

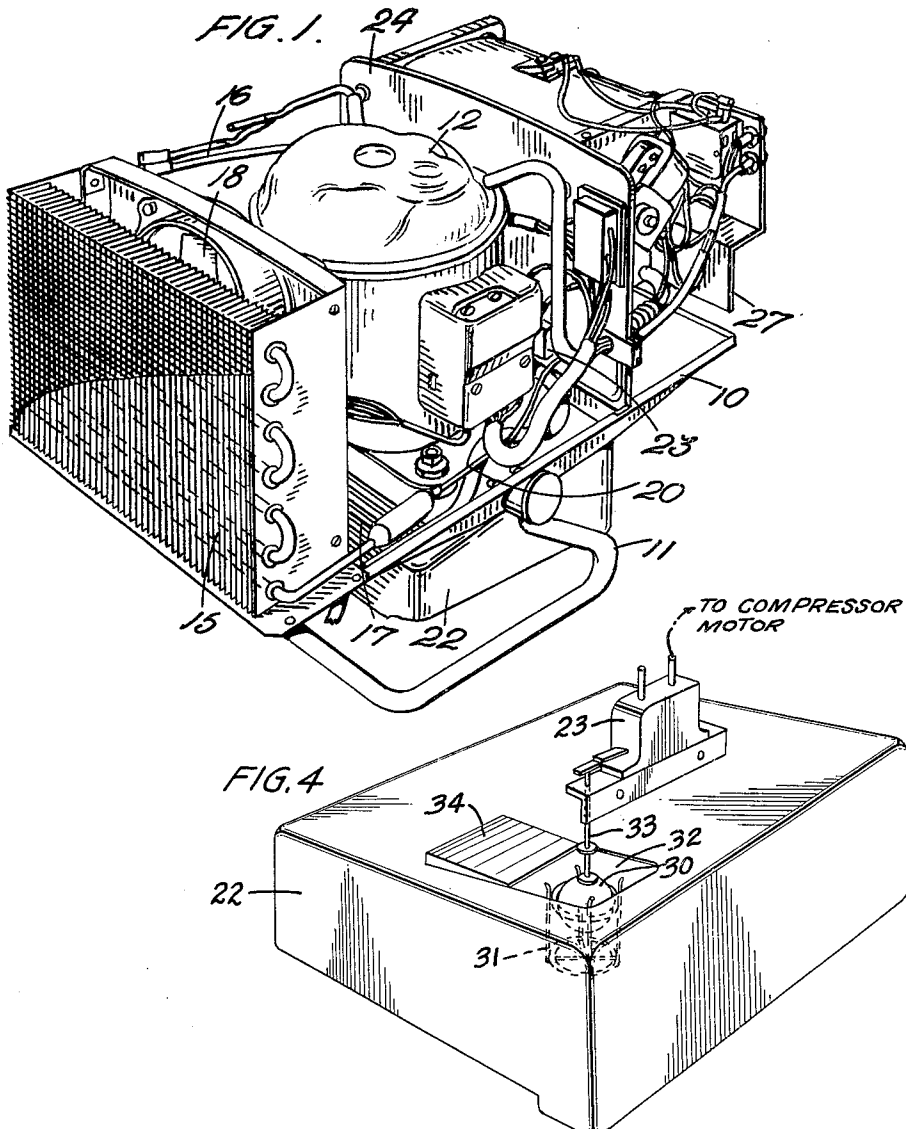
Sept. 14, 1965

R. A. WALKER ETAL
AIR-CONDITIONING APPARATUS INCLUDING
CONDENSATE CONTAINING MEANS

3,205,676

Filed May 22, 1963

2 Sheets-Sheet 1



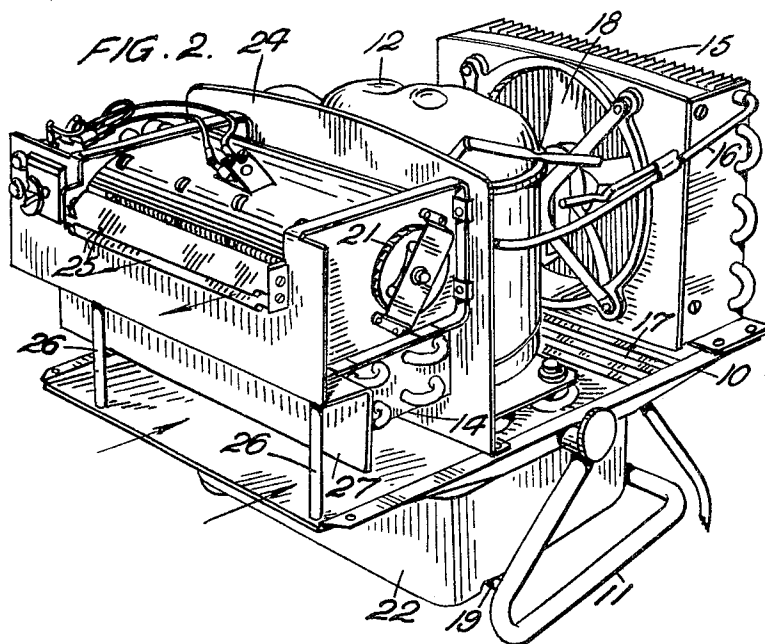
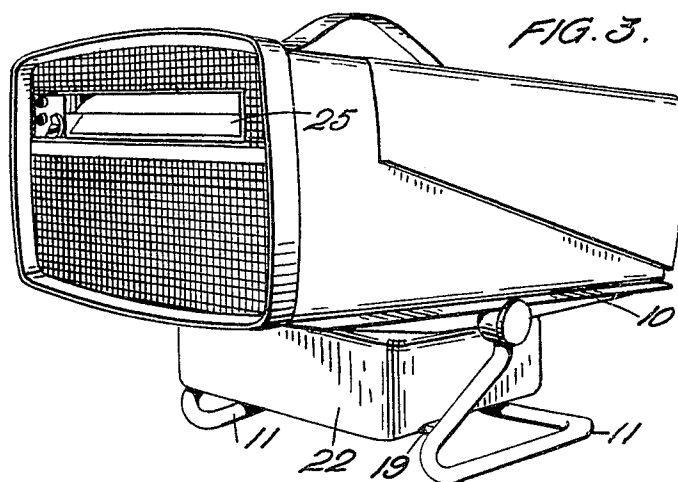
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AIR-CONDITIONING APPARATUS INCLUDING CONDENSATE CONTAINING MEANS

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3 Claims. (Cl. 62—226)

The invention relates to air-conditioning apparatus and in particular to a portable form of such apparatus suitable for personal use, or for use at, or on, a specific restricted locality.

The invention provides portable air-conditioning apparatus which comprises a refrigerant system portably mounted on a base or stand and having a condenser, a compressor, an evaporator and means for blowing separate streams of air over the condenser and the evaporator, the two streams issuing from the apparatus in opposite directions.

Preferably the condenser, the compressor and the evaporator are mounted in line, with the condenser and the evaporator at opposite ends. It is also preferred that the air streams issue in the direction of alignment from the opposite ends of the line. The air for the stream passing over the evaporator may be drawn into the evaporator end of the line, in the direction of the line.

In a preferred arrangement, the stream of air which passes over the evaporator is blown by a tangential flow fan producing a concentrated flow, and the stream of air passing over the condenser is blown by a radial fan producing a diffused flow.

The apparatus may include a drain tank to collect any condensate from the air passed over the evaporator and there may be a switch (e.g. float operated) responsive to rising water level in the tank to shut off the apparatus when the condensate in the tank has reached a predetermined level.

A specific construction of a portable air conditioner according to the invention will now be described by way of example; and with reference to the accompanying drawings in which:

FIGURE 1 is a three-quarter rear perspective view of the air conditioner,

FIGURE 2 is a three-quarter front perspective view of the air conditioner,

FIGURE 3 is a view of the air conditioner complete with decorative housing, and

FIGURE 4 is an enlarged perspective view of the condensate tank and its associated parts.

The air conditioner is a self-contained unit, which is built upon a rectangular sub-frame 10 supported on a stand 11 formed of a bar covered in poly-vinyl chloride or like plastics material at the centre of the longer sides of the sub-frame. The sub-frame can be a pressing, moulding or built-up assembly.

The sub-frame carries in line, a sealed refrigerant compressor 12, driven by an electric motor, resiliently mounted at the centre of the line and, at opposite ends of the line, an evaporator 14, and a condenser 15. The compressor, condenser and evaporator are joined together by means of piping. The compressor has a delivery pipe 16 through which refrigerant, in the form of high pressure gas, passes to the top of the condenser 15.

Air taken through a grid 17 or alternatively through louvres, in the sub-frame 10, is led over the condenser by an electrically driven axial flow fan 18, and ejected from the back of the apparatus to cool the refrigerant to its liquid phase, the liquid then being fed into the evaporator through capillary tubes 20. These capillary

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tubes are introduced to promote the pressure drop in the system necessary for the system to work.

Air is taken in at the bottom of the front of the apparatus, carried over the evaporator 14 in which it is cooled, and directed out again in a stream from the top of the front of the apparatus, by a second electrically driven fan 21. This fan is supported by a bulkhead plate 24 and pillars 26 and has the evaporator attached (e.g. by clips) to its underside. A plate 27 determines the size and shape of the fan outlet and also controls the inlet to the evaporator the air entering from the underneath.

The refrigerant, heated by the air, leaves the evaporator as a gas, and is returned to the low pressure line of the compressor giving some cooling to the windings of the compressor motor on the way.

Condensate from the cooled air is collected in a tank 22 which is located below the sub-frame, and is also readily detachable. The tank 22 and the associated parts are shown in FIGURE 4. A celluloid ball float 30 is trapped in a wire cage 31 below and around the filler hole 32 of the tank. When the level of condensate in the tank rises to a predetermined level, the float, having risen in the cage, protrudes from the filler hole and operates a push rod 33 to trip a limit switch 23. The limit switch turns off the apparatus. The tank is supported on studs 19 and against the underside of the sub-frame and is withdrawn by a forward sliding movement. There is a ramp 34 formed on the top of the tank behind the filler hole on which the push rod arm rides.

In order that the air conditioner should be effective it must blow a stream of cooled air at the user, and diffuse the warmed air into the surrounding air as far away from the user as practical. To achieve this, a tangential flow fan 21 is used to draw air over the evaporator 14 and eject it from the front of the apparatus in a relatively high velocity narrow stream. This stream passes through movable vanes 25 at the top of the front of the machine which direct the stream up or down according to the position of the vanes. The vane position is altered either manually or electrically by remote control.

For the flow over the condenser, however, an axial flow fan 18 is used, which passes a relatively low velocity widely-diffused, air stream over the condenser 15 and into the surrounding air.

This combination of fans also allows the frontal area presented to the user to be a minimum, without the apparatus having an undue length.

To increase the cycle efficiency, there can be a heat exchange between the high pressure liquid from the condenser and the low pressure gas from the evaporator. This can be done by coiling the capillary tube 20 around the compressor low pressure inlet, or by a soldered contact between the capillary tube and compressor inlet.

There can be included a heating element so that the air conditioner can serve alternative heating and cooling functions.

The unit is encased in a decorative housing and has a carrying handle by which it may readily be transported.

When operated in a confined space, the net total effect is a small increase in air temperature and a decrease in water vapour present in the air, giving an overall drop in relative humidity. The apparatus, however, is primarily intended as a "personal" or "local" air conditioner, i.e. the cooled stream of air is directed to an individual or apparatus to be cooled, in which case the warmer air issuing from the back will go unnoticed.

It is thus especially suited to use with mosquito nets, or in buildings having no adequate insulation.

A few examples of cases in which such localised air conditioning would be advantageous are shops, where it

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is desirable to avoid overheating caused by display heating, intricate assembly in, for example, radio component or other manufacture where perspiration on the fingers is detrimental to the work and temporary cooling of electrical or mechanical apparatus where certain parts are in danger of local overheating. There are also applications for dental work, commentator booths, telephone kiosks, hospitals, etc.

The invention is not restricted to the details described above. For example an electrically driven pump may be provided for emptying the condensate tank, the pump being controlled by a float operated switch in place of the cut off switch described above.

Also the air passing over the evaporator may be drawn in at right angles to the line of the condenser and evaporator, i.e. normal to the evaporator face, and other types of an may be used in place of the tangential flow fan.

We claim:

1. A portable air conditioning apparatus having
 - (a) a portable stand,
 - (b) a housing means attached to the stand and providing a cool air flow path and a hot air flow path,
 - (c) a refrigerant system mounted on the stand and within the housing, said system including a condenser, a compressor and an evaporator,
 - (d) the condenser being positioned in the hot air flow path and the evaporator being positioned in the cool air flow path,

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(e) an axial flow fan mounted on the stand in the hot air path and arranged to blow a diffused stream of air along the hot air path to an outlet therefrom,

(f) a cross flow fan mounted on the stand in the cool air path downstream of the evaporator and arranged to eject a concentrated stream of air through an outlet from the cool air path,

(g) the two paths having their outlets from the apparatus facing in opposite directions, a drain tank mounted on the stand and arranged to collect condensate from the air passed over the evaporator and there is a float operated switch in the tank responsive to rising water level in the tank to shut off the apparatus when the condensate in the tank has reached a predetermined level.

2. Apparatus as claimed in claim 1 wherein the axis of rotation of the cross flow fan is perpendicular to the path of cool air.

3. Apparatus as claimed in claim 1 wherein the portable stand is formed of a bar covered with polyvinyl chloride.

References Cited by the Examiner

UNITED STATES PATENTS

2,885,142	5/59	Eberhart	62—262
2,956,417	10/60	Lyman	62—291

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