May 1, 1951 L. YOST 2,551,227

ROOM COOLER

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Fig. 1

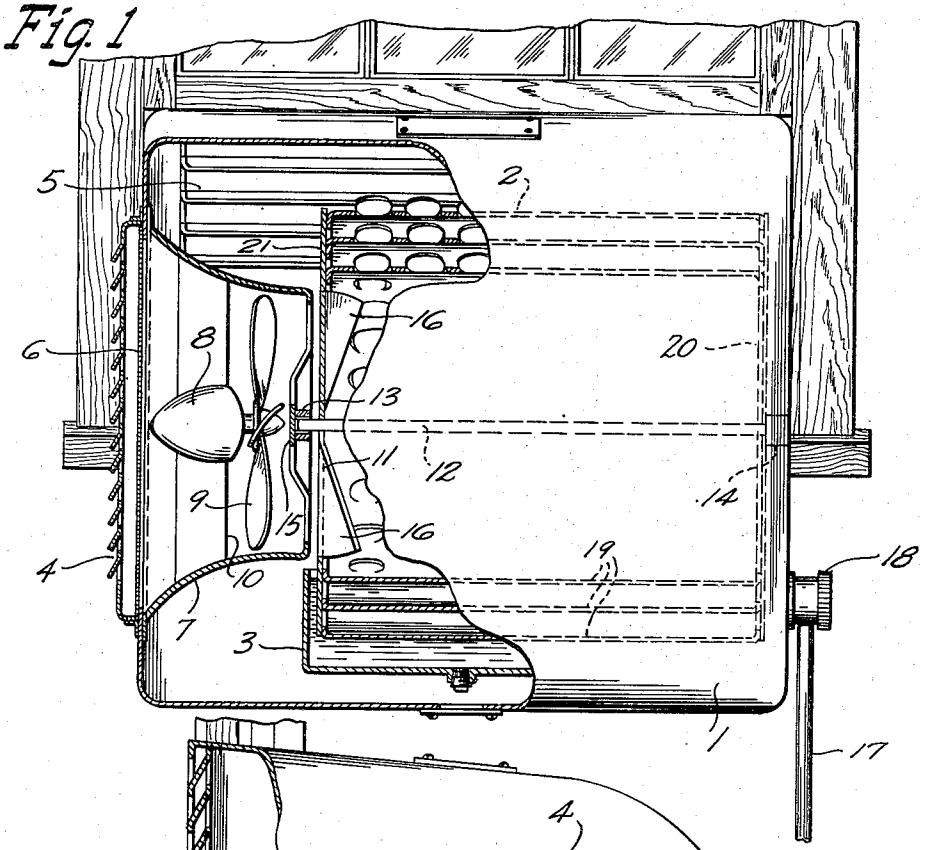
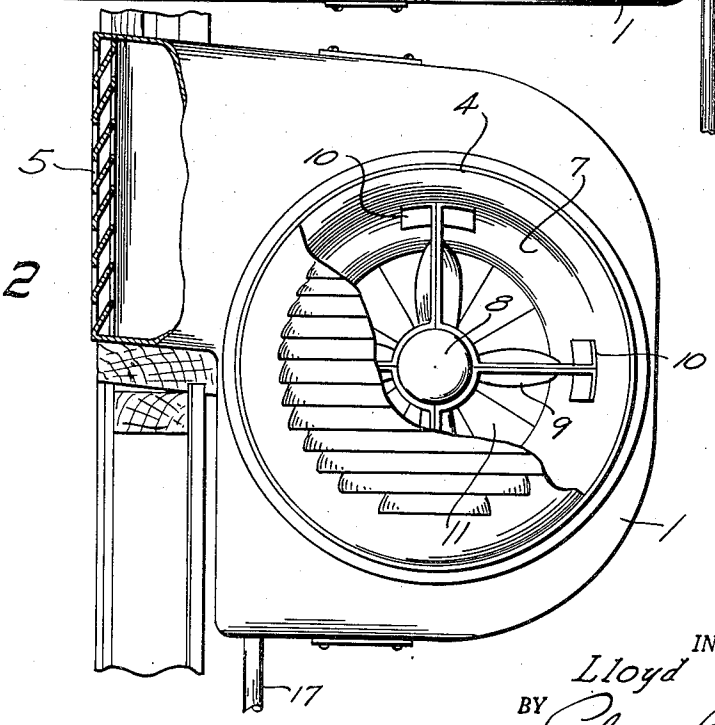


Fig. 2



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ROOM COOLER

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Fig. 3

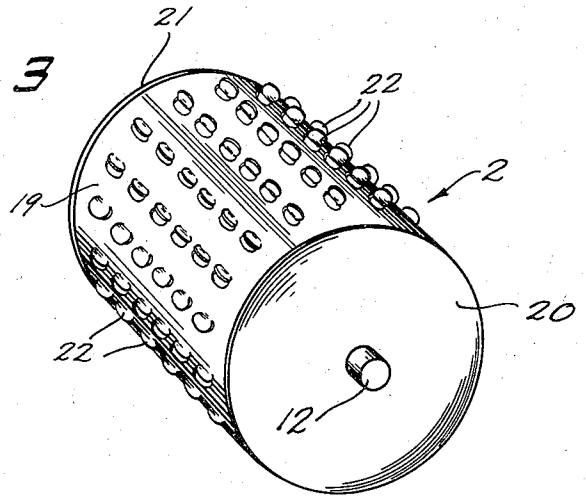


Fig. 4

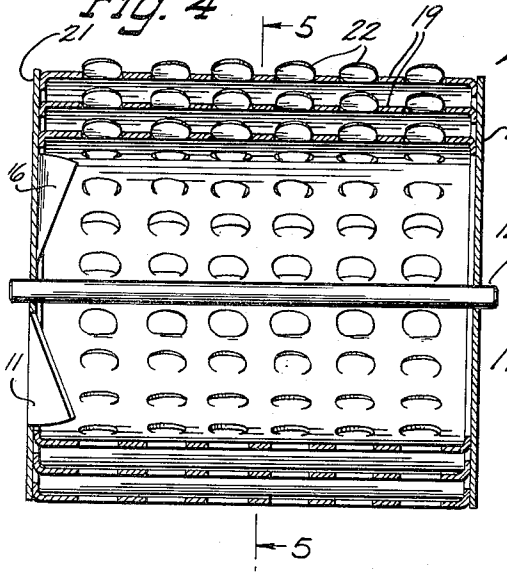
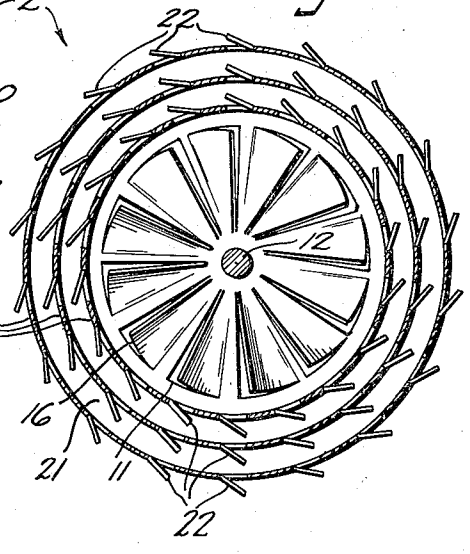


Fig. 5



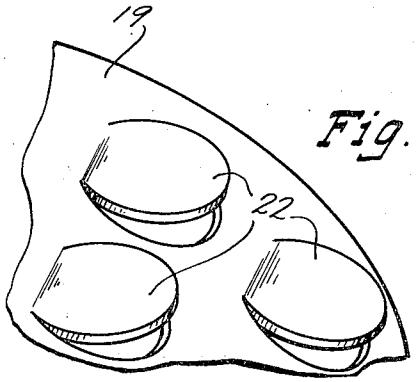


Fig. 6

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UNITED STATES PATENT OFFICE

2,551,227

ROOM COOLER

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Application November 6, 1946, Serial No. 708,141

1 Claim. (Cl. 261—92)

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This invention relates to evaporative type air cooling devices and relates more particularly to improvements in the construction and operation of the evaporative drum used in such units.

One object of the invention is to provide a drum or cylinder which is simply and economically constructed.

Another object of the invention is to provide a drum that functions immediately when required regardless of the length of time of disuse.

Another object is to provide a cylinder which will operate satisfactorily under all conditions, will not have a tendency to become too dry or too wet, and will not become obstructed by insects, foreign matter, or dust and dirt, nor become odorous or mildewed especially with disuse.

Another object is to provide an evaporative drum which will allow the air to pass easily therethrough without unnecessary back pressure reducing the efficiency of the unit, and will have a large surface over which the water may be distributed for evaporation and cooling of the air.

Another object of the invention is to eliminate the unbalance of the drum caused by disproportionate absorption of water by the drum when remaining stationary and partially submerged for a period of time which impedes the free rotation of the drum and so interferes with its operation.

A further object is to provide a room cooler that has substantially large cooling capacity for size of unit.

A preferred embodiment of the invention is illustrated in the accompanying drawings in which:

Figure 1 is an elevational view of a general type of air cooling device in which the invention is used with parts broken away and sectioned;

Fig. 2 is an end elevational view of the cooler with parts broken away and sectioned;

Fig. 3 is a perspective view of the assembled drum;

Fig. 4 is a sectional view of the drum through its axis;

Fig. 5 is a view taken on line 5—5 of Fig. 4; and

Fig. 6 is an enlarged perspective of the partially punched drum perforation.

In the drawings there is shown an evaporative room cooler, mounted in a suitable housing 1 and comprising a porous drum 2 rotatively mounted to dip into the water in the pan 3 below the drum, and mechanical means for forcing the air to be cooled through the moistened periphery of the drum 2 and into the room to be cooled.

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Housing 1 is constructed to fit in a window and project outwardly therefrom over the window sill. The cooled air is taken in from the outside through circular inlet 4 in one end of the cooler and discharged into the room through the exhaust outlet 5 on the side of the device exposed to the room to be cooled.

A dry air filter 6 is placed over inlet 4 to prevent insects, dust and the like from entering the unit. The filter 6 is detachably mounted and readily removable for cleaning or replacement.

The inlet funnel 7 extends inwardly of the housing 1 from the periphery of inlet 4. The funnel 7 may be made separately or be integral with the housing 1.

A motor 8 and fan 9 are mounted axially within the inlet funnel 7 by means of faired struts 10 extending from the inner wall of the funnel to the motor 8.

The fan 9 is preferably of the cone type providing large volumetric capacity in the relatively small dimensions of the funnel 7 and in operation draws the outside air through the filter 6 at the outer end of funnel 7 and forces it out of the inner end of the funnel.

The drum 2 is located within housing 1 with the open end 11 thereof at the inner end of funnel 7 so that air flowed through funnel 7 by motor 8 and fan 9 passes into the drum through opening 11.

The drum 2 is mounted axially on shaft 12 which is supported at each end for rotation within bearings 13 and 14. Bearing 13 is suspended at the center of the inner end of funnel 7 by supports 15 and bearing 14 is mounted in the side of the housing opposite the air inlet port 4.

A plurality of vanes 16 are secured to the shaft 12 within opening 11 and are so directed that air passing through opening 11 from inlet 4 impinges upon vanes 16 to effect rotation of the drum 2.

The water pan 3 is mounted within the housing 1 and positioned so that the lower portion of the drum 2 is submerged in the water contained in the pan and as the drum rotates the water is distributed over the surface of the drum. A pipe 17 which is connected to a suitable water supply, not shown, and a valve arrangement 18 maintain the water in pan 3 at a constant level.

The drum 2 as shown in Figs. 3, 4 and 5 comprises a plurality of perforated cylinders 19 which are disposed concentrically in radially spaced relation one within the other and secured at the ends by circular plates 20 and 21 mounted on shaft 12.

Circular plate 20 is a single piece of metal

which forms the closed end of the drum. Plate 21 is a circular piece of metal having the inlet opening 11 and is mounted on shaft 12 by means of supports 15 as described above.

The number of cylinders employed vary according to the size of the drum and the cooling capacity desired. In the drawings, a drum having three cylinders is shown.

Each cylinder 19 is made from perforated sheet metal or other suitable non-absorptive and non-corrosive material. The leaf or slug 22 of each perforation is retained to provide the surface of the leaves as well as the main metal of the drum as a surface from which the water picked up by the drum 2 may be evaporated. The perforations may be of any desired size with the slugs bent at an angle of 30° to 60° from the body of the drum to allow the passage of air through the perforations without a build-up of back pressure.

The size of the drum should correspond to the size and capacity of the motor and fan. The clearance between the concentric cylinders need be no more than necessary to allow for the slugs 22. It should be noted that larger perforations affording greater operating efficiency by the easier passage of air therethrough provides correspondingly larger slugs, thereby maintaining the evaporative surface area and capacity of the drum. Perforations as small as $\frac{3}{16}$ of an inch and as large as ¾ of an inch have been used with success.

The water is picked up and distributed at all times evenly over the surfaces of the slugs and the metal between the perforations so that the air passing through the unit is washed clean of dust and the like. The drum will not corrode or deteriorate, become water-soaked or promote the growth of fungus or mildew, even though allowed to stand for a length of time partly submerged in the water.

Because of the large perforations the drum cannot become clogged by dirt or dust and insects will not become lodged in the perforations. The cylinders are easy to clean periodically if necessary and will last indefinitely without deteriorating.

The permissible large size of the perforations reduces the effort required by the motor and fan to pass the air therethrough but maintains the required maximum cooling area.

The non-absorptive cylinders are always balanced and no more than a minimum of effort on the part of the motor and fan unit is diverted to rotate the drum.

The drum, being always in balance, operates at a constant speed. The water on the surfaces of the cylinders should not be allowed to completely evaporate during a single revolution of the drum, which would decrease its operating efficiency. This is accomplished by a correlation between the size of the drum, the speed of rotation, and the volume and speed of air movement through the drum.

The air entering the housing through the dry filter 6 passes in a straight line through the funnel and into the drum with a minimum of turbulence losses.

If desired, vanes 16 for driving the drum may be entirely eliminated. It has been found that the size and arrangement of leaves 22 causes the air to flow from the drum in a series or combination of small jets effecting rotation of the drum. The swirling of the air inside the drum as it leaves the fan also effects rotation of the drum.

Various embodiments of the invention may be employed within the scope of the accompanying claim.

I claim:

A room cooler which comprises a sheet metal housing of generally cylindrical contour having a circular air inlet opening at one end and provided with an outlet formed by a side housing extending generally at right angles from the main housing and adapted to fit the window of a room, an air inlet funnel extending inwardly of the housing a short distance from the edge of the inlet opening therein, means extending from said funnel to support a motor and fan axially within said funnel, a dry air filter detachably mounted across the inlet opening inside said housing at the outer end of said funnel, a bearing disposed in the inner end of said funnel axially in line with said motor and fan, a second bearing mounted at the end of the housing opposite from the inlet end axially in line with the first named bearing, a perforated sheet metal drum disposed in said housing and freely mounted to rotate on said bearings, a plurality of leaf members constituting the punched metal of the perforations in the drum extending from the cylindrical surface of the drum adjacent the perforations to provide a substantial wetting surface and creating a jet effect in the air discharged from the drum to rotate the same, and a water pan secured in said housing beneath said drum to wet the drum surface as the drum is rotated through the water therein by operation of the fan to effect exhaust through the drum perforations and the side outlet housing of cool moist air into the room to be cooled.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,826,508	Decker	Oct. 6, 1931
1,854,569	Welch	Apr. 19, 1932
2,230,020	Webster	Jan. 28, 1941
2,253,418	Crandall et al.	Aug. 19, 1941
2,287,147	Stratton	June 23, 1942

FOREIGN PATENTS

Number	Country	Date
537,917	Great Britain	July 14, 1941