

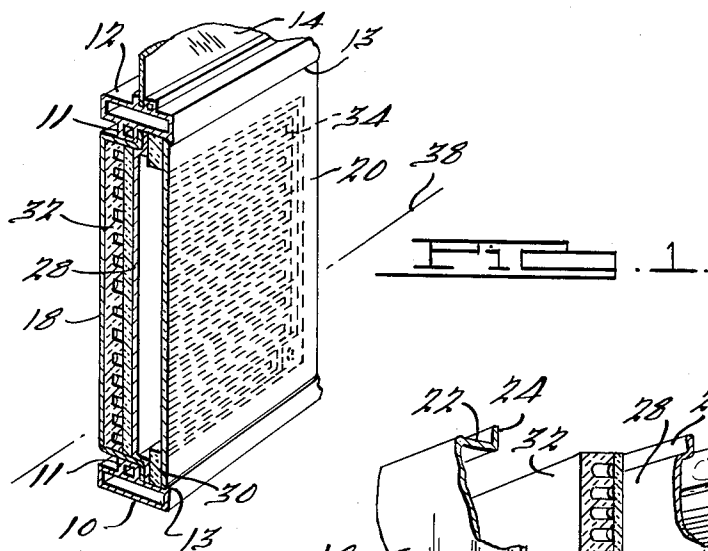
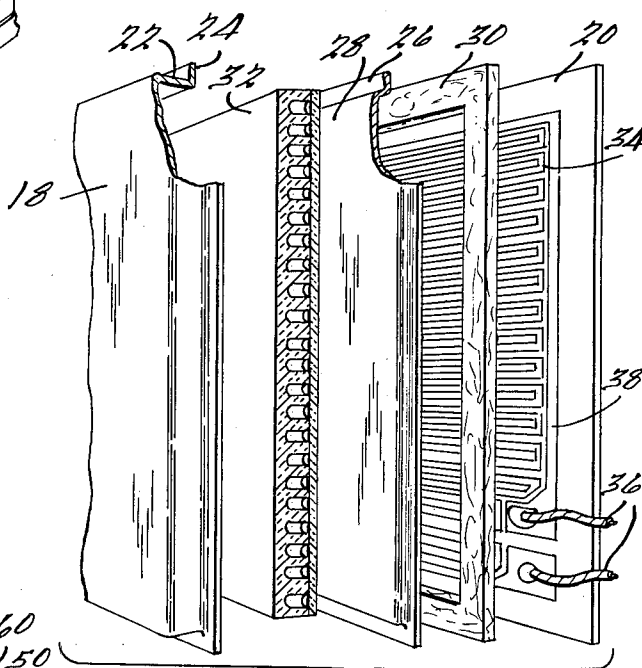
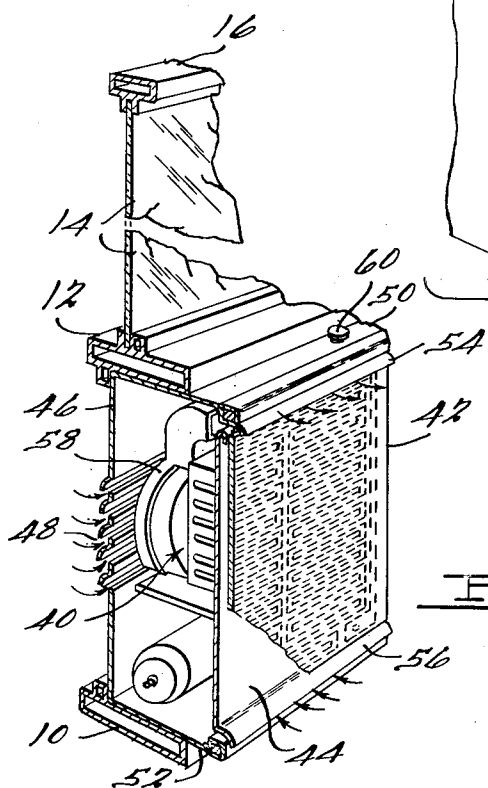
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CURTAIN WALL

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CURTAIN WALL

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This invention relates to improvements in building structures and especially to curtain wall constructions. More particularly, it relates to improved curtain wall constructions wherein the heating and air conditioning equipment for the building, of which the curtain wall is a part, is embodied in the curtain wall structure.

During recent years, the curtain wall type of building construction has come into widespread use. In this type of construction, the building wall is assembled in prefabricated sections, which sections do not become a part of the building support, the support being furnished by a steel or masonry skeleton. The wall sections do, however, carry the windows, the insulation and the exterior and interior trim.

The principal object of my invention is to provide a curtain wall for buildings, the inside trim surface of which is a radiant heating element.

Another object of my invention is to provide an improved curtain wall construction wherein heating apparatus is embodied in the wall sections, or some of them, for heating the building.

Another object is to provide a curtain wall construction embodying air conditioning equipment for cooling or otherwise treating the ventilating air to the building.

Still another object is to provide an improved building curtain wall construction wherein both heating and air conditioning equipment is embodied in the wall as an integral part thereof.

Other objects and advantages of my invention will become apparent from the following specification which, in conjunction with the accompanying drawing, discloses preferred embodiments of my invention.

In the drawing:

FIG. 1 is a perspective view, cut away, to show sectional details, of a portion of a curtain wall made in accordance with my invention.

FIG. 2 is an exploded view, on an enlarged scale, showing the elements which make up the lower section of the curtain wall in greater detail; and

FIG. 3 is a view similar to FIG. 1 showing a curtain wall embodying cooling as well as heating equipment.

Referring now specifically to FIGS. 1 and 2, it may be seen that my improved curtain wall section comprises a base member 10, a sill member 12, and a top frame member 16. The base member is adapted to rest on the building slab or foundation structure if the wall is a first floor wall, or on structural supporting members of the building skeleton if the wall is above the ground floor. The sill member 12 supports the window light 14, which may or may not be operable, and the top frame member 16 constitutes the upper window framing. The members 10 and 12 are preferably of extruded aluminum, but may be fabricated of other materials. The member 10 has an integral raised portion 11 and a raised lip 13 between which the other members of the "sandwich" are retained. The sill member 12 has similar depending elements as shown.

In some constructions where the curtain wall sections are fastened to the building skeleton exteriorly, vertically adjacent sections mate with one another. That is to say, the base member 10 mates with the top frame member 16 of the adjacent lower wall section, and so on. Sometimes an intermediate member (not shown) is inserted between the members 16 and 10 to provide desired spacing for

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floors, etc. If windows are not desired along entire lengths of wall, or not at all, the glass light 14 may be replaced by a metal, masonry or composite panel. These details are incidental and form no part of my invention which is applicable to any type of curtain wall construction or combination.

As illustrated more clearly in FIG. 2, the lower portion of my wall structure is of sandwich construction and comprises an outer metal panel 18 and an inner metal panel 20. The outer panel 18 is preferably coated on its outer surface with a permanent weather-proof material, such as porcelain enamel, paint or the like, and forms the outer decoration or trim of the building. The inner panel 20 is coated with porcelain or other vitreous substance in any color desired. This vitreous coating forms the inside decorative trim of the building and in addition constitutes a heat diffusing and radiating surface as will be presently described. The outer panel 18 has integrally formed flanges 22, 24. The marginal flange 24 engages the marginal flange 26 of a reflector member 28. The flange 26, in turn, engages the marginal portion of a spacer 30 which, in turn, engages the back surface of the inside wall panel 20.

A heat insulating member 32 of foam glass, vermiculite impregnated paper, rock wool, or the like, is nested in the depressed portion of the panel 18 as shown. The members are retained in tight assembly by the portions 11 and lips 13 of the base and sill members.

The inside wall panel 20 carries an electrical radiant heat resistor 34 in the form of a grid of metallic alloy, the opposite ends of which are adapted to be connected to the regulator 110 volt or 220 volt building supply by leads 36. The resistor grid 34 is fused to a vitreous coating 38 adhered to the inside surface of the panel 20. The coating 38 electrically insulates the grid 34 from the metal panel, and while a vitreous insulating layer is preferred, other materials, such as heat resistive resins, may be used.

As can be seen from FIG. 1, when the curtain wall is assembled, it is a complete wall section which includes a weatherproof outer panel 18, a decorative inner panel 20 and the necessary insulation 32. The spacer 30 is preferably of asbestos or other yieldable, heat resisting material that has heat insulating qualities. The space between the depressed central portion of the reflector 28 and the panel 20 constitutes an air space which permits equalization of temperature on the inner wall surface.

The resistor 34 is applied preferably by the process described and claimed in my copending application Serial No. 594,834, filed June 29, 1956, now U.S. Patent No. 2,939,807, to which reference is made for a more detailed description of the heating element. In the combination being described, energization of the resistor 34 will heat the panel 20 which, because of its vitreous coating on the surface facing the inside of the building space, will radiate heat rays, the majority being in the infra-red portion of the spectrum. The reflector 28 is preferably highly polished on the dish surface facing the resistor, and because of the sealed space between the reflector and inside trim panel 20, substantially all of the heat generated will be radiated, a very small amount being lost in conduction through the base and sill members and practically none being circulated by convection.

Because of the construction just described, a highly efficient radiant heater results, and because it is located directly below the window, where cold convection currents originate in cold weather, a most pleasant and satisfactory heating effect is achieved. By utilizing the inner panel 20 of the curtain wall as the heating element, I obtain maximum possible economy in cost of construction and space utilization.

The curtain wall sections may be as long as can be

conveniently handled in construction. Because of the relatively great area of radiation, a low temperature radiating surface may be used. This may be as low as 90° F. or as high as 300° F. Lower panel temperatures are preferable because they are harmless if contacted by the body and will not scorch draperies, upholstery or the like. In colder climates, each wall section may contain a heating element. In warmer climates, every other wall section or so may be a radiator. It is contemplated, of course, that each room or bay of the building will have its own individual thermostat, thereby providing zone control of heating.

It will be noted that the space between the element 34 and the reflector 28 is sealed. This makes the wall section practically a one hundred percent radiant device, the only convection heating being through movement of air across the face of the panel 20. Such construction is extremely efficient in converting the electrical input into radiated heat and minimizes upward air currents which tend to produce dust streaks.

The wall section of FIG. 1 may be assembled in the building with the base member 10 at floor level. However, it is common practice to erect these curtain walls such that the base 10 engages the top member 16 of the adjacent lower wall section along a line below the floor. In such instances, the floor line is about at the level indicated by the broken line 38 (FIG. 1), and the heating element will radiate along an area adjacent the ceiling of the room as well as below the window. This provides extremely comfortable heating. If desired, the area of the panel 20 covered by the grid element 34 may be restricted to that portion above the line 38.

FIG. 3 illustrates a modification of my novel curtain wall construction which incorporates air cooling as well as heating equipment in a unitary assembly. In this modification, the lower wall portion is thicker to accommodate the air conditioning equipment which is generally designated by the numeral 40. The base member 10 and the sill 12 are wider than those of FIG. 1, but perform similar functions.

The front panel 42 and the reflector 44 are assembled together without a spacer to conserve space, but a spacer like 30 of FIGS. 1 and 2 may be used if desired. The sub-assembly 42, 44, is mounted such that a slot is provided at the top and at the bottom thereof as shown.

The outside panel 46 is provided with louvres 48 for admitting outside air. The enclosure is in the form of a box with an upper side 50 on which the still 12 rests and a lower side 52 which rests in the base 10. A deflecting lip 54 is attached to or formed on the portion 50, which lip is spaced from the top of the heater sub-assembly and provides an outlet for air.

At the bottom the reflector 44 is formed with an outwardly turned flange 56 which is spaced from the inner edge portion of the side 52 to provide a lower slot for admission of room air.

The air conditioner 40 includes a blower 58 which, when operating, will draw air through the louvres 48 and the lower slot and force such air over the cooling

unit and out through the upper slot. If the air conditioner is in operation, this air will be cooled. If the heating element is energized, this air will be heated. If neither the cooling nor the heating unit is operating, ventilation will result.

Ordinarily during the heating season, the element on the rear side of panel 42 will be energized and the blower 58 will be off. This provides radiant heating with a small amount of convection heating through natural air circulation through the slots. If the louvres 48 are open, some outside air will be admitted. If desired, the louvres may be closed in cold weather.

The blower 58 may be used in cold weather, a control 60 being provided, to increase the flow of convection air passing through the slots for quick warmup although this is not necessary in ordinary circumstances.

The curtain wall of FIG. 3 is thus a combination wall section, air cooling device, radiant heater, convection heater and ventilator; any one or combination of functions being operable at the same time.

While I have shown but one example of my combination curtain wall and heating device and but one example of my combination curtain wall and air conditioning-heating device, it will be understood that the disclosure is by way of example only, and it is contemplated that changes in the precise arrangement of parts, in the sizes thereof and in the number thereof, will be made by those making use of the teachings herein set forth.

I claim:

A sandwich adapted to form the lower section of a building curtain wall comprising an outer panel, an inner panel, an insulating bat disposed against the inside surface of said outer panel, a reflector element disposed against the inside of said insulating bat, spacing means disposed between said reflector panel and inner panel, and forming a dead air space, and an electrical film-type resistor coated on the inside surface of the inner panel, the inner panel being coated on its exposed surface with vitreous enamel.

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