40b and engage resilient washers 42 at either side thereof. A headed and nutted bolt 43 extends through said ends, fin 40b and washers 42, the same being illustrated as provided with a wing nut 44. The shaft of motor 41 has secured thereto a fan 45 disposed in the inner side of cylindrical plate 40. Motor 41 is provided with usual cord 46 which will be equipped with a plug for connection to a suitable electrical socket to supply current to motor 41.

Casing 15 has supporting flanges at the bottom of side walls 15a formed by the reversely bent ends of said walls which receive the ends of bottom wall 15d. Said flanges are embraced by channel or U-shaped members 47 of rubber or similar resilient material which may be of any desired length but are illustrated as extending throughout the length of said supporting flanges. Rear wall 15b is provided with an opening 15j which as shown in Fig. 7, is adapted to be closed by a resilient or rubber washer 48 engaged by a metal washer 49 into which is threaded headed bolts 50, the head of which engages a washer 51 at the outer side of opening 15j. Opening 15j is provided for the insertion of a heating element to be later described.

In operation water is placed in container 32. This container is removable and can be carried with tube 36 to an ordinary faucet. Members 37 and 38 can be placed over the spout of the faucet, member 38 being resilient and fitting about the same. The container will be inverted as it is thus filled. When filled, the container is again placed in position on casing 15 whereupon water flows down through spout 32a until the level of water in casing 15 closes the opening through member 38. When the level of water in casing 15 falls so that the opening in member 38 is exposed some air will pass upwardly into container

32 through the tube 36. This will let some water pass out through spout 33a so that the level in casing 15 will be maintained just high enough to close the opening through member 38. Member 38 being disposed at an angle to the horizontal allows the air more easily to enter the opening thereon than if said member were horizontal. Members 36, 37 and 38 thus form a level maintaining device. With water so disposed in the bottom of casing 15, motors 16 and 41 are driven. Motor 16 rotates shaft 20 and the disks 21 at high speed. Disks 21 have their lower portions disposed in the water in casing 15 and by their rotation they throw or project upwardly in casing 15 a fine spray. The disks extend only a short distance into the water at their lower edges and in practice this distance has been substantially  $\frac{1}{8}$  of an inch at the central portions of said disks. Fan 45 may be driven in any suitable manner but as shown, is driven by motor 41 and causes a current of air to pass into casing 15 through opening 15h to pass through the spray formed in said casing by disks 21 and to pass out through opening 15e. The baffle plates 27 prevent any particles or globules of water from passing out through opening 15e. Plate 29 is provided to deflect the air from fan 45 at the lower part of the device in an upward direction. This is desirable so that if the device is placed on a desk the air will not blow downwardly and blow papers or light articles on such a desk. Plate 29 can also act as a drain plate should any moisture fall thereon. As the air passes through the spray the air is humidified and some of the spray is evaporated so that the air is cooled. This cool and humidified air passes out into the room. Some of the particles of spray will be partly evaporated and will drop back into the water in casing 15. This will act to cool said water and in practice the water in said casing decreases in temperature. The cup member 25 is provided so that water cannot work through the opening in rear plate 15 through which shaft 20 passes. Any moisture at the rear of disk 21 adjacent said rear wall will engage cup member 25 and will drip back into the casing. Cup 25 is disposed so close to rear disk 21 that any moisture entering the space between said members will be thrown out by the centrifugal action of disk 21.

It is necessary to have a definite downwardly extending spout 33a so that the air will not leak through the opening therein as it will do if the water in container 32 is at a low level and there is just a hole in the flat plate. The aperture in spout 33a forms a vent opening while container 32 is being filled. It will be noted that the motors 16 and 41 are resiliently mounted and the operation of these motors and disks 21 is practically noiseless. These motors can easily be removed if desired.

In the modification shown in Figs. 8 to 11 the structure of casing 15 is substantially the same except that motor 41 and fan 45 together with supporting fin 43b are omitted. Instead of having a fan and motor supported upon casing 15 a separate fan 60 driven by the usual motor 61 and supported on a stand or in any other suitable manner is used. When a separate fan is thus used vertically spaced plates 61 and horizontally extending spaced plates 62 extending therebetween are provided. These plates 61 and 62 act as baffle plates to prevent any particles of water from passing out at the rear of the casing. In Figs. 8 to 11 a heating element 63 is shown disposed in the bottom of casing 15. This element

is illustrated as an electric heating element and the same has a casing with a threaded stem 63a. Stem 63a extends through opening 15j and is clamped to the rear wall 15b by a nut 64. A resilient washer 65 engages the inner side of wall 15b about opening 15j. Heating element 63 will be provided with the usual conductors 66 which will be in the form of a cord and provided with a suitable plug for connection to an electric socket. It is desirable at times such as in the cooler seasons to have the water in casing 15 heated. The heating element is used to increase the rate of evaporation in the operation of the device and is used only when the desired rapid humidification is desired without the cooling effect. It will be understood that fan 60 will cause a current of air to pass through cylindrical member 40, through the spray in casing 15 and out at opening 15e as already described.

From the above description it is seen that I have provided a very simple, compact, efficient and easily portable air cooler and humidifier. The device is particularly adapted for use in rooms of homes and offices. The air from the device can be permitted to blow upon a person in an office or even when the person is in bed in hot weather without causing any stiffness or discomfort. The air in the room is effectively humidified and a desired cooling effect is produced by the device in hot weather. The humidified air passing into the room tends to absorb the dust and thus also to purify the air in the room. Casing 15 can be made of material suitably coated or decorated so that the device will have a very pleasing appearance. The device has been amply demonstrated in actual practice and found to be very successful and efficient.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which generally stated, consists in a device capable of carrying out the objects above set forth, in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:

1. An air cooler and/or humidifier having in combination, a casing having spaced walls, one of said walls having an opening therethrough above the bottom of said casing, a shaft extending through said other wall, a disk-like member carried by said shaft extending at right angles to the axis thereof and a cup-shaped member having its open side directed toward said member and between the same and said other wall and secured in said other wall about said shaft.

2. A portable air cooler or humidifier having in combination, a casing of general rectangular form in horizontal and vertical cross section, said casing being elongated vertically and constructed and arranged to contain water in its lower portion, said casing having openings in the opposite sides thereof, a series of zig-zag baffle plates disposed in vertical planes and located in said casing adjacent and extending across one of said openings, said casing having a recess adjacent its bottom at the opposite side from said opening covered by the wall of said casing, a motor disposed in said recess, means in the lower part of said casing driven by said motor for projecting a spray upwardly in said casing from the water therein, a cylindrical member extending inwardly from the other of said openings, a motor disposed in said member, a fan carried by and driven by said motor and dis-

posed in said member, said casing having a recess in its upper end shaped by the walls of said casing, a water receptacle fitting in said recess and means extending from said receptacle to the lower portion of said casing for maintaining a certain level of water in said lower portion, whereby air is drawn into said cylindrical mem-

ber directly from the atmosphere through the opening at one side of said casing and is blown through said spray and out through said baffle plates so that the air does not pass through said fan after passing through said spray.

WEBSTER D. SMITH.