Sept. 19, 1961 W. H. MULLIN ET AL 3,000,192

AIR CONDITIONING

Filed May 25, 1960

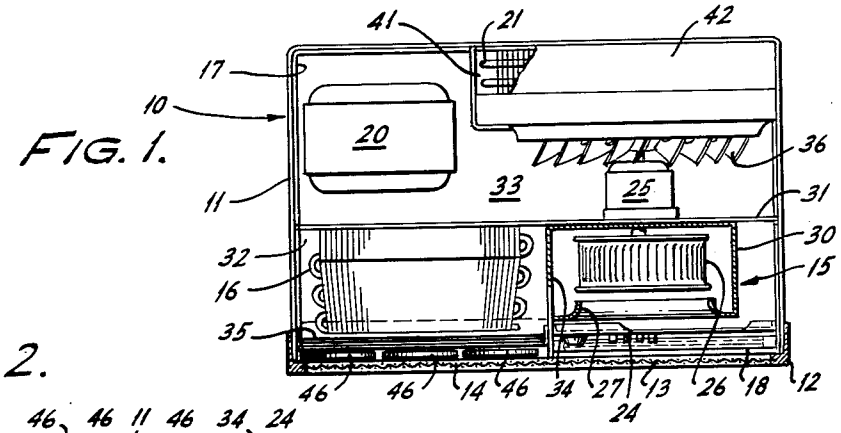
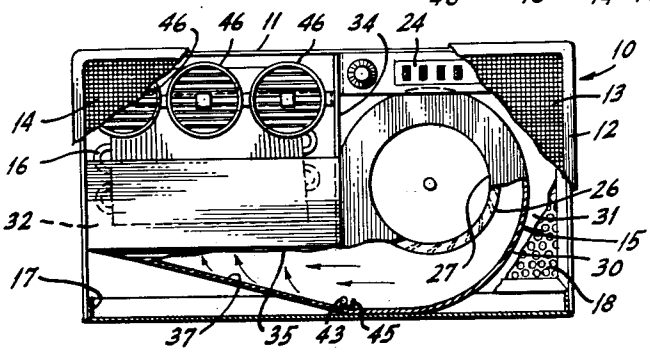


FIG. 1.

FIG. 2.



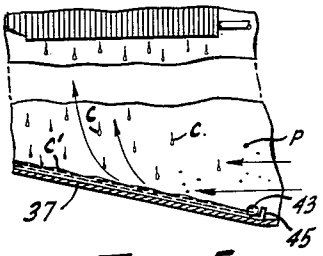


FIG. 5.

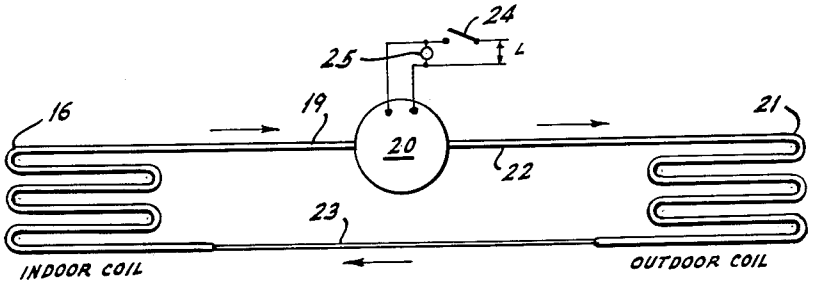


FIG. 4.

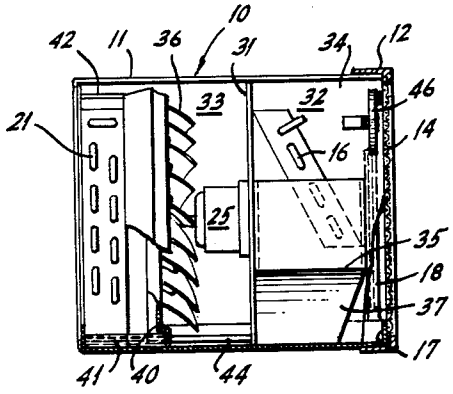


FIG. 3.

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AIR CONDITIONING

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The present invention relates to air conditioning and is especially concerned with air conditioning apparatus of a compact and unitary type having novel means for collecting and disposing of particulate matter present in the circulating air.

It is a primary object of the invention to provide apparatus that achieves improved air cleaning.

It is a particular object of the invention to provide an air conditioner of the so-called "room cooler" type in which certain novel constructional featuers contribute to the compact nature thereof as well as result in a substantial improvement in the air treating function.

To the foregoing general ends, the invention contemplates the provision of air conditioning apparatus of the type including an air cooling heat exchange element or coil, and means for forcibly circulating air in heat exchange relation with said element, and in which the element has such novel disposition with respect to the air circulating means as both to minimize dimensions of the unit and to improve the air cleaning characteristics of the apparatus.

Advantageously, the air circulating means includes a sloping baffle for directing the air onto the cooling coil, said baffle being disposed and adapted to be wetted over substantially its entire air-directing area by condensate dripping from the coil.

It is a feature of the invention that the air is washed by a contact with the wetted area of the baffle, which area serves to entrap particulate matter impinging thereon. Inasmuch as this area slopes, the condensate runs off, carrying particulate matter therewith for subsequent disposal. Also, the air advantageously is washed by contact with the droplets of water falling through the air from the evaporator coil onto the baffle.

The manner in which the foregoing objects and advantages may best be achieved will be understood from a consideration of the accompanying drawing forming a part of this disclosure, and in which:

FIGURE 1 is a top plan view, with parts removed and other parts broken away, of air conditioning apparatus incorporating concepts of the present invention;

FIGURE 2 is a front elevational showing, partly in section and with parts broken away, of apparatus seen in FIGURE 1;

FIGURE 3 is an end view, with parts removed and in section, of the left hand portion of the apparatus as seen in FIGURE 2;

FIGURE 4 is a diagrammatic view illustrating the refrigerant circulating system; and

FIGURE 5 is a somewhat enlarged view, with parts broken away, of apparatus seen in FIGURE 2, and showing an operational feature of the invention.

Now making more detailed reference of to the drawing, and initially to FIGURES 1 to 3, the window mounted air conditioner **10** includes a cabinet or housing **11**, preferably but not necessarily rectangular in configuration, having a base portion **17** and a conventional decorative panel **12**, the latter comprising inlet and outlet room passage means for the air moving means to be hereinafter more fully described. The inlet includes grille **13** and a filter **18** disposed in the right hand region of panel **12** and in air flow communication with the inlet opening **27** of indoor blower portion **26** of air moving means

15. The aforesaid outlet air passage means includes grille **14** disposed in air flow communication with an evaporator coil **16**, hereinafter also referred to as the indoor coil. A plurality of independently rotatable louvers **46** are disposed between the evaporator coil **16** and outlet grille **14** and are adapted to provide selectivity of the direction of discharge air flow. Evaporator coil **16**, preferably of the finned type, is part of the usual refrigerating system, shown diagrammatically in FIGURE 4 and including a motor compressor **20**, condensing or outdoor coil **21**, and associated conduits through which said motor compressor, condenser and evaporator coils are coupled in series flow circuit. These conduits include a line **22** through which refrigerant normally is delivered to outdoor coil **21** as the condenser, and a feed line **23** which, as shown, may advantageously comprise a continuously open restrictive connection through which liquified refrigerant is normally fed to the indoor coil **16** as the evaporator, for expansion therein. Refrigerant is withdrawn by the compressor from the evaporator through suction line **19** to complete the refrigerant flow circuit. Arrows applied to FIGURE 4 indicate the normal flow of refrigerant as occurs during the refrigerating cycle. The compressor is selectively energized through line L having in series therewith control switch means **24** (see also FIGURE 2).

Referring again to air moving means **15**, a motor **25** is connected to line L (FIGURE 4) and rotatably supports the blower **26** adapted to cause circulation of air in heat exchange relation with evaporator coil **16**. Blower **26** is housed within a scroll structure **30** disposed adjacent a partition **31** which divides cabinet **11** into an evaporator coil chamber **32** and a condensing coil chamber **33**. The portion of cabinet **11** comprising chamber **32** is adapted to extend into a room or space to be air conditioned while chamber **33** of the cabinet, lying into the other side of partition **31**, extends outwardly of the room preferably through a window opening thereof. The evaporator coil chamber **32** is subdivided by means of a partition **34**, into a section having disposed therein the blower and scroll assembly **26**, **30** and a section in which is disposed evaporator coil **16**. The mouth portion **35** of the scroll **30** extends through partition **34** and into position to direct air against one face of evaporator coil **16** (FIGURES 2 and 3), as will be hereinafter more fully described in accordance with important features of the invention.

Condensing coil chamber **33** also has disposed therein motor compressor **20** and motor **25**. A propeller type fan **36** is rotatably supported within chamber **33** by motor **25** to provide for drawing outside air into the chamber over the outdoor coil, and for discharging the spent air outwardly from the chamber over motor compressor **20**.

The fan **36** includes a conventional condensate ring **40** which dips into a condensate sump **41** (FIGURES 1 and 3). In accordance with known practice, rotation of the fan causes condensate in sump **41** to be thrown by ring **40** onto baffle means **42** suitably disposed above the ring and extending, in a downward direction, over outdoor coil **21**. Condensate impinging upon baffle means **42** flows on the latter and drips onto outdoor coil **21**, to be evaporated therefrom in the course of the refrigerating cycle. Conduit means for directing the flow of condensate formed on the indoor coil to sump **41** comprises an opening **43** (FIGURE 2) formed in the mouth portion **35** of room blower scroll **30**, from which opening **43** there extends a tube **44** terminating at sump **41** (FIGURE 3). Extending across the obliquely disposed bottom wall or baffle portion **37** of scroll mouth **35** is trough means **45** disposed and adapted to prevent condensate that drips

from evaporator coil 16 from running into the lowermost portion of scroll 30 and to insure outflow of condensate from baffle portion 37 through opening 43 for subsequent disposal in the manner above described.

In particular accordance with the invention, evaporator coil element 16 is so disposed as to extend generally angularly (see FIGURE 3) across an upper corner portion of housing 11, which portion comprises also the generally rectangular cross sectional area of the vertically extending evaporator chamber 32, as is best seen in FIGURES 1 and 3. The evaporator coil element 16 is generally planar in configuration and is positioned to slope in such manner that condensate drips from substantially the entire area of the evaporator and upon sloping baffle 37. The downward projection of the face portion of the evaporator is substantially equal to the upward projection of baffle 37 upon a plane normal to air moving therebetween. By the above described positioning of coil 16 vertical compactness of the unit also is enhanced.

Referring to FIGURES 2, 3 and 5, it will be seen that the baffle portion 37 of scroll mouth 35, while positioned to promote drainage of moisture as seen at C', derived from drops of condensate C falling thereon, is so positioned as abruptly to change the direction of the air driven from blower 26 (see arrows, FIGURES 2 and 5) and to cause the air abruptly to be directed upwardly and to impinge upon evaporator coil 16. Also, as mentioned, the baffle 37 is disposed generally in the area of downward projection of evaporator coil 16 and, by virtue of the above described cooperative positioning of baffle 37 and coil 16, condensate C dripping from the coil will drip substantially onto, and cover (as seen at C') the entire surface of baffle 37 and air being delivered from blower 26 is thus caused to flow in contact with the wetted upper surface of the baffle. Flow of air over the wetted surface results in cleaning of the air and in entrapment on the baffle of the relatively heavier particulate matter P impinging upon this surface of the baffle. In addition to the above filtering action, drops of water falling from the evaporator coil wash the air directed onto the coil. Initial coarse filtering of the air is provided by the filter 18 which is positioned between the blower 26 and the inlet air grill 13.

From the foregoing it is seen that the structure of the present invention, while affording a thorough filtering action, is characterized by simplicity and compactness. Importantly, formation of the film of moisture upon the surface of the inclined baffle is automatic, as is the disposal of the moisture and the particulate matter entrapped therein. Furthermore, it will be appreciated that due to the thorough filtering of air prior to its heat exchange contact with the evaporator coil surfaces, the latter remain substantially devoid of dust and dirt that would normally contribute to inefficient transfer of heat from the air thereto.

Still further, it will be appreciated that the same novel cooperative arrangement of the evaporator, inclined baffle, and blower provides movement of air through the evaporator chamber with a minimum of turbulence, thereby increasing the air flow rate and improving the efficiency of the air moving system. By virtue of the hereinabove described improved heat exchange and air moving functions, a relatively high degree of cooling capacity is achieved.

In summation, the invention provides an air conditioner of the room cooler type characterized by a high degree of compactness coupled with an increased capability for the treatment of air.

We claim:

1. An air conditioner comprising: a generally rectangular housing; an evaporator within said housing being so disposed as to extend angularly across an upper corner of said housing in such a manner that condensate drips from substantially the entire area of the evaporator; and blower means within said housing and including baffle means so obliquely disposed beneath said evaporator as to direct air discharged from said blower means upwardly over said evaporator in heat exchange therewith, positioning of said baffle means further being such that condensate formed upon said evaporator and falling therefrom impinges upon and wets substantially the entire air directing surface of said baffle means, the wetted surface being effective to entrap particulate matter entrained in the air moved by said blower means.

2. An air conditioner according to claim 1, wherein said blower means comprises a centrifugal impeller and a scroll disposed thereabout, and said baffle means is formed integrally with said scroll and disposed adjacent the path of air discharge.

3. In an air conditioning unit, the combination comprising: a housing having air inlet and outlet openings communicating with a space to be cooled; an air filter element disposed and adapted to extend across said air inlet opening; blower means for drawing air through said inlet opening and forcing the same through said outlet opening; a cooling element disposed within said housing, at a level above said blower means, and in the path of air as it moves through said outlet opening, said cooling element being further disposed angularly as respects said housing and in such a manner that condensate drips from substantially the entire area of said cooling element; and baffle means so angularly disposed below said cooling element as to direct air from said blower upwardly over said element in high heat exchange therewith and adapted to be wetted by condensate formed at and dripping from said cooling element whereby particulate matter entrained in the moving air becomes entrapped in said condensate, angular disposition of said baffle means providing for continuous drainage of condensate and entrapped particulate matter therefrom.

4. In an air conditioner, the combination comprising: a housing; blower means including an air discharge port from which air is forced through said housing; a cooling coil within said housing, disposed at a level above said blower means air discharge port, and having a flat face portion so inclined as respects the said housing that condensate drips from substantially the entire area of the coil face portion; and baffle means disposed below said coil adjacent said blower means air discharge port and so inclined as to direct air discharged from said air discharge port upwardly over said coil in high heat exchange therewith, said baffle means further being positioned in such manner that its upward projection is substantially equal to the downward projection of the face portion of said cooling coil upon a plane normal to air moving therebetween, said baffle means thereby being positioned to be wetted by condensate formed at and dripping from said coil, particulate matter entrained in the moving air becoming entrapped in the condensate, the inclined disposition of said baffle means further providing for continuous drainage of condensate and entrapped particulate matter therefrom.

5. An air conditioner comprising: a housing; an evaporator within said housing, said evaporator comprising a planar coil element so inclined from the horizontal that condensate drips and falls from substantially the entire area of the evaporator element; and blower means within said housing and including baffle means disposed beneath said evaporator coil element and so inclined from the horizontal as to direct air discharged from said blower means upwardly over said evaporator coil element in heat exchange relation therewith, positioning of said baffle means further being such that condensate formed upon said evaporator coil element and falling therefrom impinges upon and wets substantially the entire air directing surface of said baffle means, the wetted surface being effective to entrap particulate matter entrained in the air being moved.

6. In an air conditioner, the combination comprising: a housing; blower means for forcing air through said

housing; cooling coil means within said housing and so inclined from the horizontal that condensate formed thereon falls therefrom substantially across the entire area of said coil means; and baffle means disposed below said coil means and so inclined from the horizontal as to direct air discharged from said blower means upwardly over said coil means in high heat exchange relation therewith and positioned to be wetted by condensate formed at and dripping from said coil means, whereby particulate matter entrained in the moving air becomes entrapped in said condensate, the inclined disposition of said baffle means providing for continuous drainage of condensate and entrapped particulate matter therefrom.

7. An air conditioner according to claim 6 and further including drain trough means cooperatively disposed with said baffle means whereby to drain condensate and washed particulate matter therefrom for disposal.

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