ABSTRACT: An air vent ceiling grid member adapted to control the amount of air passing between a plenum above a suspended ceiling and the space below the ceiling, comprising a pair of channels having upper and lower horizontal flanges connected to a web and end panels extending at right angles from the web, said webs being spaced apart by the end panels to form an airspace between the webs, a pair of connectors joining the end panels of the channels together, a T-shaped control member positioned in the airspace and having a vertical fin with a pair of horizontal flanges extending outwardly from the top of the fin and adapted to seat on the top of the web upper flanges to close the air space, and a control mechanism for varying the position of the control member to vary the amount of air passing through the ceiling grid member. The control mechanism may comprise a control spacer attached to the fin of the control member with a pair of pins extending outwardly from each side into a pair of slanted slots formed in the channel web, with the slots having a series of notches for holding the pins in a desired position. Another control mechanism may comprise a control spacer attached to the fin of the control member, a cam pivotally attached to the webs and contacting the spacer, and a cam lever extending from the cam, whereby the cam lever may be manipulated to rotate the cam and raise and lower the control member to control the amount of air passing through the air space. Another control mechanism may comprise a control spacer attached to the fin of the control member and having a slanted top portion in contact with said slanted bottom portion and having a pair of bars extending outwardly therefrom, and a pair of horizontal slots formed in the channel webs for receiving said bars, whereby to control the amount of air passing through the air space by moving the actuator member horizontally so that its slanted top portion raises and lowers the central spacer and control member.
This invention relates to suspended ceiling systems, and more particularly to such systems which pass air through the suspended ceiling into the room below. The air may be hot or cold in order to warm or cool the room, and a control must be provided in order to control the amount of air flow and to regulate the temperature of the room.

Prior systems include a linear air diffuser type that includes a boot or a duct attached to the top of a ceiling grid member, main runner or cross T's. Hot or cold air is forced through the boot and the grid member is provided with openings through which the air passes into the room below.

Another type of air system for suspended ceilings includes a pressurized plenum wherein the entire space above the suspended ceiling forms a plenum or duct under pressure. Hot or cold air is blown into the pressurized plenum and the air pressure forces the air down through holes in the main runners or cross T's.

**Summary of the Invention**

It is an object of this invention to provide a controllable air suspended ceiling grid system and an air vent ceiling grid member therefor. It is another object to provide an air vent ceiling grid member which is adapted to be used interchangeably with standard grid members. It is another object to use a standard grid member of small size as the control member of the air vent ceiling grid member, thereby avoiding a separate manufacturing operation and utilizing existing machines and facilities.

It is another object to provide an air vent ceiling grid member which seals closed effectively, eliminates noise from metal-to-metal vibration, and eliminates the whistle made by air as it passes around sharp steel edges.

The objects of this invention are accomplished by providing an air vent ceiling grid member that uses a standard T-shaped grid member of small size as its control member, with the control member being positioned in an airspace between two channels having end panels joined together by standard connectors adapted to fit into the slots of standard grid members. The control member is coated with a plastic which acts as a seal when the airspace is closed and eliminates noise from metal-to-metal vibration. The plastic coating rounds the edges of the control member to eliminate the whistle made by air as it passes sharp steel edges.

**Brief Description of the Drawings**

Other objects and advantages of the invention will further become apparent hereinafter and in the drawings, in which:

- FIG. 1 is a fragmentary perspective view of the top plan of a controllable air ceiling grid system;
- FIG. 2 is a view in side elevation of an air vent ceiling grid member constructed in accordance with this invention;
- FIG. 3 is a view in top plan taken as indicated by the lines and arrows 3–3 which appear in FIG. 2;
- FIG. 4 is a partial view in elevation on an enlarged scale of the grid member of FIG. 2 and illustrates the open position of the control member passing full air through airspace;
- FIG. 5 is a view in section taken as indicated by the lines and arrows 5–5 which appear in FIG. 4;
- FIG. 6 is a view in section similar to FIG. 5 except that the control member is in closed position so as to stop the passage of air through the airspace;
- FIG. 7 is a partial view in side elevation of another embodiment of the invention and includes a cam lever operating mechanism;
- FIG. 8 is a view in section taken as indicated by the lines and arrows 8–8 which appear in FIG. 7;
- FIG. 9 is a partial view in side elevation of another embodiment of the invention and includes an actuator member having a slanted top portion; and

**DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Although specific terms are used in the following descriptions for clarity, these terms are used to refer only to the structure shown in the drawings and are not intended to define or limit the scope of the invention.

Turning now to the specific embodiments of the invention selected for illustration in the drawings, there is shown in FIG. 1 a partial view in perspective of the top of a controllable air suspended ceiling grid system 11 comprising main runners 13, and cross T's 15 that form a suspended grid system which supports ceiling tiles 17. The suspended ceiling grid may be supported from the ceiling of the room by wires, or may be otherwise supported.

The cross T's and main runners may be of the standard, inverted-T type, or they may take the form of the air vent ceiling grid member 19 as shown in FIG. 2. Grid member 19 is adapted to control the amount of air passing between a plenum above a suspended ceiling and the space below the ceiling, and comprises a pair of opposing channels 21, 23 having upper horizontal flanges 25, 27, and lower horizontal flanges 29, 31, with upper flange 25 being connected to lower flange 29 by a web 33 and upper flange 27 being connected to lower flange 31 by a web 35. End panels 37 are located inwardly at right angles from web 33, and end panels 39 extend inwardly at right angles from web 35. Webs 33, 35 are spaced apart by end panels 37, 39 to form an airspace 41 between the webs. A pair of connectors 43 join the end panels 37, 39 of the channels together.

Connectors 43 are inserted into vertical slots in the web of a grid member and include a tab 44 that hooks over the bottom of the vertical slot and a shoulder 46 that abuts the web. A T-shaped control member 45 is positioned in airspace 41 and has a vertical fin 47 with a pair of horizontal flanges 49, 51 extending outwardly from the top of the fin 47 and adapted to seat on the top of upper flanges 25, 27 of the channels to close airspace 41.

A control mechanism is provided for varying the position of control member 45 to vary the amount of air passing through ceiling grid member 19. The control mechanism shown in FIG. 2 through 6 includes a control spacer 53 slidably attached to a bulb 55 formed along the bottom of fin 47. Control spacer 53 is preferably having springlike qualities so that it can recess 57 snaps onto bulb 55 and is slideably therealong. A pair of pins 59, 61 extend outwardly from each side of control spacer 53, a pair of slanted slots 63 are formed in channel webs 33, 35 for receiving pins 59, 61, and the slots 63 have a series of notch 65–69 for holding the pins 59, 61 in a desired position, fully open, half open, and fully closed. The end panels 37, 39 of the channels constrain horizontal movement of control member 45 so that the control member moves vertically and not horizontally.

The amount of air passing through airspace 41 is controlled by moving control spacer 53 horizontally so that its pins 59, 61 move along the slanted slots 63 to raise and lower the control member 45, with the control spacer 53 sliding horizontally along the bulb 55 and the control member 45 being constrained to vertical movement by the end panels 37, 39 of the channels. Control spacer 53 may easily be moved from below by inserting a screwdriver of something similar.

Control member 45 is provided with a plastic coating 71, preferably vinyl, whereby when the airspace 41 is closed with the control member flanges 49, 51 seated on the upper flanges 25, 27 of the channels, as shown in FIG. 6, the plastic coating 71 acts as an air seal and eliminates noise from metal-to-metal vibration, and whereby when the space air 41 is open with the control member flanges 49, 51 spaced away from the upper flanges 25, 27 of the channels, as shown in FIG. 5, the plastic coating 71 rounds the edges of the control member flanges 49, 51 to eliminate the whistle that air makes when passing sharp steel edges. The grid members of suspended ceiling systems are normally made from metal such as steel or aluminum.
Ceiling grid member 73 shown in Figs. 7—8 includes channels 21, 22 and control member 45, but it has a different control spacer 75 and operating mechanism.

Spacer 75 is preferably formed of plastic and has a central recess 77 that snaps around bulb 55, but it has no pins extending therefrom.

The operating mechanism includes a cam 79 Pivotaly attached to webs 33, 35 by a pivot pin 81. Cam 79 contacts the bottom of spacer 75, and a cam lever 83 extends from the cam and may be manipulated to rotate cam 79 and raise and lower the control member 45 to control the amount of air passing through airspace 41.

In Figs. 9—10, ceiling grid member 91 includes a pair of channels 93, 95 having upper horizontal flanges 97, 99 connected to lower horizontal flanges 101, 103 by webs 105, 107, control member 45 and a control spacer 109 having a central recess 111 which snaps onto bulb 55. Control spacer 109 has a slanted bottom portion 113. An actuator member 115 is provided with a slanted top portion 117 that is in contact with slanted bottom portion 113, and has a pair of bars 119 extending outwardly from its sides into a pair of horizontal slots 121 formed in channel webs 105, 107. The amount of air passing through airspace 41 is controlled by moving actuator member 115 horizontally from below, using a screwdriver or similar device, so that its slanted top portion 117 raises and lowers the central spacer 109 and control member 45.

The air vent ceiling grid member of the invention provides a controllable air suspended ceiling system that is simple and effective. It makes provision against the noise of whistling air and metal-to-metal vibration, and provides an effective air seal. It is easily operated from the room below the suspended ceiling without disturbing any of the elements of the suspended ceiling. Further, it uses as a control member a grid member from a system of smaller size, thereby using present plant equipment and avoiding the use of special machines and equipment to manufacture the control. Moreover, the air vent ceiling grid member is compatible with a standard suspended ceiling grid members and may be joined to them without the use of any special attachments or adapters.

1. A ceiling grid member comprising a pair of side members connected together in spaced apart relationship to form an airspace therebetween, and control means for controlling the amount of air passing through the airspace between a plenum above a suspended ceiling and the space below, said control means including a T-shaped control member positioned in said airspace and having a vertical fin with a pair of horizontal flanges extending outwardly from the top of the fin and adapted to seat on the top of said upper side members to close said airspace, and control means connected between said side members and said control member for varying the vertical position of the control member flanges relative to the top of the side members to vary the amount of air passing through the ceiling grid member.

2. A ceiling grid member adapted to control the amount of air passing between a plenum above a suspended ceiling and the space below the ceiling, comprising a pair of channels having upper and lower horizontal flanges connected together by a web and end panels extending at right angles from the web, said webs being spaced apart by the end panels to form an airspace between the webs, a pair of connectors joining the end panels of the channels together, a T-shaped control member positioned in said airspace and having a vertical fin with a pair of horizontal flanges extending outwardly from the top of the fin and adapted to seat on the top of said upper flanges to close said airspace, and control means connected between said webs and said fin for varying the vertical position of the control member flanges relative to the channel upper flanges to vary the amount of air passing through the ceiling grid member.

3. The ceiling grid member of claim 2 wherein said control means includes a control spacer slidably attached to the fin of the control member and having a pair of pins extending outwardly from each side, and a pair of slanted slots formed in the channel webs for receiving said pins, said slots having a series of notches for holding the pins in a desired position whereby to control the amount of air passing through the airspace by moving the control spacer so that its pins move along the slanted slots to raise and lower the control member.

4. The ceiling grid member of claim 2 wherein said fin has a bulb formed along its bottom and said control means includes a control spacer having a central recess that snaps onto said bulb and is slidable therealong, a pair of pins extending outwardly from each side of the spacer, a pair of slanted slots formed in the channel webs for receiving said pins, said slots having a series of notches for holding the pins in a desired position, the end panels of the channels constraining horizontal movement of the control member, whereby the control amount of air passing through the airspace by moving the control spacer so that its pins move along the slanted slots to raise and lower the control member, said control spacer sliding horizontally along the bulb and the control member being constrained to vertical movement by the end panels of the channels.

5. The ceiling grid member of claim 2 wherein the control member is provided with a plastic coating, whereby when the airspace is closed with the control member flanges seated on the upper flanges of the channels, the plastic coating acts as an air seal and eliminates noise from metal-to-metal vibration, and whereby when the airspace is open with the control member flanges spaced away from the upper flanges of the channels, the plastic coating rounds the edges of the control member flanges to eliminate the whistle that air makes when passing sharp steel edges.

6. The ceiling grid member of claim 2, wherein said control means includes a control spacer attached to the fin of the control member, a cam pivotally attached to the webs and contacting the spacer, and a cam lever extending from the cam, whereby the cam lever may be manipulated to rotate the cam and raise and lower the control member to control the amount of air passing through the airspace.

7. The ceiling grid member of claim 2, wherein said control means includes a control spacer attached to the fin of the control member and having a slanted bottom portion, an actuator member having a slanted top portion in contact with said slanted bottom portion and having a pair of bars extending outwardly therefrom and a pair of horizontal slots formed in the channel webs for receiving said bars, whereby to control the amount of air passing through the airspace by moving the actuator member horizontally so that its slanted top portion raises and lowers the central spacer and control member.