March 24, 1964 A. L. RADCLIFF 3,125,944

SUPPLY GRILLE AND/OR REGISTER

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FIG. 1

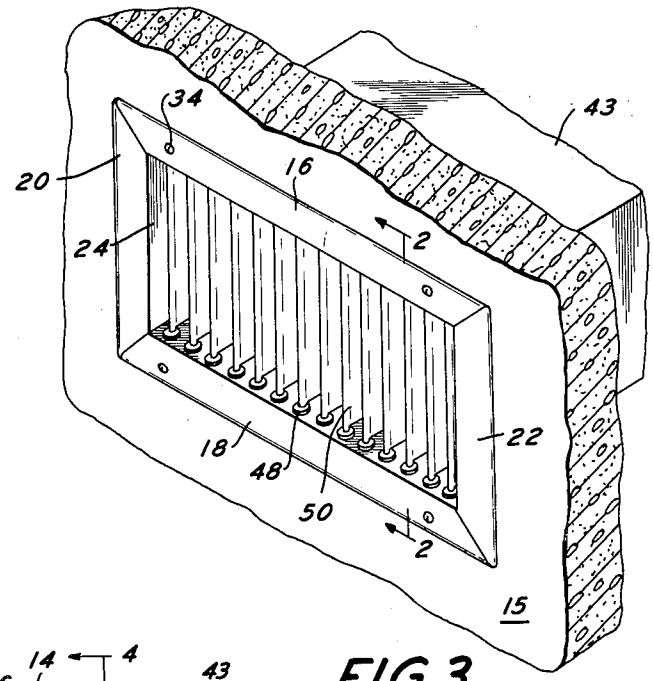


FIG. 2

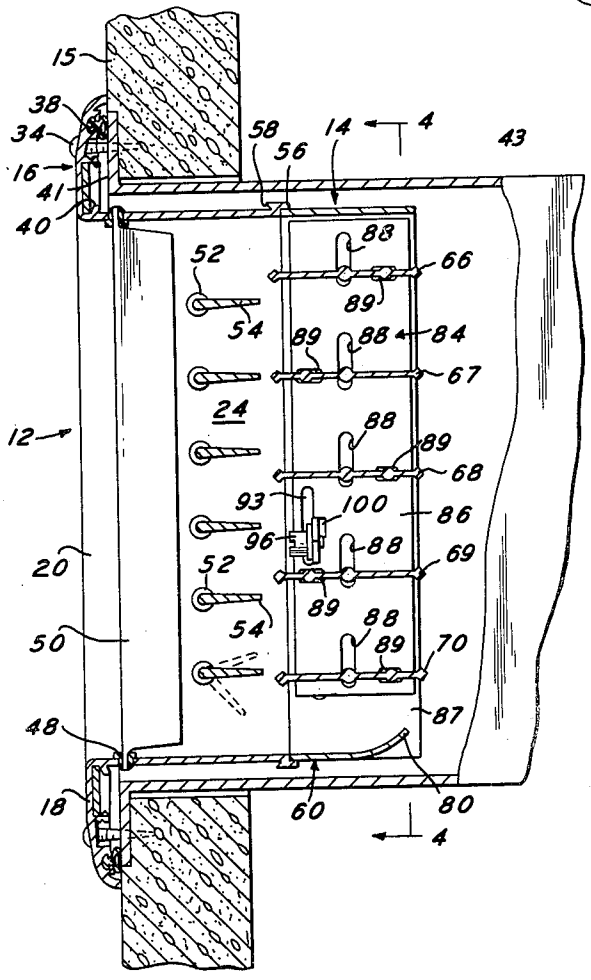
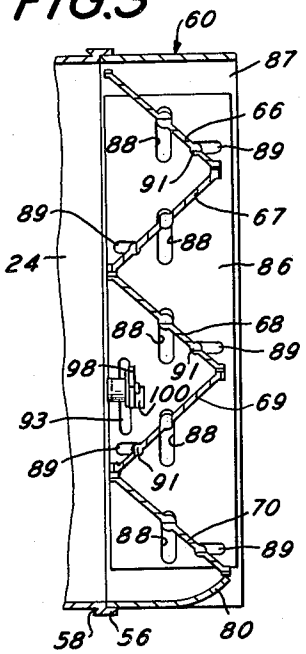


FIG. 3



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FIG. 4

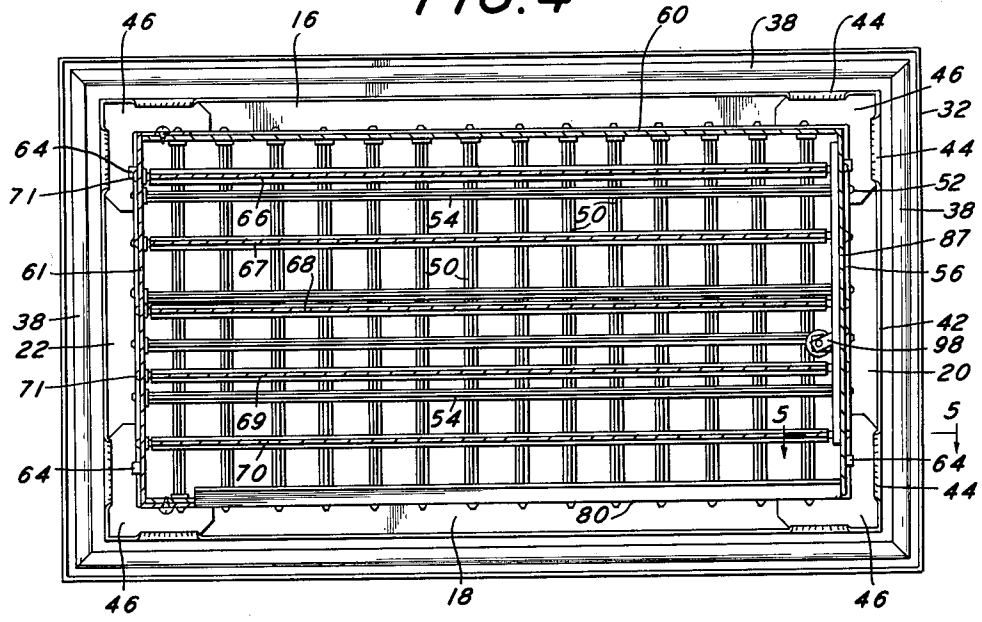


FIG. 5

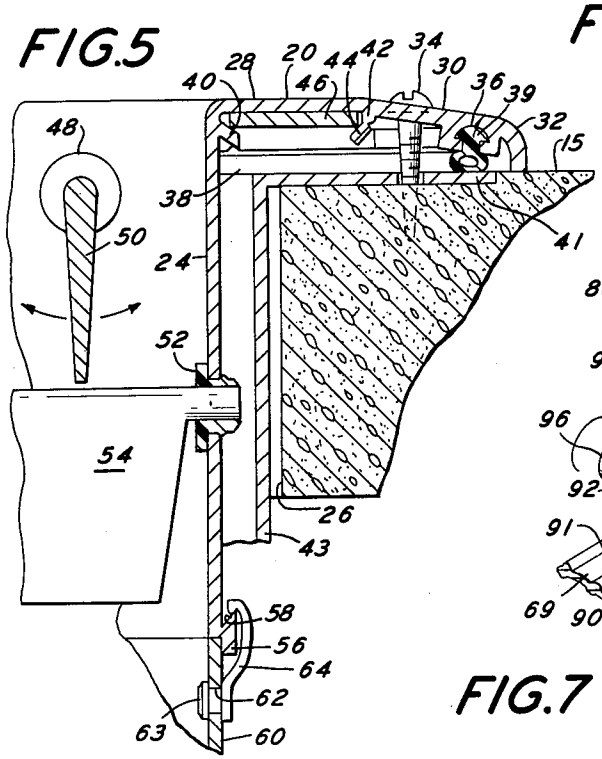
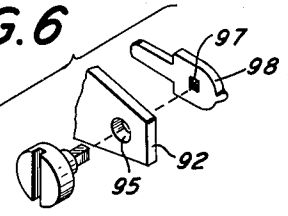


FIG. 6



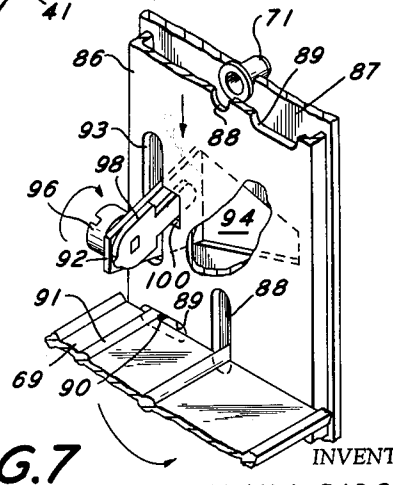


FIG. 7

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FIG. 8

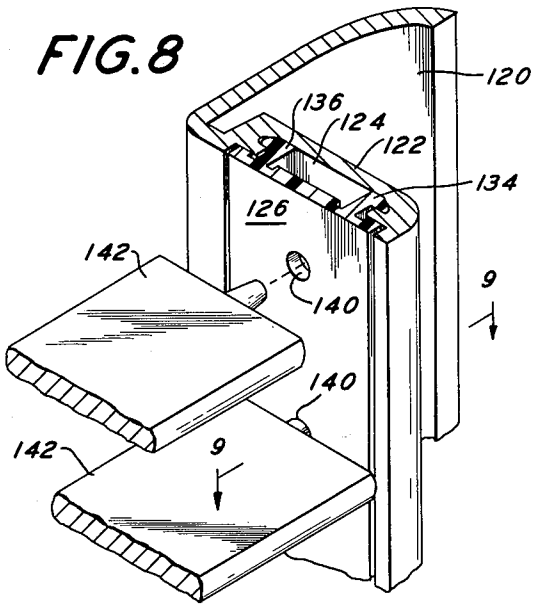


FIG. 9

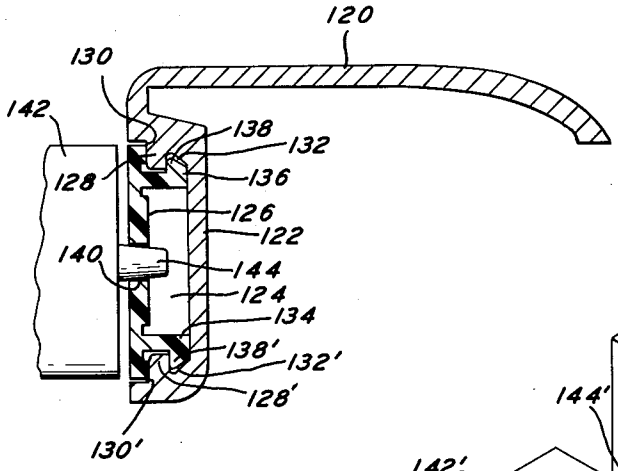
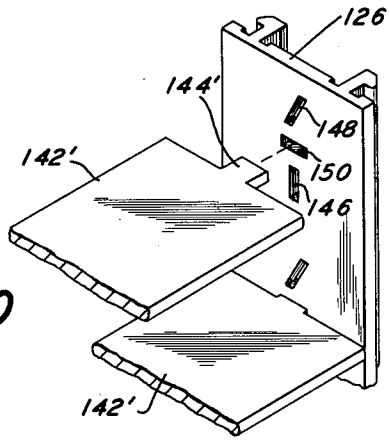


FIG. 10



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United States Patent Office 3,125,944 Patented Mar. 24, 1964

3,125,944

SUPPLY GRILLE AND/OR REGISTER

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Filed Feb. 8, 1962, Ser. No. 171,865
8 Claims. (Cl. 98—110)

This invention relates to a supply register, and more particularly, to an air supply register adapted to be mounted within an opening in a supporting wall or the like to control the flow of air into a room.

A wide variety of grilles and registers have been proposed heretofore. A grille is provided with movable vanes which are adapted to control the direction of flow of air. Grilles have been proposed heretofore which are 4-way or curved blade grilles capable of deflecting air to opposite sides of the grille as well as above and below the grille. A grille becomes a register when a damper is added to it in the rear thereof.

Heretofore, the grilles and registers of the prior art were composed of four pieces having mitered corners. The mitered corners were interconnected by spot welds, brazing, etc. A neoprene gasket has been conventionally glued to the inner surface of the pieces forming the frame. The neoprene gasket has been conventionally applied by cutting the same into individual lengths and gluing the individual lengths to each section of the frame.

The grilles and registers proposed heretofore suffer from numerous disadvantages. Quite often the corners break, or the corners are not mitered close enough so as to provide a frame which does not accurately fit the opening within the supporting surface. When corners are not mitered close enough, they present a grille or register which is not commercially acceptable. After a short period of time, the presence of moisture and/or heat causes the gasket or glue to decompose. When the gasket becomes loose or falls off, a seal is no longer provided between the grille or register and the supporting wall surface.

The present invention is directed to apparatus which overcomes the above and other defects of the prior art. In particular, the present invention includes mechanical corner locks which provide positive assurance that the corners are in abutting contact with each other. The apparatus of the present invention includes a seal means which is positively locked to the members forming the frame. The air deflecting means or vanes of the apparatus of the present invention are mounted for rotary movement in self-lubricating bushings snap-fitted to the frame. The apparatus of the present invention includes a two-piece damper frame secured to the grille frame with clips thereby facilitating ease of mounting and eliminating the possibility of air gaps.

It is an object of the present invention to provide a novel register.

It is another object of the present invention to provide a novel register having mechanical corner locks.

It is another object of the present invention to provide a novel seal means for the frame of a grille.

It is another object of the present invention to provide a novel means for interconnecting a damper and grille.

It is still another object of the present invention to provide a novel actuating means for the vanes of the grille or damper.

It is still another object of the present invention to provide a novel register capable of being economically manufactured and easily installed with a minimum of effort.

Other objects will appear hereinafter.

For the purpose of illustrating the invention there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIGURE 1 is a perspective view of a register in accordance with the present invention mounted in an opening in a supporting wall.

FIGURE 2 is a sectional view taken along the lines 2—2 in FIGURE 1 with the damper blades in an open position.

FIGURE 3 is a sectional view similar to FIGURE 2 with the damper blade being in a closed position.

FIGURE 4 is a sectional view taken along the lines 4—4 in FIGURE 2.

FIGURE 5 is a sectional view taken along lines 5—5 in FIGURE 4.

FIGURE 6 is a partial perspective view of the damper blade actuating mechanism.

FIGURE 7 is an exploded view of a portion of the damper blade actuating mechanism.

FIGURE 8 is a partial perspective view of a section of a frame in accordance with another embodiment of the present invention.

FIGURE 9 is a sectional view of the frame illustrated in FIGURE 8 illustrating the manner in which a vane will be mounted thereon.

FIGURE 10 is a partial perspective view of an alternative means for mounting the vane on a side section of a frame.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIGURE 1 a register designated generally as **10**. The register **10** is composed of a grille **12** and a damper **14**.

The grille **12** illustrated in the drawing in a 4-way air deflection grille supported by a wall **15**. The grille **12** includes a rectangular frame made from extruded lightweight material such as aluminum. The frame of the grille includes a top section **16**, a bottom section **18**, and side sections **20** and **22**. Each of the sections **16–22** are identical in transverse cross section. Accordingly, only the section **20** will be described in detail.

Section **20** is generally L-shaped in transverse cross section. Section **20** includes a leg **24** which is adapted to extend through an opening **26** in the wall **15**. Section **20** also includes a leg which is adapted to overlie a portion of the wall **15** around the opening **26**. Said last mentioned leg includes a horizontally disposed portion **28** integrally connected to an angled portion **30** which terminates in a curved ridge **32**. The free edge of the curved ridge **32** is adapted to be in abutting contact with the juxtaposed surface of the wall **15**.

A plurality of fasteners **34**, such as screws, are adapted to extend through the angled portion **30** to removably secure the register **10** to the wall **15**. As shown more clearly in FIGURE 5, the angled portion **30** is provided with an increased thickness on its inner surface. A T-shaped slot **36** is provided in the angled portion **30**. A seal **38** which is annular in transverse cross section is provided with an integral leg **39**. The leg **39** is T-shaped in transverse cross section and is adapted to completely fill the T-shaped groove **36**. When the free edge of the curved ridge **32** abuts the juxtaposed surface of the wall **15**, the seal **38** will be deformed against flange **41** of duct **43** as illustrated in FIGURE 4. The duct **43** extends through opening **26** and flange **41** is disposed in a recess on wall **15**.

As shown more clearly in FIGURES 4 and 5, the section **20** is provided with a flange **40** extending from the leg **24** in a direction toward the curved ridge **32** and substantially parallel to the portion **28**. A wall **42** is integral with the portion **28** and extends in a direction substantially perpendicular therefrom on the inner surface thereof. The wall **42** is provided with an elongated flange **44** adjacent the free ends of the section **20**. An L-shaped

corner lock **46** is disposed adjacent each corner of the frame of the grille **12**. Each corner lock **46** is disposed between the leg **24** and the wall **42**. The flange **40** overlies one edge of the locks **46**. The flanges **44** are adapted to be bent over to overlap an opposite edge of the locks **46**.

The sections **16** and **18** are provided with a plurality of spaced holes in line with one another. Each hole is adapted to receive a bushing **48** therein. The bushings **48** are preferably made from a self-lubricating material such as nylon or Teflon. The bushings **48** are preferably snap-fitted to their respective sections. A plurality of vanes **50** extend between the sections **16** and **18**. The vanes **50** are provided with a reduced cross sectional area at their respective ends. The reduced cross sectional area of the vanes **50** are extended through the bushings **48**. The vanes **50** may be rotated by digital manipulation to cause air to flow to one side or the other of the register.

The legs **24** of the sections **20** and **22** are provided with a plurality of aligned holes. A bushing **52**, identical with the bushing **48**, is snap-fitted in the holes in the legs **24**. A plurality of vanes **54** are horizontally disposed within the grille **12**. The ends of the vanes **54** are provided with a reduced cross sectional area disposed within the bushing **52**. The vanes **54** may be digitally manipulated as shown in phantom in FIGURE 2 to cause air to flow in an upward or downward direction. Hence, the grille **12** is a 4-way grille. That is, the grille **12** enables air to flow straight through, to the left, to the right, upwardly, downwardly, to the upper left, to the upper right, to the lower left, or to the lower right. If desired, curved vanes may be substituted for the tear-drop or tapered vanes **50** and **54**.

As shown more clearly in FIGURES 2 and 5, the free edge of the leg **24** is provided with a flange **56**. The flange **56** is integral with the leg **24** and lies in a contiguous plane. The flange **56** terminates at one edge in a beveled surface **58**. The damper **14** is adapted to be releasably connected to the grille **12**. The damper **14** includes a housing **60** which is rectangular in transverse cross section. The housing **60** is a two-piece housing having a removable end wall **61** and a cross sectional area corresponding with the cross sectional area of the legs **24**. Since the flange **56** lies in a plane contiguous with the outer surface of the legs **24**, the housing **60** will have walls which lie in the same plane as the legs **24**.

The housing **60** is provided with a plurality of spaced holes **62**. A plastic spring clip **64** has a stud **63** at one end extending through the holes **62** and snap-fitted to a wall of housing **60**. The other end of the spring clips **64** extend over the flange **56** and cooperate with the beveled surface **58**. As illustrated more clearly in FIGURE 4, four clips **64** are utilized to secure the damper **14** to the grille **12**. While four such clips **64** are adequate to perform this function, a greater or lesser number of clips may be utilized as desired. The clips **64** are preferably made from a plastic such as Delrin but may be made from metal if desired.

The damper **14** is of the opposed blade type. The damper **14** includes blades **66**, **67**, **68**, **69** and **70** mounted for rotation about a horizontal axis parallel to the axis of rotation of the vanes **54**. As shown more clearly in FIGURE 4, each of the blades **66–70** are provided with a shaft having its extremities rotatably mounted in a bushing **71**. The bushings **71** are force-fitted in aligned holes in wall **61** and the opposite side wall **87** of the housing **60**.

As shown in FIGURE 3, the blades **66** and **67** cooperate with each other to close a portion of the flow passage through the damper **14**. Another portion of the damper flow passage is controlled by blades **68** and **69**. The remainder of the flow passage through the damper **14** is controlled by moving the blade **70** to a position wherein it may cooperate with a portion **80** of the housing **60**. The portion **80** is an integral part of the housing **60** which has been bent out of the plane of the wall of the housing **60** juxtaposed to blade **70**.

An actuating mechanism designated generally as **84** is provided so that the relative disposition of the blades **66–70** may be simultaneously adjusted. Mechanism **84** includes a plate **86** juxtaposed to wall **87** of housing **60**. Plate **86** is provided with a plurality of holes **88** elongated in a vertical direction in FIGURES 2 and 3. The central rib on each of the blades **66–70** extends through one of the holes **88** and into one of the bushings **71**. The holes **88** are in line with each other in the plane of the axes of rotation of the blades **66–70**.

The plate **86** is provided with a plurality of holes **89** which are elongated in a horizontal direction in FIGURES 2 and 3. One hole **88** and one hole **89** are provided for each of the blades **66–70**. While the holes **88** are in line with each other, the holes **89** are staggered on opposite sides of the plane containing the axes of rotation of the blades **66–70**. Each of the blades **66–70** has a finger **90** disposed in one of the holes **89**. The fingers **90** are a continuation of the ribs **91**.

A finger **92** on wall **87** extends through an elongated slot **93** in plate **86**. Finger **92** is integral with wall **87** since it is a portion thereof which has been bent out of the plane of wall **87** thereby forming hole **94**. Finger **92** has a hole **95** therethrough as shown more clearly in FIGURE 6. A bolt **96** having a screw driver slot in its head and a square shank is provided to cause reciprocation of plate **86**. The shank of bolt **96** extends through hole **95** and a square hole **97** in lug **98**. Lug **98** has a free end disposed in slot **100**.

Hence, as bolt **96** is rotated in the direction of the arrow in FIGURE 7, plate **86** reciprocates downwardly in FIGURE 7, and vice versa. As plate **86** reciprocates downwardly in FIGURE 2, blades **66–70** are rotated to the disposition illustrated in FIGURE 3. It will be noted that the bolt **96** is accessible from a position in front of the grille **12**. Thus, the mechanism **84** converts the rotary motion imparted to te bolt **96** to reciprocation motion of the plate **86** to simultaneous rotary movement of the blades **68–70**.

The corner locks **46** offer many advantages not found in the prior art. The corner locks **46** result in a tighter fit at the miter joint at juxtaposed ends of the sections **16–22**. Also, the corner locks **46** provide a double thickness of material at the corners of the frame of the grille **12** thereby reinforcing the weakest area thereof.

In order to retain the corner locks **46** in position, the flanges **44** are bent over toward the flange **40** as shown more clearly in FIGURES 4 and 5. In doing so, the corner locks **46** slightly bend the flanges **40** so that the flanges **40** are slightly angled as illustrated in FIGURE 4. In practice, the flanges **44** adjacent each corner of the frame of the grille **12** will be deformed at the same time.

The seal **38** has many advantages over the neoprene rubber gaskets which have been utilized heretofore. In particular, it will be noted that the seal **38** cannot be removed in a direction perpendicular to the plane of the angled portion **30**. The seal **38** is preferably inserted in a lengthwise direction in the extruded material from which the sections **16–22** will be formed. Thereafter, the extruded material may be cut to the desired length on a bias so as to form the sections **16–22** which will have ends cut on a bias so that a miter joint may be formed. Since the seal **38** will be inserted into the extruded material from a roll of the seal material, the assembly of the seal can be performed much more rapidly than the application of individual sections of a gasket to the inner surface of an assembled grille. Hence the necessity for measuring and cutting a gasket seal to the required length corresponding to the length of the sections forming the frame of the grille as proposed heretofore can be eliminated.

The bushings made from self-lubricating material offers a positive non-jamming and non-rusting bearing surface for the vanes and blades. Heretofore, the grilles were provided with a steel spring wire to obtain friction so that the vanes and/or blades would remain in a predeter-

mined position. However, the steel wire electrolyzes with the aluminum material of the frame and prevents rotation of the vanes or blades for proper deflection of air.

The seat for the damper **14** formed by the end of the legs **24** and the flanges **56** enables the damper **14** to be assembled to the grille **12** in a manner which provides an air-tight joint. Heretofore, a grille was connected to a damper by screws or other fastener means which did not provide an air-tight joint or required overlapping of members thereby interrupting the flow pattern. The spring clips **64** facilitate rapid coupling of the damper **14** and the grille **12**.

In FIGURE 8, there is disclosed an alternative means for mounting the vanes with respect to the sections of the frame of the register and/or grille. In place of the nylon bushings which are snap fitted with respect to the frame, the vanes or blades may be supported as set forth hereinafter. In FIGURES 8 and 9, there is disclosed a side section **120** of a frame, such side section may be comparable to section **20** described above. The section **120** is provided with a depending leg **122** which will be comparable to leg **24** mentioned above.

Leg **122** is C-shaped in transverse cross section thereby providing a channel **124** on the inner peripheral surface of the frame of which section **120** forms a side thereof. An elongated mounting strip **126** is disposed within the channel **124**. Strip **126** is preferably made from a flexible material such as rubber, plastic, etc. The strip **126** may be slid into the channel **124** from an end thereof. Preferably, the strip **126** is snap-fitted into the channel **124**.

In order for the strip **126** to be snap-fitted into the channel **124**, the leg **122** is provided with inwardly directed flanges **128** and **128'** as shown more clearly in FIGURE 9. The flanges **128** and **128'**, respectively, define shoulders **130** and **130'**. The strip **126** is provided with peripheral flanges which rest on the shoulders **130** and **130'**.

The flanges **128** and **128'** also define grooves **132** and **132'**, respectively, at the base of the channel **124**. It will be appreciated that the flanges, shoulders, and grooves of the leg **122** run or extend for the full length thereof. The strip **126** is provided with a pair of depending legs **134** and **136** which are parallel to one another and spaced inwardly from said edges of the strip **126**. The leg **136** is provided with a bead **138** which extends into the groove **132**. The leg **134** is provided with a bead **138'** which extends into the groove **132'**.

The strip **126** is provided with a hole **140** at spaced points therealong in a central portion thereof. A vane or blade **142** is provided with a stud **144** extending therefrom in a central portion thereof. The stud **144** is provided with a tapered peripheral surface. The base of the stud **144** has an outer diameter which is greater than the diameter of the hole **140**. Hence, the stud **144** will be frictionally held by the strip **126** and remain in any preset rotative disposition. The flexibility of the central portion of the strip **126** and the spacing thereof from the bottom of the channel **124** enables the central portion of the strip **126** to be depressed so that the stud **144** may enter the hole **140**.

The strip **126** extends for the full length of the section **120**. Preferably, the holes **140** are punched in the strip **126** at spaced points therealong prior to the insertion of the strip **126** into the channel **124**. The vane or blade **142** may be made of plastic or aluminum or any other suitable metal as described above in regard to the blades and vanes illustrated in FIGURES 1–7. The tightness of the fit between the stud **144** and the hole **140** enables the friction to retain the blade or vane **142** in any fixed position.

In FIGURE 10, there is disposed a mounting strip **126'** which may be substituted for the mounting strip **126** when the blade does not have a stud which is circular in transverse cross section. Hence, the strip **126'** is adapted to be utilized with a vane or blade **142'** having a stud **144'** which is rectangular in transverse cross section.

The strip **126'** is provided with a plurality of sets of slots, such as slots **146**, **148** and **150**. The slots **146** will enable the blade to be maintained in an upright position. The slot **150** will enable the blade or vane **142'** to be supported in a horizontally disposed position for maximum flow. The slot **148** will enable the blade or vane **142'** to be supported in an angular disposition for intermediate flow. Except for the provision of sets of slots at spaced points therealong, the strip **126'** is identical with strip **126**. Accordingly, it is not deemed necessary to describe strip **126'** in detail.

The slots **146–150** have side dimensions which are slightly smaller than the corresponding dimensions on the stud **144'**. Hence, the stud **144'** will be retained in one of the slots **146–150** with a force fit. The force-fit support for the blades or vanes **142** and **142'** eliminates vibration and rattling which exists in grilles and registers proposed heretofore where metal touches metal at the juncture of a blade and a frame.

The vanes and blades are provided with a smooth contoured surfaces which provides for rapid flow of air with minimum friction and drag. The components of the registers are made of a lightweight non-corrosive material to provide a register which reduces shipping costs and will remain attractive for an extended period of time.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. Apparatus comprising a register, said register including a grille and a damper, said grille having corners reinforced and mechanically interconnected by an L-shaped corner lock, said grille having a T-shaped slot on a rear surface thereof, a seal having a T-shaped portion disposed within said groove, spring clip means securing said damper to said grille, said grille including vanes, the ends of said vanes being rotatably mounted in bushings, said bushings being made from a self-lubricating material, said grille being provided with a seat defined by a peripherally disposed flange, said damper having a portion within said flange in abutting contact with said seat, and said spring clip means extending across said flange.

2. Apparatus comprising a grille, said grille having top and bottom sections, said grille having parallel side sections, each section having mitered ends, each section having a substantially horizontal flange, each section having a wall spaced from said respective flange, an L-shaped corner lock reinforcing each corner of said grille, each corner lock being disposed between the wall and between the flange on each section, a flange portion of the wall being deformed so as to overlie a portion of each corner lock, spaced vertically disposed vanes, each vane having an end extending to a bushing made from a self-lubricating material, each bushing being in snap-fitted engagement with a section of said grille, said grille being provided with a plurality of spaced horizontally disposed vanes, each vane having an end extending into a bushing made from a self-lubricating material, each of said last-mentioned bushings being in snap-fitted engagement with a section of said grille.

3. Apparatus comprising a register, said register including a grille and a damper, said grille having a plurality of movable vanes controlling flow of air therethrough, said grille having a leg adapted to extend through a hole in a supporting wall, said damper having movable blades, said leg having a damper seat along the free edge thereof, said damper being received within said seat on said leg of said grille, the inner peripheral surface of said damper being coextensive with the inner peripheral sur-

face on said leg, and spring clip means interconnecting said damper with said leg.

4. Apparatus comprising a grille, said grille being composed of sections interconnected at adjacent ends by means of a corner lock, said corner lock being L-shaped, said sections being L-shaped in transverse cross section with a first leg adapted to extend through a hole in a supporting surface and a second leg substantially perpendicular to said first leg, a flange on said first leg, said flange being substantially perpendicular to said first leg, a wall on said second leg, said wall being substantially perpendicular to said second leg, said corner lock being disposed beneath a flange on said first leg and between said first leg and said wall on each section, and a flange on each wall overlapping a portion of each corner lock.

5. Apparatus comprising a grille, said grille having a plurality of sections interconnected at adjacent ends, said grille being adapted to be secured on a supporting surface over a hole in the supporting surface, a rear surface of said sections having a T-shaped groove, a deformable seal, said deformable seal having a T-shaped portion adapted to be disposed within said T-shaped groove on each section, said seal being adapted to cooperate with said supporting surface to prevent passage of air between said grille and said supporting surface, said grille being provided with a plurality of vanes supported by a removable strip on each of two of said sections, said two sections being provided with a leg which is C-shaped in transverse cross section thereby defining a channel extending for the full length thereof, and said strip being received within said channel on each section.

6. Apparatus in accordance with claim 3 wherein said leg is C-shaped in transverse cross section thereby defining a channel on an inner peripheral surface thereof, a strip of flexible material disposed within said channel, holes at spaced points along said strip, and said vanes being supported at opposite ends by said strip with a friction fit.

7. Apparatus comprising a grille, said grille being rectangular, said grille being defined by sections which are generally L-shaped in transverse cross section. One leg of each section being adapted to overly a supporting surface, the other leg of each section being adapted to extend through a hole in the supporting surface, said other leg of each section being C-shaped in transverse cross section thereby defining a channel on an inner surface of the sections, a strip disposed within the channel on at least two oppositely disposed sections, said strip having holes at spaced points therealong, a plurality of vanes rotatably supported by said strips, said vanes having studs extending into and frictionally received in said holes.

8. Apparatus in accordance with claim 6 wherein said strip is made of a flexible plastic material snap-fitted into said channel.

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