March 3, 1970 C. E. RACKLEY 3,498,206

AIR-HANDLING LUMINAIRE

Filed Oct. 9, 1967

FIG. 1.

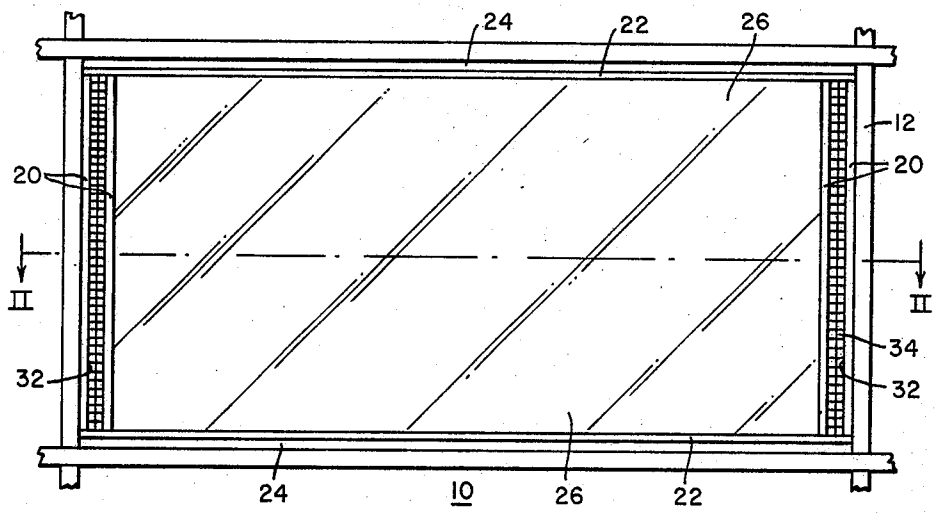
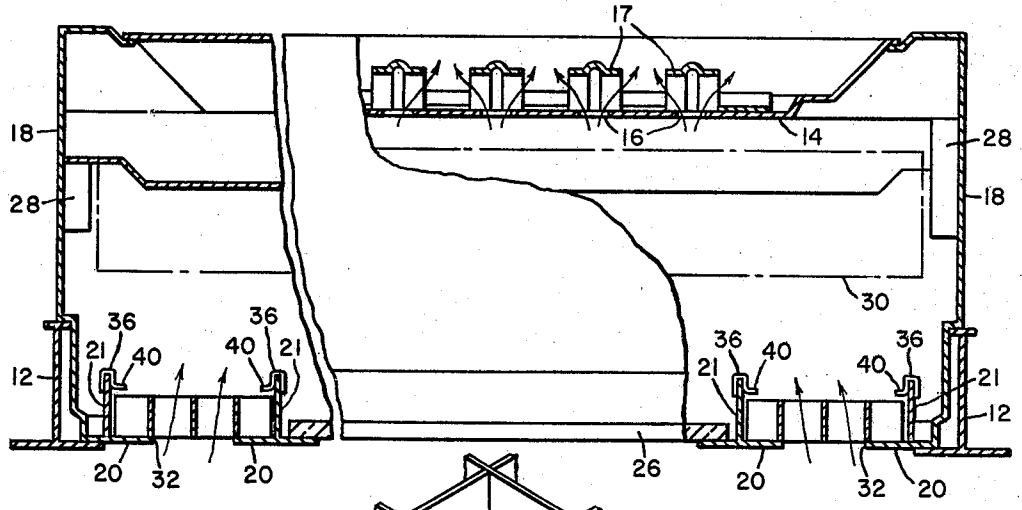


FIG. 2.



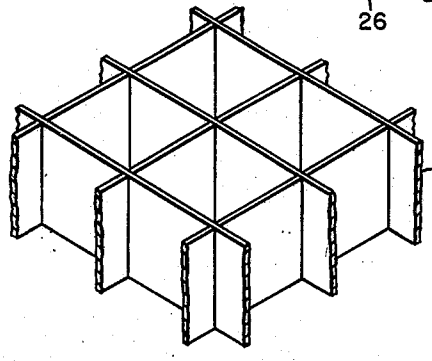


FIG. 3.

WITNESSES

Robert C. Baird

James F. Young

INVENTOR

Carle E. Rackley.

BY

Blair R. Studebaker

ATTORNEY

United States Patent Office

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AIR-HANDLING LUMINAIRE

Carle E. Rackley, Westlake, Ohio, assignor to Westinghouse Electric Corporation, Pittsburgh, Pa., a corporation of Pennsylvania

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ABSTRACT OF THE DISCLOSURE

An air-handling luminaire having enlarged air entrance slots within the door frame ends for returning air from a room or occupied space through the lamp compartment of the lighting fixture and into the plenum space thereabove. Disposed within the enlarged air entrance slots are louvers in the form of an eggcrate which shield the lamps from sight at normal viewing angles but offer almost no resistance to the flow of air through the air entrance slots into the lamp compartment.

BACKGROUND OF THE INVENTION

With the advent, in recent years, of combined lighting, heating and air conditioning systems in the design and construction of modern buildings the air-handling luminaire has become commonplace. In the conventional system, conditioned air is removed from the occupied space or room by being drawn through the lamp compartment of the lighting fixture into a negatively pressurized space or plenum above the fixture for reconditioning and recirculation into the room. Removing the air from the room by traversing the lamp compartment of the lighting fixture or luminaire is generally accomplished for purposes of removing heat generated by the lamp bulbs within the compartment in order to eliminate some of the effect of the heat from the lamps on the temperature within the associated room.

Generally, the static pressure drop across the lighting fixture has to be limited in value in order to prevent the "lay in" type acoustical tile used to form the remainder of the ceiling from being lifted from its supporting frame due to negative pressures on the backsides thereof. This limiting static pressure differential accordingly limits the volume of air which can be drawn through a conventional fixture. A practical limit to the static pressure drop is considered to be about 0.05 inch of water.

In the usual heat removal troffer or air-handling luminaire, the return air from the room to the air conditioning system enters the lamp compartment through a carefully designed air-duct-light-lock in one or both ends of the luminaire door frame. In order to reduce light leakage to a minimum the air path usually makes the equivalent of two or three 90° bends. The tortuous path provided by these conventional air-duct-light-lock systems cause considerable friction to air flow and accordingly exhibits a fairly large static pressure drop across the air duct. This type of air-duct-light-lock generally is limited in the volume of air that it can handle to about 25 to 75 cubic feet per minute depending upon the particular fixture design. Occasionally applications arise in which it becomes necessary to return higher volumes of air through the lamp compartment of a conventional 2 x 4 foot air-handling luminaire. Air volumes which the troffer may be required to handle sometimes reach a figure as high as 150 cubic feet per minute because of a specific application. In order to handle high volumes of air, it is necessary that air duct resistance be minimized.

SUMMARY OF THE INVENTION

This invention relates to air-handling luminaires and more particularly to an air-handling luminaire having the facility for handling high volumes of air.

It is an object of the present invention to provide an air-handling luminaire capable of handling large rates of air flow.

Another object of the present invention is to provide an air-handling luminaire capable of handling large rates of air flow through the lamp compartment while shielding the lamps from sight at normal viewing angles.

Yet another object of the present invention is to provide an air-handling luminaire capable of handling large rates of air flow while shielding the lamps from sight at normal viewing angles without significant restriction to the flow of air through the luminaire.

The foregoing, and other objects, are accomplished in accordance with the present invention by providing in an air-handling luminaire comprising a housing having a top member and walls affixed thereto and a bottom light opening generally defined by said walls and an at least partially light transmitting closure member disposed within said bottom opening and forming an enclosure or lamp compartment within said housing, an air inlet system communicating with said enclosure. The air inlet system includes enlarged air entrance slots along at least one edge of the light transmitting closure member and louvers in eggcrate form disposed in said enlarged air entrance slots which shield the lamps from sight at normal viewing angles but offer almost no restriction to the flow of air through the air entrance slots.

BRIEF DESCRIPTION OF THE DRAWING

The above described objects along with many of the attendant advantages of the present invention will become more readily apparent and better understood as the following detailed description is considered in connection with the accompanying drawings, in which:

FIG. 1 is a bottom plan view of a luminaire employing the air entrance system of the present invention;

FIG. 2 is a sectional view taken along the line II—II of FIG. 1; and

FIG. 3 is a fragmentary isometric view of the louvered eggcrate of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to the drawings wherein like reference characters represent like parts throughout the several views there is shown in FIG. 1 a bottom plan view of an air-handling luminaire generally designated **10** constructed in accordance with the present invention. The luminaire **10** is mounted within a supporting frame **12** of the type conventionally employed in the standard lay in acoustical tile ceiling providing a plenum space thereabove. There is shown in FIG. 2, in section, a generally conventional air-handling fixture including a top member **14** provided with air exit slots **16** for removing air from the luminaire housing. The luminaire further consists of sidewalls **18** which terminate at their lower edge in the door frame members **20** which extend laterally along the luminaire housing and the door frame members **22** which extend longitudinally along the bottom sidewalls of the housing. The air-handling luminaire may be further provided, where desired, with air entrance slots **24** to provide the enclosed space or room with conditioned air around and through the edges of the luminaire housing. The bottom opening defined by the door frame members **20** and **22** is closed off by a refractor member **26** which completes the housing enclosure. Mounted within the enclosure in a conventional manner are lamp holders

28 and heat generating light sources or fluorescent lamps 30.

A similar air-handling luminaire is illustrated and described in Patent No. 3,312,160 for "Adjustable Air Flow Damper for a Luminaire" issued Apr. 4, 1967 to the instant inventor and owned by the present assignee. This patent illustrates a conventional air return slot and light trap box which, in a standard 2 x 4 foot air return troffer, is capable of handling air flow volumes of 25 to 75 cubic feet per minute quite readily. It has been found however that where high air volumes must necessarily traverse the fixture the tortuous path provided for air flow and the resultant static pressure drop across the lighting fixture can be prohibitive. As illustrated in the drawing, in the luminaire of the present invention, an enlarged air entrance slot 32 is provided in the door frame 20 at each end of the luminaire and a louver or eggcrate 34 is mounted therein which may, for example, exhibit cells having a dimension of ½ inch by ½ inch by ½ inch. It has been found that an eggcrate will have almost no pressure drop thereacross and will shield the lamps from sight at normal viewing angles. If it is desired, the depth of the eggcrate can be increased to provide lamp shielding at greater viewing angles without appreciably increasing the pressure drop thereacross. The pressure drop across the luminaire housing can be further controlled by adding adjustable dampers 17 to the slots 16 to control the air flow volume as well as the static pressure drop across the fixture. This mechanism is described in detail in U.S. Patent No. 3,312,160 referred to above.

The eggcrates 34 may be retained within the air entrance slot 32 in the door frame 20 by means of a plurality of spring clips 36 which may be spring fastened or clipped to the door frame uprights 21 and which are provided with an arm extension 40 designed to overlie the upper edge of the eggcrate 34 to prevent them from being disengaged from their seats on door frame 20. Approximately three clips per side have been found to be adequate for a standard 2' x 4' luminaire.

As will be apparent from the foregoing the air-handling luminaire of the present invention provides for the return of air from the room through the luminaire, and while retaining the air-duct-light-lock features of conventional air return ducts eliminates the two or three 90° bends of conventional air return ducts. By eliminating this tortuous path and associated frictional impedance to air flow, the fairly large static pressure drop developed thereby is also eliminated while the lamp shielding feature, at normal, viewing angles, is retained. The air return ducts of the present invention may be employed in either a total air-handling fixture which provide for both the introduction of conditioned air into the habitable space through air entrance slots 24 and also for systems

wherein the luminaire housing or troffer is used only for air return through air return slots 32.

Since numerous changes may be made in the above described apparatus and different embodiments of the invention may be made without departing from the spirit thereof, it is intended that all matter contained in the foregoing description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. An air-handling luminaire comprising:
- a housing having a top member, walls affixed thereto, and a bottom light opening generally defined by said walls;
- an at least partially light transmitting closure member disposed within said bottom opening and forming an enclosure within said housing;
- lampholder means mounted on said housing and adapted to support heat generating light source means within said enclosure;
- said enclosure having an elongated air entrance slot provided adjacent at least one edge of said light transmitting closure member;
- an eggcrate within said elongated air entrance slot offering almost no impedance to the flow of air through said elongated air entrance slot while shielding said light source means from view at normal viewing angles;
- spring clip means secured to said enclosure including a portion thereof overlying said eggcrate to retain said eggcrate within said elongated slot; and
- a plurality of air exit slots having damper means associated therewith for permittting air entering said enclosure through said air entrance means to exit therefrom.

2. An air-handling luminaire according to claim 1 wherein said enclosure is provided with an air exit means adjacent at least one other edge of said light transmitting closure member for permitting conditioned air to exit from said luminaire.

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WILLIAM E. WAYNER, Primary Examiner

U.S. Cl. X.R.

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