March 19, 1963 J. BELL 3,081,689

ADJUSTABLE, TAMPER-PROOF AIR REGISTER

Filed May 27, 1960 2 Sheets-Sheet 1

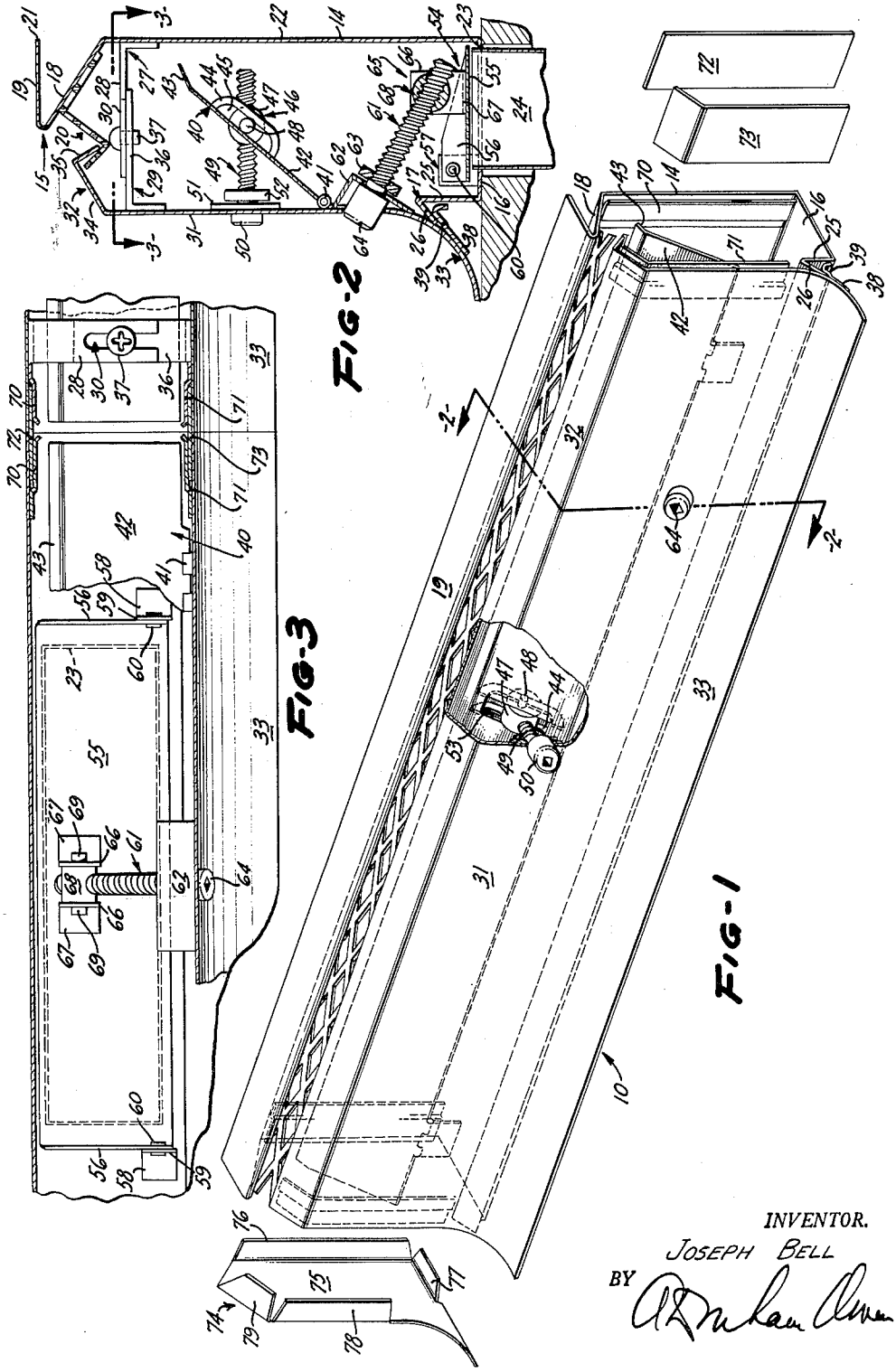


FIG-2

FIG-3

FIG-1

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ADJUSTABLE, TAMPER-PROOF AIR REGISTER

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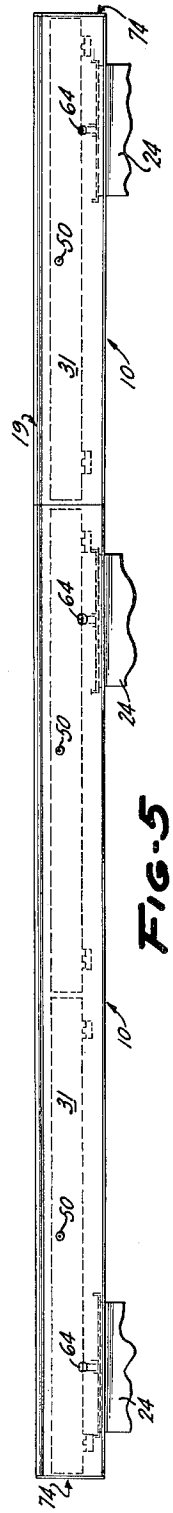


FIG-5

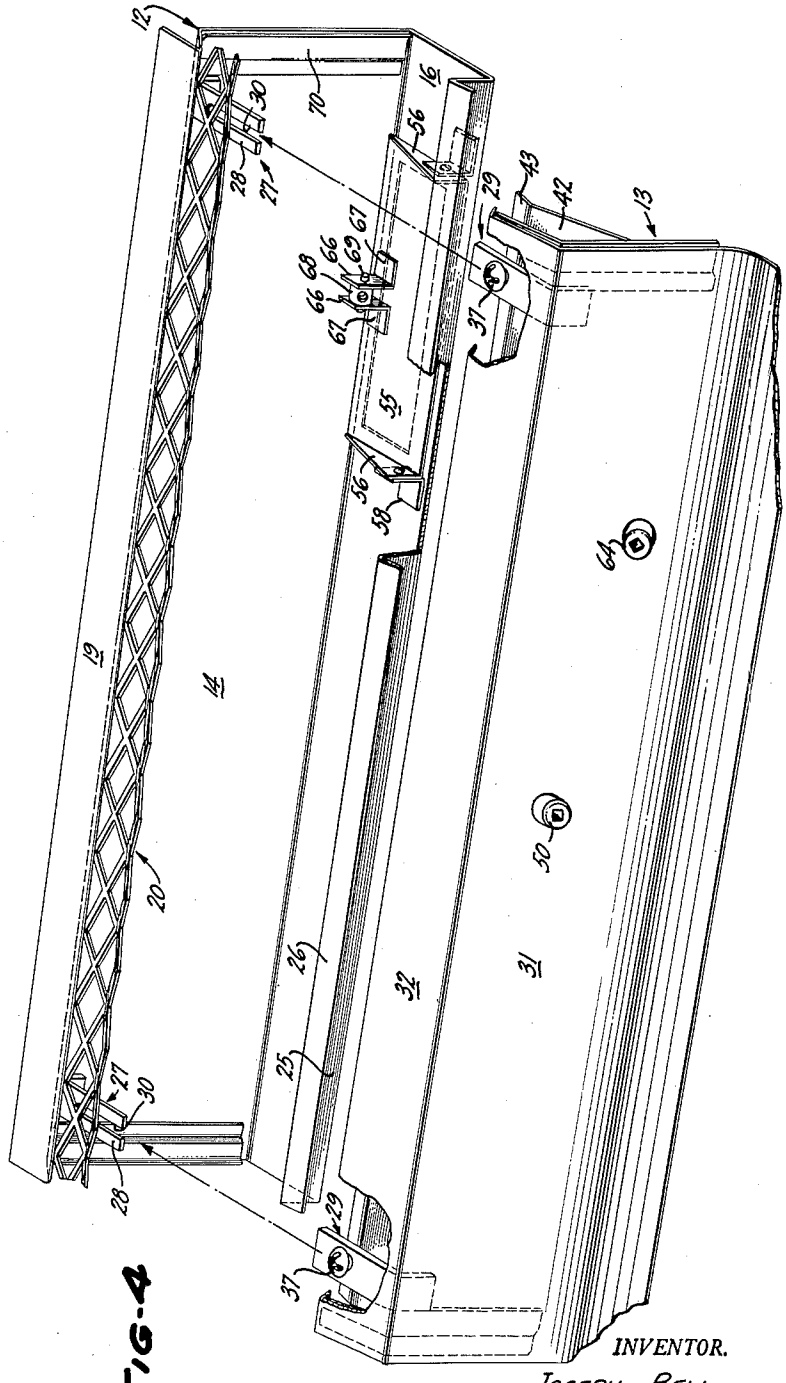


FIG-4

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3,081,689

ADJUSTABLE, TAMPER-PROOF AIR REGISTER

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9 Claims. (Cl. 98—40)

This invention relates to an improved air register. More particularly, this invention relates to an adjustable, tamper-proof baseboard register particularly suitable for use where vandalism is a problem.

One major problem confronting any hardware installation in a correctional institution is the tendency of the inmates to tamper with the device. Such vandalism may run all the way from merely scratching the finish of the object to total removal and destruction of the device. Air registers are no exception to this activity, especially where they are readily accessible, as is often the case. Where a forced-air heating and/or cooling installation is desired, satisfactory service can be obtained only if provision is made for minimizing the vulnerability of the register, especially its easily damaged, movable parts.

Past attempts at providing a satisfactory forced-air register installation in correctional institutions have, for one reason or another, failed. When the register parts were made of extra heavy material, excessive limitations were encountered in adjusting and regulating the flow of air. Furthermore, the heavier the material used the more costly it was to manufacture. If the register was constructed of standard weight material, it was very prone to destruction. Mounting the register in a supposedly inaccessible place was no solution to the problem, for prisoners seemed to have a way of reaching practically any point in their quarters.

The primary object of my invention, therefore, is to provide a tamper-proof, indestructible, baseboard-type of air register.

Another object of my invention is to provide an air register which, although made from standard-weight material, resists destruction with more success than registers constructed of much heavier material.

Another object of my invention is the provision of a tamper-proof air register which is easily adjustable with a simple, commonplace tool, yet which cannot be adjusted with items usually carried by, or available to, inmates in correctional institutions.

Still another object of my invention is the provision of a tamper-proof air register having a relatively small number of parts, joined together in a simple yet very strong and efficient manner.

Another object of my invention is the provision of a baseboard-type, tamper-proof air register which hugs the floor and the wall so tightly that it discourages attempts to force it destructively away from its mounting.

Other objects and advantages will become apparent from the following description of a preferred form of my air register, taken in connection with the drawings, in which:

FIG. 1 is a view in perspective of one type of register unit with an end plate and locking plates in detached position;

FIG. 2 is an enlarged sectional view in side elevation taken along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged top plan view on the line 3—3 of FIG. 2, partially broken away, of portions of two joined register units;

FIG. 4 is an exploded view in perspective of the two main sections of a register unit; and

FIG. 5 is a view in front elevation, on a reduced scale, of two register units of different lengths joined to form one complete register.

The Housing

As illustrated in the drawings, my air register 10 comprises a generally rectangular-shaped housing 11 formed by a back section 12 and a front section 13. The housing 11 serves as a tamper-proof container for the movable parts of the register by enclosing them in such a manner that they are inaccessible from the outside, as will be more fully explained later. Once the back section 12 and the front section 13 are assembled to form the housing 11, a special tool is needed to gain access to the interior of the register, as well as to change the adjustment of any contained movable parts.

The Back Section

The back section 12 is preferably constructed from a sheet of 18-gauge steel of the proper dimensions for the particular installation, although other similar hard and strong materials may be used in lieu thereof, if desired. The particular type of material used for forming this back section 12 is not critical to the operation of my invention, and its choice is left to the discretion of the practitioner. Many materials will work, so long as they possess the qualities of sufficient strength and durability.

Directly or indirectly, the back section 12 provides a foundation for all the remaining parts of my register. This back section 12 is formed into a flat, wall-abutting back 14 with an upper wall-contacting molding 15 and a flat floor-abutting bottom 16 perpendicular to the back 14, with a front molding 17.

The upper wall-contacting molding 15 has a lower slanting section 18 and an upper substantially horizontal section 19. The lower section 18 serves as a foundation for a grille 20, which preferably is welded thereto, and also as a support for the upper section 19.

One of the vulnerable spots on a baseboard-type register is its upper juncture with the wall, for if an object can be forced between the register and the wall, the register usually can be pried loose. To discourage any attempt at this, I have extended the wall-contacting edge 21 of the upper section 19 beyond the plane formed by the outer wall 22 of the back 14, so that when my register 10 is properly mounted the edge 21 is pressured tightly against the wall—so tightly that even the thinnest of instruments cannot be forced between this edge and the wall.

The bottom 16 is provided with a number of air-inlets 23 corresponding with air-ducts 24 directing a flow of air into the room. The shape of the air-inlets 23 may be rectangular, oval, or some other shape, so long as they neatly accommodate the ducts 24. One preferred embodiment of my register comprises a housing 120 inches long having several air-inlets, each approximately 16 inches long, evenly spaced along the bottom. However, many other housing sizes as well as sizes and numbers of air-inlets may be substituted for this embodiment, for my register is easily adapted to a wide variety of situations.

The front molding 17 extending from the front edge of the bottom 16 comprises a substantially perpendicular section 25 and a slanting, downturned flange 26. The flange 26 projects outward from the top edge of the section 25 at an acute angle, preferably of approximately 45°. This flange 26 functions as a retainer for the novel locking device at the bottom of the register's front section 13, as will be explained later.

Mounted high up on the inside of the back section 12 is a series of substantially L-shaped brackets 27. The feet of these brackets preferably are welded to the inside of the back section 12 in such a position that the arm 28 of each extends horizontally forward to connect with similar brackets 29 mounted on the inside of the front section 13. A longitudinal slot 30 in the arm 28 permits

easy joining of the paired brackets 27, 29 when the register is assembled.

The Front Section

The front section 13 of the housing 11 comprises a flat front 31 with an upper angular molding 32 and a lower arcuate floor-contacting molding 33, all three elements formed from one continuous sheet of the same material used for the back section 12. Joining the front section 13 to the back section 12 completes the housing 11, forming a highly tamper-proof container for the interior mechanisms, such as those to be described as well as others which are adaptable to the dimensions of the structure.

The upper angular molding 32 comprises a slanting front section 34 extending upward and backward from the top edge of the front 31, and a slanting rear section 35 extending downward and backward from the rear edge of the front section 34. This upper angular molding 32 serves not only to enclose part of the top opening to the register, and thereby to impart a finished appearance thereto, but more importantly it provides a baffle which, in connection with the grille 20, resists any attempt to insert a destructive instrument into the interior of the housing 11.

As previously mentioned, the grille 20 is welded to the lower section 18 of the upper wall-contacting molding 15, and extends therefrom downward and forward, and thence upward and forward to terminate under the upper angular molding 32 at a point substantially immediately beneath the juncture of the section 34 and the section 35. This configuration of the grille and the way it combines with the upper angular molding 32 are greatly responsible for the security provided by the housing 11, for it is not possible to introduce a damaging device into the interior of the housing 11 between the grille 20 and the molding 32. Any configuration of opening may be used in the grille 20, the preferred form being that of a four-sided parallelogram, as illustrated in FIG. 1. However, as long as structural strength and integrity are maintained, any design is operable.

Holding the upper part of the front section 13 in place against the back section 12 is the previously mentioned series of L-shaped brackets 29, their feet welded to the inside of the front 31 and their arms extending back to connect with the forward extending arms 28 of the brackets 27. Each arm 36 carries a screw 37, such as a conventional slot-head or Phillips-head type, for tightly linking it to an arm 28, this being done by guiding the screw into the slot 30 and tightening it down on the arm 28. Although the screw-tightening procedure usually involves inserting a long, thin screwdriver through the grille 20, it is not likely that prisoners will have such an instrument in their possession, or any other device suitable therefor, so that the screw is relatively inaccessible to them.

The Clips

The lower part of the front section 13 is held securely and tightly in place against the molding 17 by a unique method which successfully defines unauthorized or other improper removal. This is accomplished by the use of a plurality of inverted, substantially J-shaped clips 38 welded to the inside of the lower arcuate floor-contacting molding 33 at evenly spaced intervals along the entire length of the register. These clips 38 are positioned to engage tightly the downturned flange 26 when the housing is assembled, acting with the brackets 27 and 29 to lock the front section 13 and the back section 12 into one rigid unit.

The configuration of the clip 38 is described as substantially J-shaped, but the section of the clip corresponding to the straight portion of the J has a jog-type curvature at the point 39 to accommodate the terminal portion of the downturned flange 26. This curvature allows the flange 26 to extend further down in between

the clip 38 and the molding 33 than if the clip were precisely the shape of the letter J. The result of this extension is that, when the front section 13 is in place on the back section 12, it is impossible to pull, pry, or otherwise forcibly disengage the molding 33 from the downturned flange 26, without first loosening the screw 37 and disengaging the upper brackets 27, 29. Any pressure exerted upwardly on the front section 13 only serves to further tighten the clip 38-flange 26 linkage, a distinguished advance over other types of interlocking connections, which are loosened by such a force. The molding 33 is held so tightly against the floor by the several clips 38 that it effectively prevents insertion of a foreign object with the purpose of damaging, etc., the register.

The Volume-Damper

In order to regulate the flow of air emanating from the housing 11 through the grille 20, a substantially rectangular volume-damper 40 is attached to the inside of the front 31 approximately one-half-way up from the bottom of the register, by hinges 41 which preferably are welded to the front 31. This volume-damper is angular in shape and has a relatively large body-section 42 terminating in a narrow flange 43. When the damper 40 is in the closed position, the flange 43 rests against the inside of the back 14 to close the register and stop the flow of air. The length of the volume-damper 40 is variable, depending upon the length of the register; for instance, in a register unit 120 inches in length, I prefer to use two volume-dampers, each approximately 60 inches in length. However, any number of dampers may be used, so long as a satisfactory control of the volume of air coursing through the register is obtained. The volume-damper 40 pivots on a longitudinal axis running through the hinges 41, and can be opened completely or set at any position between full open and full closed.

As a foolproof means of operating the damper 40, I have provided a novel arrangement of interconnected parts, illustrated best in FIGS. 2 and 4. Mounted on the underside of the center of the body section 42 of the damper 40 and extending downward perpendicular thereto is a pair of flat, parallel brackets 49, each having a longitudinal slot 45. A cylinder-nut 46, comprising a metal cylinder 47 having a threaded hole extending therethrough perpendicular to the axis of the cylinder and a short projecting cylindrical shaft 48 at each end of the cylinder 47, with axes concurrent with that of the cylinder 47, is positioned between the brackets 44 with the shafts 48 protruding through and riding in the slots 45. An Allen-head screw 49, with a head 50 partially extending through an opening (not shown) in the front 31, extends through a flat annular spacer 51 attached to the front 31 and is retained thereagainst by a lock-washer 52. This screw continues through a slot-like opening 53 in the center of the body section 42 and is threaded into the cylinder-nut 46 to connect the volume-damper 40 to the front 31 of the register. When the Allen-screw 49 is rotated, the cylinder-nut 46 moves up or down the thread of the screw, depending upon the direction of rotation, drawing with it the volume-damper 40. The slots 45 in the brackets 44 allow the cylinder-nut 46 to vary its position as the damper is opened or closed. This permits the Allen-head screw 49 to remain in correct operating position without any binding or other restriction on its movement. Thus the volume-damper may easily be adjusted from full open to full closed, merely by the use of a small Allen-wrench; no other large, cumbersome, or special tools are needed. Furthermore, an Allen-wrench, although commonplace in almost any tool kit, is not usually found among the possessions of prisoners and, since the objects which are available to them are not likely to be an operable substitute for an Allen-wrench, the dampers resist unauthorized adjustment.

The Balancing-Damper

Each of the air-inlets **23** in the bottom **16** preferably is covered by its own balancing-damper **54**. This damper comprises a flat, plate-like body section **55** with perpendicular upstanding end-flanges **56**. The damper **54** is pivotally mounted on the forward part of the bottom **16** through a pair of L-shaped brackets **57**. These brackets **57** have feet **58** attached, preferably by a weld, to the bottom **16**, and perpendicular upstanding arms **59** adjacent the flanges **56**. A pivot **60**, such as a cylindrical pin, connects each upstanding arm **59** with its adjacent upstanding flange **56**, to establish an axis of rotation for the damper **54** and enable it to be pivoted up or down along a longitudinal axis for regulating the flow of air into the register. In forced-air installations having a plurality of air ducts of equal size, the quantity of air emanating from each duct usually is not uniform. Therefore, a control system to adjust the inflowing air to a constant figure throughout the register is necessary for optimum efficiency. That is why I prefer to provide a separate balancing-damper **54** for each air duct.

A means similar to that employed for the adjustment of the volume-damper **40** connects the balancing-damper **54** to the front **31**, as illustrated best in FIG. 2. This means comprises an Allen-head screw **61** extending through an opening (not shown) in the front **31** and held in position by the angular spacer-bracket **62** which is mounted on the front **31**, a lock-washer **63** retaining the head **64** of the screw **61** against the spacer-bracket **62**, a pair of L-shaped brackets **65** with upstanding arms **66** and sheet **67**, the feet **67** preferably welded or otherwise attached to the top surface of the damper **54**, and a cylinder-nut **68** with cylindrical end-shafts **69** rotatably housed in the arms **66**. The Allen-head screw **61** is threaded into the cylinder-nut **68** and, as the screw is rotated, the damper **54** is either raised or lowered on an axis through the pivots **60**, depending upon the direction of rotation. As the damper **54** is raised for permitting more air to flow through the register, the axis of the Allen-head screw **61** approaches a horizontal position, tilting the head **64** from the position illustrated in FIG. 2. To accommodate this tilt, the diameter of the opening in the front **31** through which the head **64** protrudes is slightly larger than the diameter of the head.

Assembly and Installation

In assembling my air register, the back section **12** is mounted against the wall abutting the floor, with screws, bolts, or the like (not shown). The front section **13** is then aligned in front of the back section, and the Allen-head screw **61** started into the cylinder-nut **68**. The bracket-arms **36** are then positioned beneath the bracket-arms **28**, with the screws **37** centered in the slots **39** and the upper angular molding **32** then hooked over the grille **20**. The clips **38** are then inserted behind the downturned flange **26**, and the screws **37** turned down tight. Removal of the front section **13** is accomplished simply by reversing this procedure. Both installation and removal procedures are quickly and easily performed, even without skilled labor or supervision. Furthermore, very few tools are needed; a screwdriver and an Allen-wrench sufficing.

Joining Several Register Units

In some installations it is desirable to join several units of my register **10** end-to-end to form one long register running the length of the wall, such as illustrated in FIGS. 3 and 5. This is easily done by means of a pocket-lock device at each end of the single register **10**. A back-clip **70** is attached, preferably by welding, to the inside of each end of the back **14**, and a front-clip **71** is attached, also preferably by welding, to the inside of each end of the front **31**. A pair of locking-plates, one the back locking-plate **72** comprising a flat rectangular

sheet of material such as that used to form the back **14**, etc., and the other a front locking-plate **73** of the same material but angular in configuration to conform with the contour defined by the front **31** and the slanting front section **34** of the upper molding **32**, fit under the abutting clips **70**, **71**, respectively, of abutting registers to complete the connection. Once these plates **72**, **73** are installed, which is done simply by starting them under their clips and pushing the ends of the registers **10** together, the only way the registers may be separated is by an opposite, longitudinal pull. The front clip **71**, extending as it does up along the section **34** of the molding **32**, prevents any up or down movement between adjoining register units.

The Endplates

In FIG. 1, I have illustrated an endplate **74** which may be used to close in an end of my register, where the end is not joined to another register unit. This endplate **74** is designed to be held by the back clip **70** and front clip **71**, and comprises a body **75** having the configuration of the housing **11** in cross-section, a back flange **76**, a bottom flange **77**, a front flange **78**, and a top flange **79**. These flanges are perpendicular to the body **75** and are positioned thereon so that, when the endplate is installed, the flanges lie flush against the inside of the abutting housing walls, and are retained in that position by the clips **70**, **71**. The result is a neat, tight fit which prevents entry into the housing as well as escape of appreciable amounts of air from the housing.

From the foregoing description of my invention, it is apparent that I have provided a simple, yet very strong, tamper-proof air register which can be used in a wide variety of installations. The material from which my register is preferably constructed is readily available, standard strength-and-thickness steel, although other types of firm and durable material may be substituted therefor. The hinges **41**, the Allen-head screws **49** and **61**, the screw **37**, and the grille **20** are all standard materials, readily available. The rest of the parts of my device are simple, and easily constructed without the need of elaborate machinery or highly skilled labor.

My device is assembled easily and, because of the clips **38** and the manner in which they are used, the only need for a removable joining device; i.e., the screw **37**, is at the top, and it is positioned so that only with a long and narrow screwdriver may it be reached. A maximum of resistance to tampering is thereby obtained, along with simple and quick assembly. Furthermore, since an Allen-wrench is not an item commonly available to inmates in correctional institutions, my register successfully defies readjustment by unauthorized personnel.

The tight fit between the back **14** and the wall prevents anything from being inserted between the register and the wall. The only way the register may be detached from the wall is by first removing the front section **13**—and this requires certain tools unavailable to correctional institution inmates. In the same manner, the very tight fit between the lower floor-contacting molding **33** and the floor prevents any tampering with the mounting of the register to the floor, as long as the front section **13** is in position.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

I claim:

1. A tamper-proof air register for use along the baseboard area of a wall, comprising: a first section having a substantially planar back with an inner and an outer surface, a substantially planar bottom having air-inlet means, an upper molding extending up from the upper

edge of the back, and a lower molding with a first portion extending upwardly from the front edge of the bottom and a second portion extending downwardly from the upper edge of the said first portion; a second section having a substantially planar front with an inner and an outer surface, a top molding extending first upwardly and then inwardly and downwardly from the upper edge of the front, and a floor-contacting molding extending out from the lower edge of the front with upwardly extending means on its inner surface engaging the said lower molding between the said first and second portions thereof; a plurality of first brackets attached to the inner surface of the back and extending forward from said inner surface; a plurality of second brackets attached to the inner surface of the front connecting with the said first brackets; means to fasten the connecting brackets together; an air-outlet grille mounted on the upper molding of the back and extending first outwardly and then upwardly to terminate above and in front of the edge of the said top molding to form a lock with the said top molding and thus bar access to the interior of the register; pocket locks positioned on the inside of the said back and the said front at both ends thereof; and means fitting tightly into said pocket locks for closing in the ends of the register.

2. The register of claim 1 wherein the said upwardly extending means engaging the said lower molding comprises a plurality of inverted substantially J-shaped clips each with a straight portion affixed to the said floor-contacting molding and a curved portion fitting tightly between the said first and second portions of the said lower molding when the register is assembled, said clips preventing the said second section from being moved upwardly away from its proper assembled position.

3. The device of claim 1 wherein the said upper molding of the back extends backward beyond the plane formed by the outer surface of the back, to tightly abut the wall when the register is in place and so prevent insertion of a foreign body between the said wall and the said outer surface of the back.

4. An adjustable tamper-proof air register for use along the baseboard area of a wall, comprising: a first section having a substantially planar back, a substantially planar bottom having air-inlet means, and a lower molding with a first portion extending upwardly from the front edge of the bottom and a second portion extending downwardly from the upper edge of the said first portion; a second section having a substantially planar front, and a floor-contacting molding extending from the lower edge of the front and having upwardly extending means engaging the said lower molding between the said first and second portions thereof; means rigidly securing the upper portion of both said sections together while providing air-outlet means between them; means to adjust the volume of air flowing through the register; means to balance the flow of air through the register; means to enclose the ends of the register; and means inside the said front and back to tightly hold the said end-enclosing means in place.

5. The register of claim 4 wherein the said upwardly extending means engaging the said lower molding comprises a plurality of inverted substantially J-shaped clips each with a straight portion affixed to the said floor-contacting molding and a curved portion fitting tightly between the said first and second portions of the said lower molding when the register is assembled, said clips preventing the said second section from being moved upwardly away from its proper assembled position.

6. An adjustable, tamper-proof air register for use along the baseboard area of a wall, comprising; a first section having a substantially planar back with an inner and an outer surface; a substantially planar bottom having air-inlet means, an upper wall-contacting molding on the top edge of the back, and a lower molding on the front edge of the bottom with a first portion extending upwardly from the front edge of the bottom and a second portion extending downwardly from the upper edge of said first portion; a second section having a substantially planar front with an inner and an outer surface and a plurality of circular upper and lower openings therethrough, a top molding extending first upwardly and then inwardly and downwardly from the top edge of the front, a floor-contacting molding on the bottom edge of the front, and a plurality of inverted substantially J-shaped clips with straight portions attached to the inside of the floor-contacting molding and curved portions fitting tightly between the said first and second portions of the said lower molding when the register is assembled, said clips preventing the said second section from being moved upwardly away from its proper assembled position; a plurality of first brackets attached to the inner surface of the back and extending forward therefrom; a plurality of second brackets attached to the inner surface of the front and extending backward therefrom to connect with the said first brackets; adjustable means fastening the connecting brackets together; volume-dampers hinged to the inner surface of the front; tamper-proof means extending from the front to the said volume-dampers for adjusting their positions; balancing-dampers pivotally mounted to the bottom over the air-inlet means; tamper-proof means extending from the front to the said balancing-dampers for adjusting their positions; a non-removable air-outlet grille mounted on the upper molding of the back and extending first outwardly and then upwardly to terminate above and in front of the edge of the said top molding to form a lock with the said top molding and thus bar access to the interior of the register; pocket-lock means on the inside of said front and said back at each end thereof; and means fitting into the said pocket-lock means for completely enclosing the ends of the register.

7. The device of claim 6 wherein the said upper wall-contacting molding protrudes beyond the plane formed by the outer surface of the back, to fit tightly against the wall when the register is in place and prevent insertion of a foreign object between the said wall and the outer surface of the back.

8. The device of claim 6 wherein the tamper-proof means for adjusting each volume-damper comprises a flat annular spacer attached to the inner surface of the said front, positioned to coincide with one of the said upper openings; a flat annular lock-washer; a cylinder-nut rotatably mounted on the said volume-damper; and an Allen-head screw extending through the said opening and spacer and threaded into the said cylinder-nut, with its head held in abutting position against the said spacer by the said lock-washer.

9. The device of claim 8 wherein the tamper-proof means for adjusting each balancing-damper comprises an angular spacer-bracket attached to the inner surface of the front with a bore positioned to coincide with one of the said lower openings; a flat, annular lock-washer; a cylinder-nut rotatably mounted on the said balancing-damper; and an Allen-head screw extending through the said opening and spacer and threaded into the said cylinder-nut, with its head held in abutting position against the said spacer by the said lock-washer.

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