July 25, 1961 W. M. ERICSON 2,993,240

CEILING TILE MOUNTING CONSTRUCTION

Original Filed Jan. 3, 1955 2 Sheets-Sheet 1

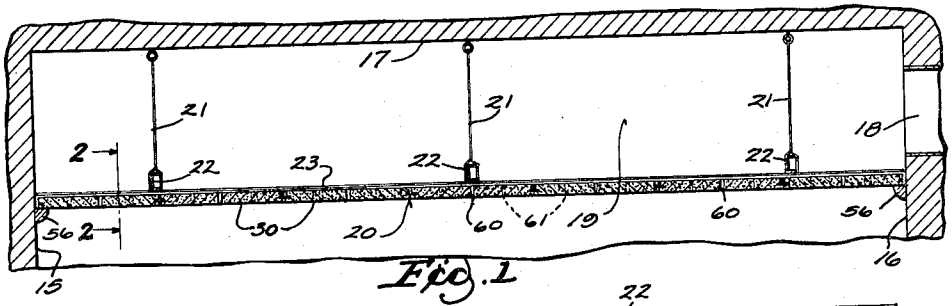


Fig. 1

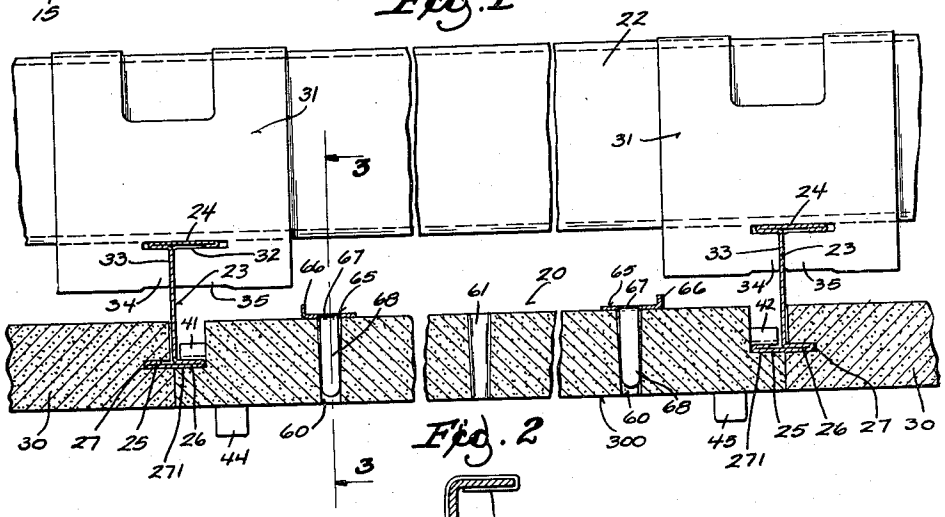


Fig. 2

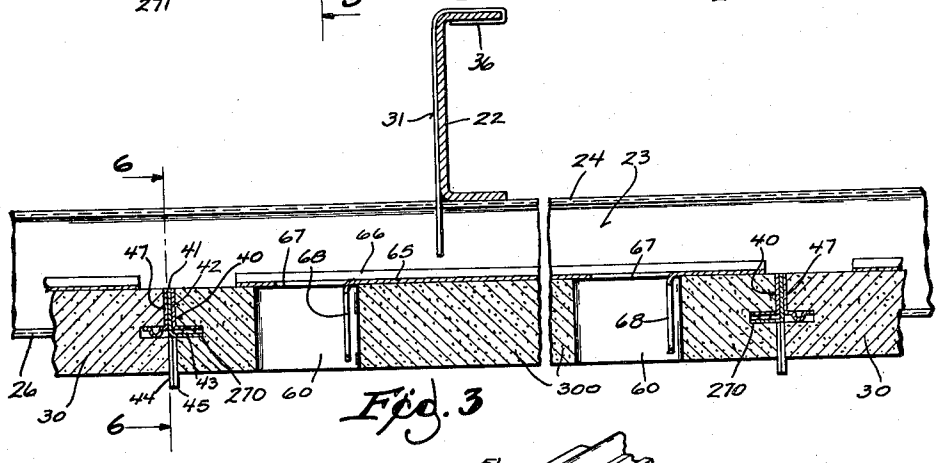


Fig. 3

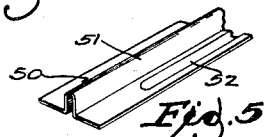


Fig. 5

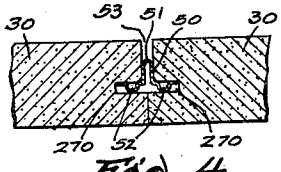


Fig. 4

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Fig. 7

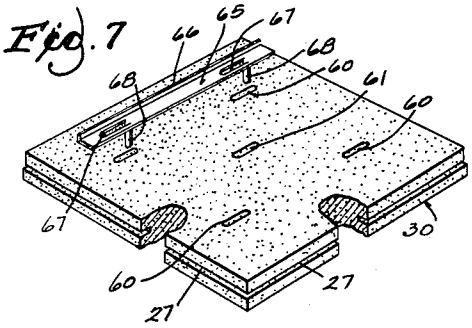


Fig. 8

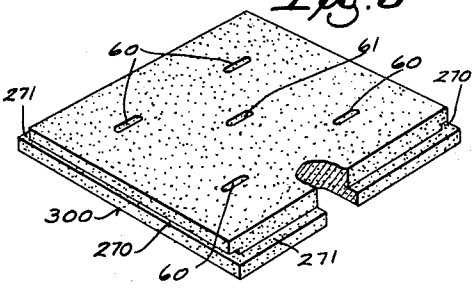
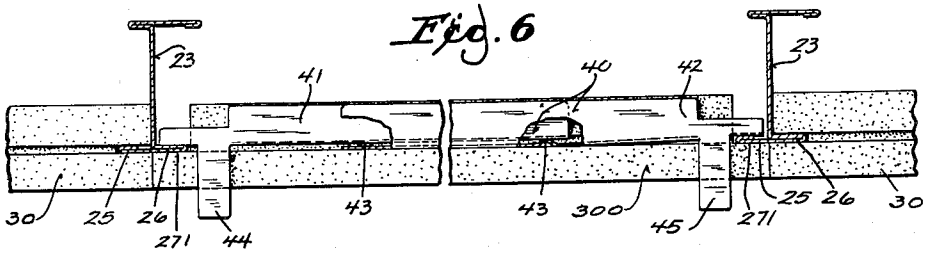


Fig. 6



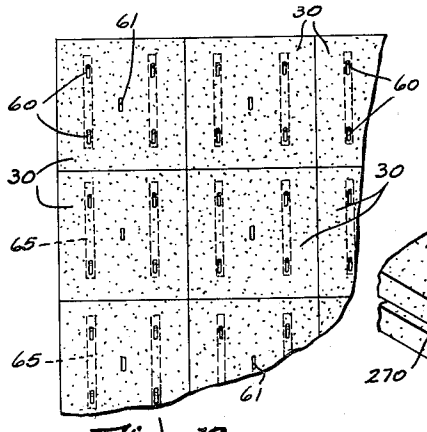


Fig. 12

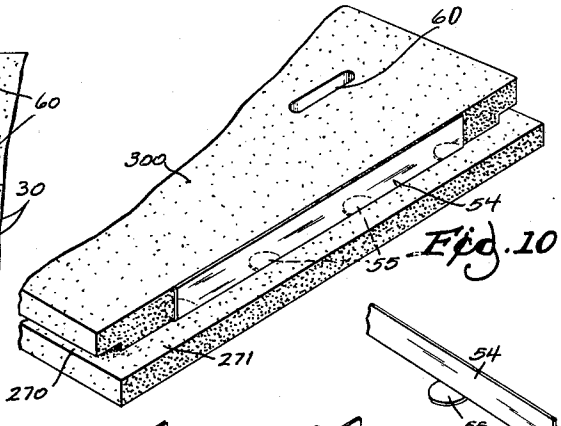


Fig. 10

Fig. 11

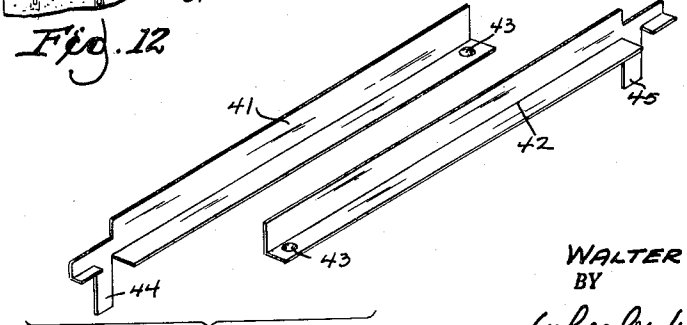


Fig. 9

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CEILING TILE MOUNTING CONSTRUCTION

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Original application Jan. 3, 1955, Ser. No. 479,629, now Patent No. 2,807,993, dated Oct. 1, 1957. Divided and this application Sept. 28, 1956, Ser. No. 612,666

3 Claims. (Cl. 20—4)

My invention relates to improvements in a ceiling tile mounting construction.

This application is a division of my copending application Serial No. 479,629, filed January 3, 1955, now Patent 2,807,993.

Numerous attempts have been made to devise ventilating or air conditioning systems using a ceiling plenum chamber with means for permitting a flow of air through the ceiling into the room to be ventilated or air conditioned. The unsolved problem in such installations has been an adequate, comprehensive control of air flow to eliminate draft. The requirements vary in every installation according to the location, or absence of, windows, doors and other openings. Even furniture locations affect the requirements.

The present ceiling is desirably constructed of tile, one feature of the invention comprising retractable interlocking means which makes certain tile removable to give access to others to the end that any portion of the ceiling may be separable as desired.

More fundamentally, however, the invention is concerned with a simple, inexpensive means invisible to the ordinary person using the room but readily accessible from beneath the ceiling to regulate air flow through all portions of the ceiling so that draft-free movement can be tailored to the particular requirements of the installation. In the preferred embodiment of the invention, each tile has a pattern of slots which taper downwardly in the cross section of the opening and at least most of which are controlled by simple, inexpensive slides mounted on the top surface of the tile and having operating tongues depending in the slot and serving not only to permit the slides to be operated from beneath, but also providing guidance for the slides. The control is effected by varying the extent to which the slot in the slide, formed by stamping out the tongue, registers, or fails to register, with the slot in the ceiling.

Through the arrangement described, an operator can use any pointed instrument, such as a nail or an ice pick, to reach into a slot and manipulate the tongue depending from one of the slides to move the slide to open or close that particular slot and any other controlled by the same slide.

In the drawings:

FIG. 1 is a fragmentary view in cross section through the upper portion of a room provided with a ceiling embodying the present invention.

FIG. 2 is a view on an enlarged scale taken in section on the line 2—2 of FIG. 1.

FIG. 3 is a view taken in section on the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary detail view in cross section through a preferred spline used between tile.

FIG. 5 is a fragmentary detail view of the spline in perspective.

FIG. 6 is a view taken in section on the line 6—6 of FIG. 3.

FIG. 7 is a view in perspective showing a single tile with portions broken away and one of the control valve slides shown in slightly raised position.

FIG. 8 is a view in perspective of a modified form of tile used where access to the plenum is required.

FIG. 9 is a view in perspective showing in slightly separated positions the complementary parts of an extensible support for the modified tile of FIG. 8.

FIG. 10 is a fragmentary detail view on an enlarged scale of the edge portion of a thin tile showing a re-enforcing angle.

FIG. 11 is a fragmentary detail view in perspective of a portion of such a re-enforcing angle.

FIG. 12 is a fragmentary bottom plan view of a portion of a ceiling completed in accordance with the present invention.

The room fragmentarily illustrated in FIG. 1 comprises the usual side walls **15**, **16** with a ceiling **17** immediately below which opens the air supply duct **18** which delivers ventilating air, heated air or cooled air, as the case may be, into the plenum chamber **19** above the false ceiling **20** with which the present invention is primarily concerned.

Ties connected to the ceiling **17** at suitable intervals support channels **22** at any suitable spacing which, for example, may be four feet between centers. The ceiling tile hereinafter to be described are connected with joist elements **23** which are of I-beam corss section but are extremely lightweight, being molded of thin sheet metal as best shown in FIG. 2. The upper end portion **24** of each joist snugly abuts the several channels **22**. The lower portion of each joist comprises laterally projecting flanges **25** and **26** formed by folding the sheet metal upon itself, these flanges being received into kerfs **27** of the tile **30**.

The joists **23** are supported by special clips **31**, each of which has an opening at **32** to receive the top of the joist, the clip being slit at **33** from such opening to its lower margin to provide tongues **34** and **35** which abut the central webs of the respective joists. With the clip engaged with the joists as shown in FIG. 2, its upper end portion **36** is folded over the stringer channel **22** to hold the joist securely against the channel as shown in FIG. 3.

If the several tile are all assembled by sliding them into place with their respective kerfs engaged over flanges **25** of the supporting joists, access to the plenum is obtainable only by disassembling the entire ceiling or destroying one or more tile and substituting a makeshift replacement. Accordingly, it is one of the features of the invention to provide for opening the ceiling at any appropriate intermediate point. To this end, special tile **300** are provided as shown in FIGS. 6 and 8, and incidentally illustrated in FIGS. 2 and 3. The tile **300** has grooves **270** along two of its sides, but a shoulder **271** is exposed by opening up each groove **27** at the other two sides of the tile by removal of the portion of the tile thereabove. As best shown in FIGS. 2 and 6, the exposed shoulders **271** engage the joist flanges **25** and **26** from beneath, but the tile are not supported by engagement of any portion of the tile **300** with the upper surfaces of the respective joist flanges. Thus, but for some other means of support, the tile **300** would fall from its illustrated position between the joists **23** in FIG. 6 and FIG. 2.

The supports **40** separately illustrated in FIG. 9 and shown in side elevation in FIG. 6 comprise a pair of relatively extensible angle slides **41** and **42** desirably embossed at **43** for bearing contact with each other and having depending tongues **44**, **45** for their manipulation. These tongues hang down between the tile at opposite sides of the tile which is removable.

The horizontal flanges of the angle slides **41** and **42** fit into the grooves **270** of the removable tile **300** at opposite sides thereof. With the slide elements **41** and **42** extended, their ends overlie flanges **26**, **25** of respective joists **23** to support the tile. When such elements are

relatively retracted, their combined length is less than the space between the flanges of the joists, thereby freeing the tile for removal. An operator grasping the depending tongues 44, 45 can readily manipulate the slides for extension or retraction to mount the tile 300 or to free it from support from the flanges of the joist elements, as may be desired.

Where the supports 40 are used to carry a removable tile 300, the adjacent margin of tile 30 is desirably reinforced by an angle 47 as best shown in FIG. 3. This is required only when the tiles are relatively thin and it serves to keep the tile 30 from sagging by providing marginal support comparable to that provided for tile 300 by the lapping and relatively slidable angles 41 and 42.

For transversely interlocking thin tiles 30 at other points, a reinforcing strip 50 may be used. The preferred construction is shown in FIGS. 4 and 5, the strip having an embossed central rib 51 of substantial height and its lateral flanges having elongated ribs 52 which closely fit into the kerfs 270 of contiguous tile. It will be noted that there is marginal clearance above these kerfs at 53 on all four sides of each of the tile (see FIG. 7) to accommodate the ribs 51 of these inserts.

Where very thin tiles are used, it may also be desirable to reinforce the tile where these are cut away at the exposed shoulders 271, as shown in FIG. 10. A reenforcing strip 54 may be applied to the remaining margin of the tile and anchored by lateral tongues 55 forced into the material of the tile as shown in FIGS. 10 and 11.

The joists between the ceiling and the side walls may be made as disclosed in my copending application Serial No. 256,574, now Patent No. 2,781,557, or a simple piece of quarter round or other molding may be used, as shown at 56 in FIG. 1, the closure at this point being immaterial to the present invention.

In order to control air flow downwardly through the ceiling 20 from plenum chamber 19, the entire ceiling 20 is provided at relatively short intervals with openings 60 and 61 which desirably take the form of elongated narnow slots downwardly tapering in cross section, as best shown in FIG. 2. The form and relative size of the tile or other ceiling material is irrelevant to this phase of the invention, but whatever the size and shape of the tile or ceiling sheets, it is desirable that a plurality of slots 60 be aligned to be controlled by the single valve. Other slots 61 may be left open, the flow to these representing the minimum flow desired, irrespective of control. Assuming that the tile are square, as shown, each may be provided with five slots comprising two pairs of aligned slots 60 and one central uncontrolled slot 61.

The slide valve 65 comprises a plate of sheet metal desirably having an upturned flange at 66 to stiffen it and having slots at 67 spaced to register with the slot-like ports 60 which the valve is to control. Obviously, the number of slots 67 in the valve plate 65 should correspond to the number of slots in the ceiling which the plate controls, two being illustrated. The metal punched from each of the slots 67 is formed downwardly to comprise a tongue 68. These tongues are of such a length that they can readily be reached from a point below the ceiling for the manipulation of the slide. They are of such a width that at their lower ends they fit quite closely the downwardly converging side surfaces of the ceiling slots 60, whereby friction between the tongues and the material of the ceiling will tend to prevent displacement of the slides from adjusted position. The fit is not so tight as to preclude ready adjustment manually when a nail or an ice pick or a similar pointed instrument is inserted into the ceiling slot 60 from below and engaged with one of the tongues.

Accordig to the position to which the tongue is manipulated in this manner, the ports 67 in the slide valve 65 may be substantially in registry with the port 60 in the ceiling or may be substantially wholly out of registry with the ceiling ports. In all movement of the slide valve, the engagement of the tongues in a plurality of consecutive and aligned slots will guide the reciprocation of the valve to maintain it in a position where its ports will be aligned at all times against lateral displacement with respect to ceiling ports. Thus the only way in which ceiling ports can be opened or closed is by slide movement in a direction which is longitudinal of the ceiling slots.

As shown in FIG. 12, the entire ceiling may comprise a regular pattern of tile, all of which may, if desired, have permanently open ports at 61 and each of which desirably has potrs 60 in aligned pairs, each spanned by one of the slide valves 65. Thus each such pair of ports 60 is individually controllable by its own valve to regulate flow independently of flow through any other pairs of ports. By having each valve arranged to control at least two ports, guidance for its movement is assured by the controlling and guiding tongues 68. By limiting the number of ports to two, control is much more localized than would be the case if longer valve slides were used to control a greater number of ports.

With a ceiling installed as here disclosed air flow can be regulated as minutely as may be desired, the individual slide valve being opened or closed to meet the requirements of the particular room in which the system is used and to maintain, regardless of obstructions or openings, a substantially uniform downward flow of air from the entire ceiling area.

It will be understood, of course, that the air delivered into the room has to escape from it in some manner and will ordinarily be recirculated through return ducts in the conventional way.

It should be noted here that the invention is applicable to metal tile as well as tile made of acoustical or insulating material such as gypsum or fiber glass. Cross reference is made to my co-pending application Serial No. 580,738, filed April 26, 1956, and now Patent 2,920,357.

I claim:

1. For use in a ceiling having spaced supports, a tile receivable at two sides between the supports and having kerfs on its other two sides, and supporting means disposed in one of the kerfs and engageable at one end with one of the supports and having a retractable extension movable to and from a position of projection for engagement with the other support said supporting means comprising a pair of nested angles having superposed flanges in the kerf of the tile and having terminal portions projecting beyond the tile to positions for engagement with the supports, the said angle having individual tongues depending beside the tile for access therebeneath to manipulate the angles.

2. The combination with a ceiling tile having a marginal shoulder on one margin and a kerf on a contiguous margin, of a support therefor comprising spaced joists having opposed flanges, the undersurface of one of which is engaged by said shoulder, and means for releasably mounting the tile from said joists and including at one side of the tile a pair of nested angles having complementary horizontal and vertical flanges, the vertical flanges extending upwardly beside the kerfed margin of the tile and having ends resting on said opposed joist flanges, the horizontal flanges being superimposed and together engaged in the said kerf of said tile for the support of said one side of the tile, the said angles being relatively movable longitudinally for extension and retraction to vary their combined length, their combined length being greater than that of the tile in the relatively extended position of the angles and being no greater in length than the tile in the relatively retracted position thereof, each of said angles having a depending lug projecting beneath the supported tile for the manipulation of said angles.

3. The combination with a ceiling tile having a lateral kerf, of supporting means engaged with one side of the

tile and comprising nested angles having superimposed horizontal flanges both engaged in the kerf and vertical flanges beside the tile and above the kerf, the said angles being relatively adjustable longitudinally in the kerf to vary their combined length and having manipulating lugs depending from the respective angles beside the tile, and a pair of fixed supports respectively engaged by the ends of the angles in one relative position thereof, the vertical angle flanges having oppositely projecting ends normally resting on said fixed supports for carrying the kerfed tile from said supports, the combined length of the angles in a relatively retracted position being no greater than the clearance between said supports.

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