Nov. 20, 1962 C. N. O'DAY ETAL 3,064,550

AIR OUTLET CONSTRUCTION

Filed Oct. 7, 1960

FIG. 1

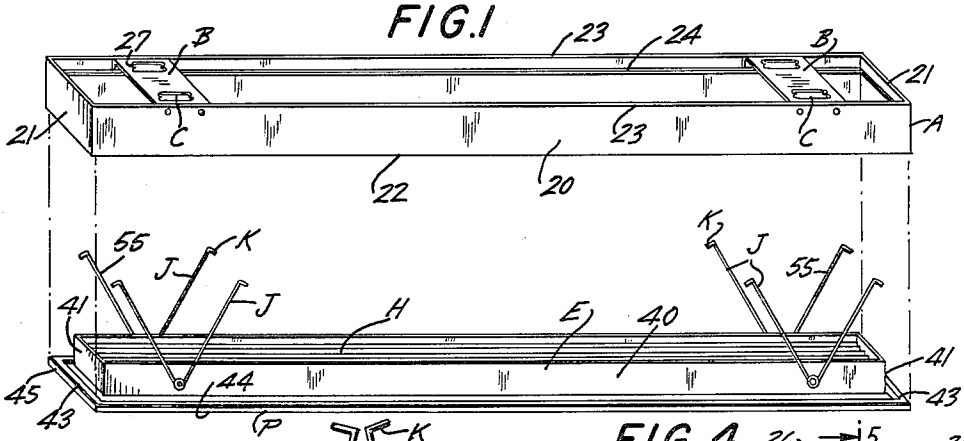


FIG. 2

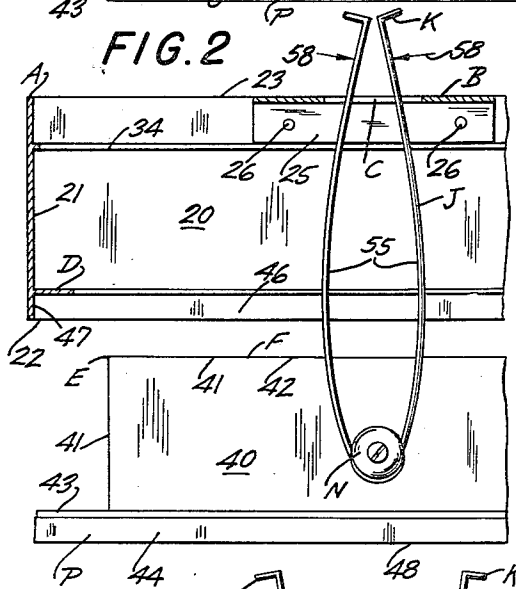


FIG. 4

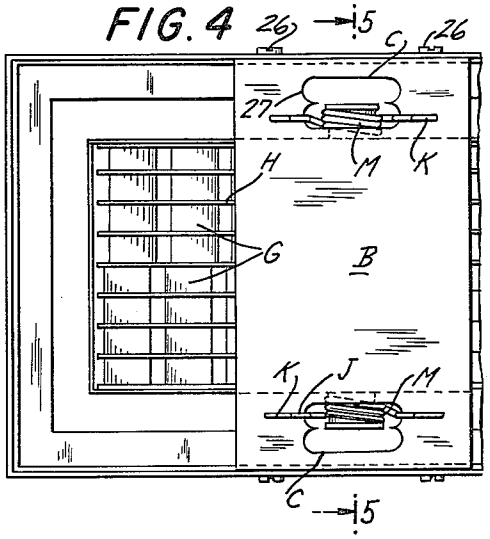


FIG. 3

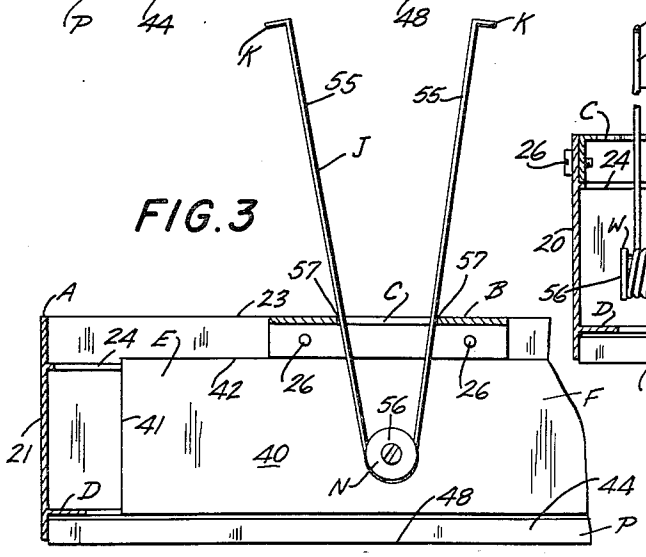
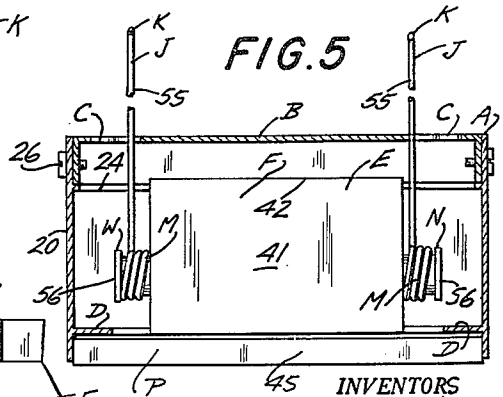


FIG. 5



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AIR OUTLET CONSTRUCTION

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The present invention relates to an air outlet construction and it particularly relates to a readily detachable air diffuser or register outlet.

Although not limited thereto, the present invention will be particularly directed to a rectangular or elongated air conditioning, ventilating, or heating outlet positioned in a ceiling or wall structure which may be readily removed from the ceiling or wall and replaced in the ceiling or wall without the necessity of screw or bolt connections.

In connection with air conditioning, ventilating, heating, or cooling air outlets for rooms, offices, lofts and other enclosures used by office or working people, considerable difficulty is experienced in attaching screws, bolts or other elements which are necessary when the device is inserted in place in the ceiling or wall or removed from its location in the ceiling or wall.

It is among the principal objects of the present invention to provide a novel air outlet fixture of the character described which may be readily inserted into or removed from a desirable opening in the ceiling or wall without the necessity of laboriously removing screws, rivets or bolts, and which may be readily inspected or serviced without a great deal of manual labor and without considerable inconvenience to the people working or employed in the enclosure if the servicing is carried out during working hours.

Another object is to provide a simple, durable, readily detachable and insertable air diffuser outlet, of square, rectangular or other contours, which may be removed from and inserted in a ceiling structure in a minimum of time by relatively simple manipulation without the employment of tools and without the need of hiring special workmen.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

In accomplishing the above objects, according to one preferred embodiment of the present invention, a frame receptacle is employed which is mounted, desirably in the ceiling, wall, sill or floor and which may form the end of an internal conduit system conducting ventilating, conditioning, heating or cooling air into the enclosure from a concealed or external conduit system and from a central source, which may supply the air in compressed or expanded condition.

In one preferred form of the invention, the end conduit opens or is connected to the ceiling, wall, sill or floor by a frame which extends around the recess and which acts to receive the diffuser or grill member serving as air inlet and also serving to control the flow of air into the room or enclosure.

Desirably, the outer element, which is removable or detachable, has an enclosure conforming in shape and size to the fixed casing mounted in the ceiling, and has an outer peripheral flange for cutting or fitting around the edges of the fixed enclosure or collar which is mounted in the ceiling, wall, sill or floor structure.

Desirably, interiorly of the collar or neck, which is the permanent frame mounting in the ceiling, is located

a number of cross-members having slots or openings therein, desirably of elongated shape with rounded end portions.

On the sides of the conforming neck or enclosure structure of the removable air diffuser or air outlet unit are positioned a plurality of V-shaped spring elements, or V-shaped clip elements, having out-turned end portions which are designed to be received in special slots, and which, because of their resiliency and tendency to form a fairly wide V and press against the ends of the slots, will tend to hold the detachable diffuser or grill tightly in position within the fixed frame.

In one preferred form of the invention, the spring engagement elements consist of coiled base elements which fit around pins or studs on the sides of the external frame of the insert element which is to be mounted within the holding structure, which is in turn mounted inside of the ceiling.

Normally, the resiliency and tendency to spring apart of the legs of the V latches will be such that the detachable unit will be held tightly and firmly in position.

On the other hand, as against a very sharp downward pull, the detachable unit may be moved downwardly from its connection with the legs, being more closely compressed, but total removal cannot be achieved in view of the fact that the out-turned ends of the spring legs will catch in the ends of the slots and will retain the insertable unit in partly removed condition, or suspended condition, so that the interior of both the fixed element on the ceiling, as well as the partly removed element, may be inspected for servicing purposes.

If it then be desired altogether to remove an insert element or the diffuser or the register outlet, this is accomplished by means of pressing together the ends of the legs and the out-turned portions thereof, so that they may be passed downwardly through the attachment slots.

Thus, the entire fixture, whether it be an air conditioner outlet, or an air diffuser inlet, or even a register or grill for heating or cooling the air, may be repaired, inspected or replaced.

The unit is particularly advantageous since it eliminates objectionable appearance of screws on the face of the unit.

In re-inserting or replacing the unit, the outer ends of the legs with their in-turned end portions are pressed together, inserted within and through the slots in the fixed cross members of the sleeve in the ceiling, and then the fixture may be pressed home so that it will nest closely against the outer periphery of the fixed insert sleeve member.

Although the present invention is readily applicable to air outlet registers, or outlet grills or air outlet diffusers, it will be particularly described in its application to an air diffuser outlet.

Furthermore, although the present invention is also applicable to square, rectangular or circular or ovular diffuser outlets, it will be particularly described in its application to an elongated rectangular air outlet diffuser construction.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described, and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:

FIG. 1 is a separated view of the fixed frame in the upper part of the figure in perspective and the removable air diffuser outlet in the lower part of the figure, showing

them in the position in which they will be placed either after removal of the central unit or just before insertion of the central unit.

FIG. 2 is a fragmentary end sectional view, showing the frame with the detachable unit in the manner in which it is inserted or removed therefrom.

FIG. 3 is a fragmentary end side sectional view, similar to FIG. 2, showing the detachable inside diffuser element in its final position telescoped home within the outer frame and held in position by the resilient V-shaped member.

FIG. 4 is an end top plan view of the unit of FIG. 3, with the inside unit telescoped or pressed home in its final position.

FIG. 5 is a transverse side sectional view taken upon the line 5—5 of FIG. 4, showing the diffuser unit inserted home within the outer frame structure.

Referring to FIGS. 1 to 5, there is shown the frame structure A which may be fitted into an opening in the ceiling and which may be connected to an internal conduit system supplying ventilating, cooling, heating, or conditioning air to a room or enclosure.

The external frame has the cross-members B, which may consist either of V-shaped or angle brackets at each side, or cross-bars, as shown in FIGS. 1 to 5.

These cross-members B are provided with the slots C, which, as shown, are of double width and have curved end portions. The fixed enclosure A has an internal outer frame structure D which is designed to form a seat or recess for the frame or periphery of the detachable element or structure E.

The detachable air diffuser or air outlet unit E has a central, inwardly telescoping unit F having sutiable arrangements of inclined vanes G (see FIG. 4) separated by fins or partitions H to give a suitably controlled directional effect to the outward flow of conditioned, heating, cooling or ventilating air, as the case may be.

The outer portion of the inside telescoping unit E has the outwardly extending flange P, which nests in the pocket or enclosure D to form a tight connection, thus forcing the air to flow out over the vanes G and between the partitions H.

On the sides of the telescoping element F are positioned the V-shaped spring attachment clips or units J, having the out-turned end catch portions K and the central coiled engagement pivot portions M which are received by the stud elements N.

Referring specifically to the outer structure A, it has the elongated side walls **20**, with the end connecting walls **21** forming a complete enclosure or sleeve inserted and fixed in position in the ceiling and with the outer edge **22** desirably flush with the plaster face of the ceiling.

The internal upper end or inside end **23** of the structure A is desirably provided with an in-turned flange member **24**, which acts to locate the side flanges **25** of the cross-members B.

These side flanges **25** are screwed or riveted in position by the elements **26** (see FIGS. 4 and 5).

The slots C, as shown in the cross-members B, have double riveted ends **27** and extend in pairs on each side of the cross-member B.

The cross-member B is shown as extending from side wall **20** to side wall **20**, but it may project just shortly into the inside area between the walls **20** to carry the double slot C and serve as a means to receive and engage the V-shaped clip members J.

The double slot C is sufficiently wide so that it has considerable latitude in respect to engagement by the resilient clip members J and also the rounded end portions **27** forming a locating end for the leg members J.

Desirably the plane of the cross-members B should be flush with the inner edges **23** of the sleeve structure A.

Referring to the inside element E, the telescoping portion F of this element which receives the vanes and partitions H has the elongated side walls **40** and the connecting end walls **41**, and it will telescope inside of the walls **21** and **21** in the manner indicated in FIG. 5, substantially in the manner shown in FIGS. 3 and 5, with their being a relatively wide space between the outer sleeve A and the inside telescoping element E.

The inside element E projects toward but not against the cross-members B, and, as shown in FIGS. 3 and 5, it will terminate at its upper edge **42**, substantially below said cross-member B and substantially below the outer edge of the fixed sleeve A.

A gasket **43** may fit around the inside face of the periphery of the flange P of the inside unit E, as is best shown in FIGS. 1 and 2.

This gasket may press up against the in-turned member or seat member D, while the outer walls **44** and **45** of the flange will fit closely inside the interior faces **46** and **47** and the outer sleeve unit A. (See particularly FIGS. 2, 3 and 5).

This fitting of the flange P and its nesting tightly inside of the seat D will form an airtight, leakproof connection in which the outer face **48** will slightly project beyond the lower edge **22** of the outer sleeve A, forming a very neat finish for the air conditioning outlet unit.

The V-shaped spring slip K desirably has two relatively strong spring legs **55**, which are joined integrally together by the connecting coil M around the reduced diameter portion inside of the head **56** of the stud N.

The spring legs **55** are relatively stiff and tend to spring outwardly into the relatively wide V structures, as shown in FIG. 1.

When, however, they are in home position in the slots C, as shown in FIG. 3, they will so strongly and tightly press against the edges of the slots C, as indicated at **57** in FIG. 3, as to hold the inside unit E tightly in position inside of the outer sleeve A, with the flange P pressed inside the lower edge of the structure A and against the partially inwardly directed flange D.

The resiliency of the leg elements **55** should hold the inside elements E sufficiently tightly in the closed position as indicated in FIGS. 3, 4 and 5, regardless of any vibration or normal banging or changes in expansion or contraction.

However, when a substantial force is applied, exceeding this frictional force as exerted at **57** to pull the members E downwardly out of the sleeves A, the out-turned ends K will catch or latch against the curved ends **27** of the slots C.

However, when a sharp contracting force is applied, as indicated at **58** in FIG. 2, by pliers or by the fingers, the out-turned elements K may be pressed sufficiently inwardly as to pass downwardly through the slots C in dismantling or upwardly in assembly.

It is thus apparent that the present invention has provided a novel, readily detachable and readily insertable air diffuser, or recess, or air grill unit, which may be inserted into or removed from an outer sleeve A without screws, bolts or special tools.

The inside element E may be partly lowered, with the elements K latching in the slots C, for inspection without total displacement, and then it may be readily shoved back into the position of FIGS. 3, 4 and 5.

On the other hand, the latch elements K may be pressed sufficiently together, as indicated in FIG. 2, to permit complete removal.

As many changes could be made in the above air outlet construction, and many widely different embodiments of this invention could be made without departure from the scope of the claims, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

Having now particularly described and ascertained the nature of the invention, and in what manner the same is to be performed, what is claimed is:

1. A detachable air outlet unit including an outside sleeve element mounted on a ceiling and connected to

receive air from an internal or exterior conduit system, and an inside detachable telescoping sleeve element having air control members therein, said elements being rectangular and elongated in one direction and each having opposite telescoping vertical side and end walls which are parallel to each other and closely spaced when the inside element is mounted inside the outside element and the outside element having slot latching structures with the slots extending parallelly to the long dimension of the rectangular elements, said slot latching structures extending in a horizontal plane inwardly from the upper ends of the side walls of the outside element, said elements having interfitting air sealing constructions and V-shaped spring elements having upwardly divergent legs and having integral coiled connections at the lower ends of the legs, said legs extending into and through said slots and horizontal pivots extending outwardly from the side walls of the inside element forming pivot mounts for said coil connections and permitting partial or complete detachment of the inside element for inspection, servicing and replacement.

2. A detachable air outlet unit including an outside sleeve element mounted on a ceiling and connected to receive air from an internal or exterior conduit system, and an inside detachable telescoping sleeve element having air control members therein, said elements being rectangular and elongated in one direction and each having opposite telescoping vertical side and end walls which are parallel to each other and closely spaced when the inside element is mounted inside the outside element and the outside element having slot latching structures with the slots extending parallelly to the long dimension of the rectangular elements, said slot latching structures extending in a horizontal plane inwardly from the upper ends of the side walls of the outside element, said elements having interfitting air sealing constructions and V-shaped spring elements having upwardly divergent legs and having integral coiled connections at the lower ends of the legs, said legs extending into and through said slots and horizontal pivots extending outwardly from the side walls of the inside elements forming pivot mounts for said coil connections and permitting partial or complete detachment of the inside element for inspection, servicing and replacement, said latching structures consisting of cross, transversely slotted plates in the outside element.

3. A detachable air outlet unit including an outside sleeve element mounted on a ceiling and connected to receive air from an internal or exterior conduit system, and an inside detachable telescoping sleeve element having air control members therein, said elements being rectangular and elongated in one direction and each having opposite telescoping vertical side and end walls which are parallel to each other and closely spaced when the inside element is mounted inside the outside element and the outside element having slot latching structures with the slots extending parallelly to the long dimension of the rectangular elements, said slot latching structures extending in a horizontal plane inwardly from the upper ends of the side walls of the outside element, said elements having interfitting air sealing constructions and V-shaped spring elements having upwardly divergent legs and having integral coiled connections at the lower ends of the legs, said legs extending into and through said slots and horizontal pivots extending outwardly from the side walls of the inside element forming pivot mounts for said coil

connections and permitting partial or complete detachment of the inside element for inspection, servicing and replacement, said structures having cross-members on the outside elements with transverse rounded end double slots positioned closely adjacent to the side walls of the inside element.

4. A detachable air outlet unit including an outside sleeve element mounted on a ceiling and connected to receive air from an internal or exterior conduit system, and an inside detachable telescoping sleeve element having air control members therein, said elements being rectangular and elongated in one direction and each having opposite telescoping vertical side and end walls which are parallel to each other and closely spaced when the inside element is mounted inside the outside element and the outside element having slot latching structures with the slots extending parallelly to the long dimension of the rectangular elements, said slot latching structures extending in a horizontal plane inwardly from the upper ends of the side walls of the outside element, said elements having interfitting air sealing constructions and V-shaped spring elements having upwardly divergent legs and having integral coiled connections at the lower ends of the legs, said legs extending into and through said slots and horizontal pivots extending outwardly from the side walls of the inside element forming pivot mounts for said coil connections and permitting partial or complete detachment of the inside element for inspection, servicing and replacement and V-shaped spring structures having out-turned end portions to act as a final latch structure and prevent complete removal of the inside element.

5. An air diffuser unit having an outside fixed frame element mounted permanently in an opening in a ceiling and a inside removable diffuser element detachable from said frame element, said diffuser unit having a detachable latch unit for mounting the detachable inside element in the ceiling, said latch unit including fixed horizontal plate in the ceiling and on said frame element positioned substantially inside of and above the level of the ceiling plate having elongated slot and said removable diffuser element having a vertical side wall, a pivot mount on said side wall, a coil wire pivotally mounted on said pivot mount upstanding divergent spring wire legs integral with said coil wire and extending upwardly from opposite sides of said pivot mount and extending through said slot and out-turned upper ends at the upper ends of said legs engaging the ends of said slots.

6. The diffuser unit of claim 5, said spring wire legs extending between the frame element and the diffuser element and said frame element and diffuser element being of elongated rectangular shape and said legs and said slot being positioned in vertical planes parallel to the long dimension of said diffuser unit.

7. The diffuser unit of claim 5, said diffuser unit having an elongated rectangular frame element and an elongated diffuser element each with parallel elongated vertical side walls extending longitudinally and parallelly to each other and the walls of the frame element.

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