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EDGE ADJUSTMENT DEVICE FOR DOORS

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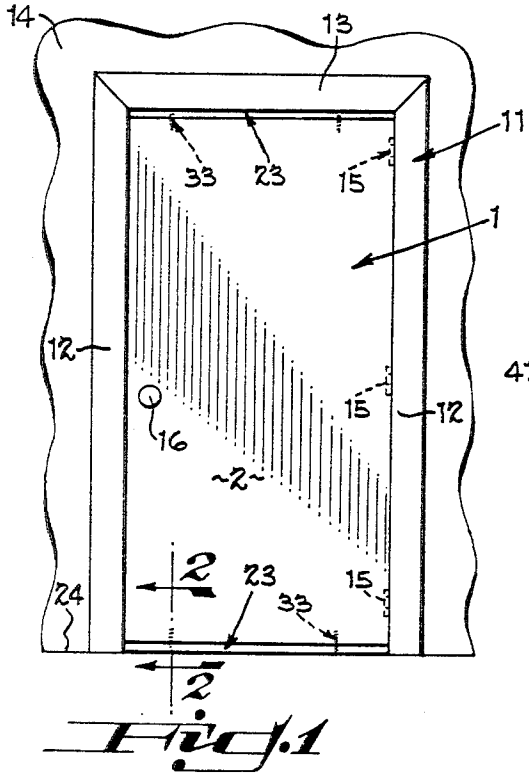


Fig. 1

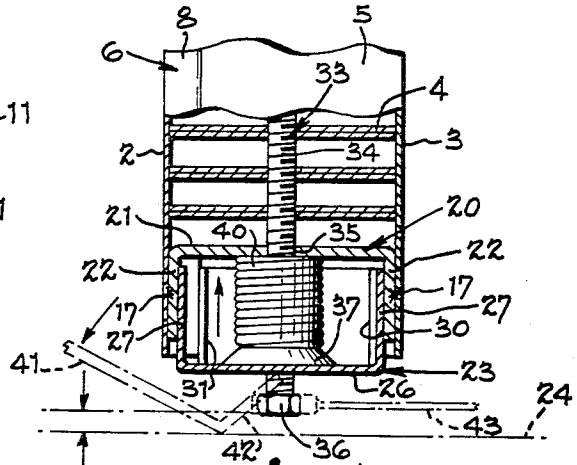


Fig. 2

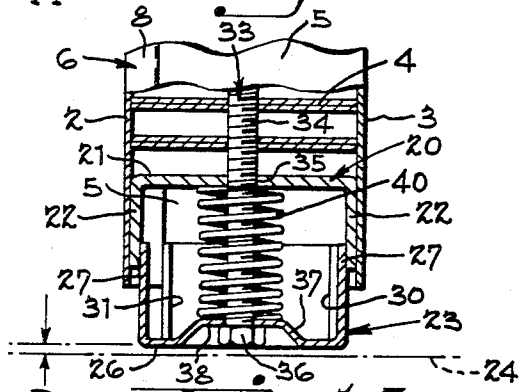


Fig. 3

Fig. 4

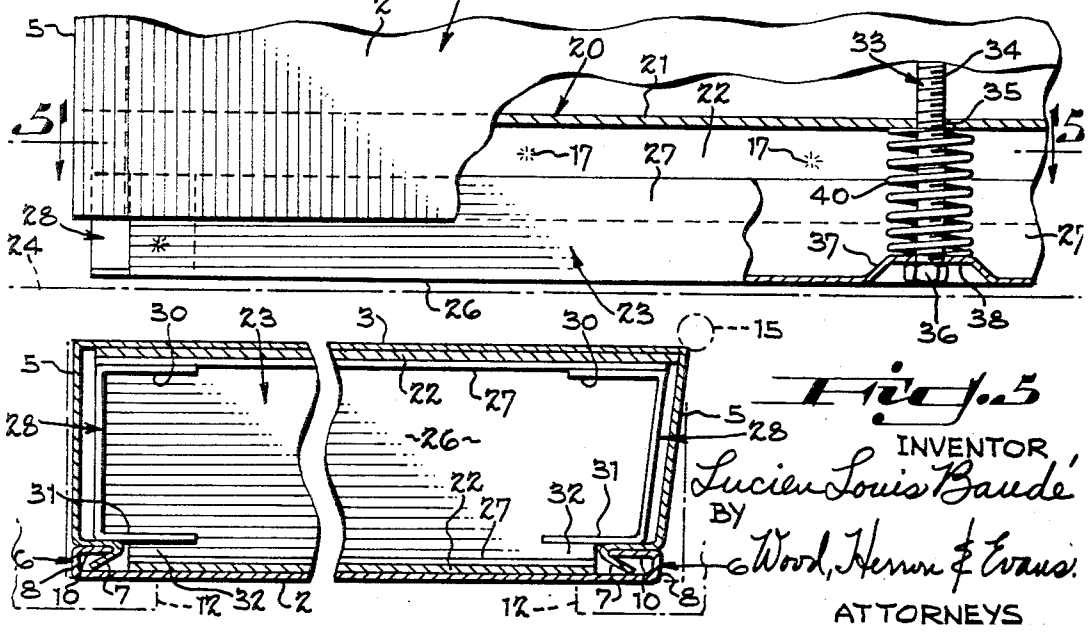


Fig. 5

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EDGE ADJUSTMENT DEVICE FOR DOORS

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ABSTRACT OF THE DISCLOSURE

The disclosure relates to prefabricated doors formed of sheet metal for installation in a casing or doorframe, also formed of sheet metal. In order to compensate for variations in the size of the prefabricated door and its casing or frame, the door includes at least one edge adjustment device arranged to be regulated after the door is installed in the casing. In the disclosure, the adjustment device is installed in the lower edge portion of the door which includes a fixed, downwardly facing reinforcement channel. The edge adjustment device is in the form of an upwardly facing, channel-shaped adjustment rail slidably fitted within the recess delineated by the reinforcement channel and biased downwardly by a series of spaced springs maintained under compression between the reinforcement channel and the adjustment rail. Adjustment screws pass through the adjustment rail and into threaded engagement with the fixed reinforcement channel, whereby adjustment of the screws in one direction forces the adjustment rail inwardly, counter to the biasing springs, while adjustment in the opposite direction permits the compression springs to force the adjustment rail outwardly.

This invention relates to doors, particularly to sheet metal doors which are prefabricated at the manufacturing plant, then installed within a sheet metal door casing, which is also prefabricated. The door casing or frame is assembled and installed in the field in the opening of a wall, then the door is hung within the casing.

In installing the prefabricated casing and door in the field, it may be necessary to trim the jambs of the casing, in order to fit the door casing within the preformed opening in the building wall. In other instances, where the casing and door fit properly, it may be necessary to change the clearance between the lower edge of the door and the floor level because of rugs or other floor coverings or to prevent drafts due to excessive clearance.

It is not particularly difficult to fit the casing to the opening, particularly with reference to the vertical dimension, in order to provide a fit with respect to the floor level. However, the fitting of a sheet metal door within the casing, presents a more complex problem since it is a great deal more difficult to trim the lower (or upper) edge of the sheet metal door to fit the casing than it is to trim the jambs.

One of the primary objectives of the present invention has been to provide an edge adjustment device for sheet metal doors, which permits the dimension of the door to be varied in the vertical direction simply and conveniently after the door has been hung within a door casing which is installed in the building wall.

According to this aspect of the invention, a typical composite sheet metal door, for which the present edge adjustment device is particularly intended, includes spaced inner and outer panels, with an internal core or filler of honeycomb construction disposed between the spaced panels to impart stiffness to the door and to provide a sound deadening and heat insulating effect. The top and bottom marginal edge portions of the door each include a fixed, outwardly facing reinforcement channel having opposed, outwardly projecting limbs seated against and spot welded to the spaced panels of the door for reinforcement.

The edge adjustment device of the present invention is intended particularly for installation within the channel-shaped recess which is provided by the fixed reinforcement channel along the lower edge of the door, thus taking advantage of the fixed reinforcement channel to provide a recess for the adjustment device. The edge adjustment device may be installed along the upper edge portion of the door in the same manner if desired; however, in most cases, a closure cap is inserted along the upper edge portion of the door to close off the channel-shaped recess delineated by the fixed, upwardly facing channel.

A further objective of the invention has been to provide an edge adjusting device which is of simple construction and which is inconspicuous so as not to detract from the appearance of the door after it is hung.

The adjustment device essentially comprises an upwardly facing channel-shaped rail which is installed in the downwardly facing fixed channel at the lower edge portion of the door. In other words, the channel-shaped adjustment rail, when installed in the lower edge of the door, faces upwardly and includes spaced limbs which interfit telescopically the downwardly projecting limbs of the fixed reinforcing channel. Suitable adjusting devices connect the adjustment channel rail with the fixed channel, providing relative adjustment.

A further objective of the invention has been to provide an edge adjustment rail particularly for providing adjustment between the lower edge of the door and the floor level in which the adjusting means are accessible for tool engagement in this restricted space after the door is hung, and in which the adjusting means are self-locking.

According to this concept, the channel-shaped adjustment rail, which fits within the downwardly facing lower reinforcement channel, is provided with a plurality of coil springs which urge the adjustment rail outwardly. Respective adjustment screws pass through the horizontal web of the adjustment rail and through the coil springs, with upper end portions threaded into the web of the fixed reinforcement channel.

The heads of the adjusting screws, which are hexagonal in the present disclosure, are seated within cylindrical recesses which are formed in the web of the adjustment rail. The depth of the recesses is substantially equal to the thickness of the heads of the adjustment screws, such that the outer surface of the heads normally is flush with the outer surface of the horizontal web of the adjustment rail.

Before the door is hung within the casing, the adjusting screws are threaded in sufficiently to provide a sub-

stantial amount of clearance relative to the floor level. Thereafter, the adjustment rail is levered upwardly with a suitable leverage tool against the compressive force of the coil springs to expose the heads of the adjustment screws for tool engagement. In this position, a tool, such as an open end wrench, is fitted upon the head of each adjustment screw and the screw is turned downwardly until the lower surface of the head is disposed at a predetermined distance above the floor level.

At this point the wrench is removed and the leverage tool is relaxed to permit the coil springs to force the adjustment rail downwardly into engagement with the adjusted heads of the screws. When the adjustment rail reaches this position, its lower surface will be located a distance above the floor level corresponding to the predetermined clearance between the lower surface of the adjustment screw heads and floor level.

The pressure of the coil springs transmitted by the adjustment rail to the heads of the screws locks the screws functionally in adjusted position.

The various features and advantages of the invention will be more clearly apparent to those skilled in the art from the following description taken in conjunction with the drawings.

In the drawings:

FIGURE 1 is a general elevation illustrating a typical sheet metal door mounted in its casing and equipped with the edge adjustment rail of this invention.

FIGURE 2 is an enlarged fragmentary sectional view taken along the line 2–2 of FIGURE 1, detailing the adjusting rail at the lower edge portion of the door and showing the manner of setting the position of the adjustment rail with reference to the floor surface or door sill.

FIGURE 3 is an enlarged fragmentary sectional view similar to FIGURE 2, showing the edge adjustment device after it has been set with reference to the floor.

FIGURE 4 is an enlarged fragmentary view of the lower edge portion of the door, taken from FIGURE 1, further detailing the edge adjustment rail.

FIGURE 5 is an enlarged sectional view taken along line 5—5 of FIGURE 4, further detailing the construction of the edge adjustment rail.

DOOR STRUCTURE

The door, indicated generally at **1**, which has been selected to illustrate the principles of this invention, is fabricated from sheet metal, comprising spaced panels **2** and **3** (FIGURES 2 and 5), with a core or filler **4** is interposed between the panels **2** and **3**. The core is formed of stiff fibrous sheet material of honeycomb formation, suitable to stiffen the panels and to provide a sound deadening effect.

The sheet metal door **1** is of composite design, the panel **3** having flanges **5** forming the vertical edges of the door. The panel **2** has its opposite vertical edges configurated to interfit the edge of the panel **5** so as to form the seams **6—6**.

Each seam **6** comprises a groove **7** formed in the edge of the flange **5** of panel **3**. A narrow flange **8** is formed along the edge of the companion panel **2** and includes a lip **10** which interfits the groove **7**. The seam may be completed by spot welding.

The upper and lower horizontal edges of the door each are closed off by an outwardly facing, fixed reinforcement channel **20** which is spot welded between the panels **2** and **3**. The edge adjustment device or rail of the invention is seated within the longitudinal recess which is delineated by the fixed reinforcement channel at the lower edge of the door (and if desired, along the upper edge of the door) as described later.

Referring to FIGURE 1, the door **1** is hung in the usual way within a casing **11** which may also be fabricated from sheet metal members, comprising vertical jambs **12—12**, with a horizontal header **13** extending across the upper end of the door opening between the jambs. The

casing is installed in the door opening within the wall **14**, in the field (FIGURE 1), the door being hung in the casing **11** by means of hinges **15**, shown in broken lines in FIGURE 1. The swinging edge of the door includes the usual lock which is operated by the knob **16**.

As shown generally in FIGURES 2, 3 and 4, the lower reinforcement channel **20** faces downwardly and includes a cross web **21** having downwardly projecting limbs **22—22**. The door panels at **2** and **3** are spot welded as at **17** to the limbs **22—22** of channel **20**. The upper edge portion of the door includes a channel (not shown), which is similar to the lower channel **20** except that its position is reversed, with the limbs **22** projecting upwardly.

As best shown in FIGURES 2 and 3, the edge adjustment device or rail of the present invention, indicated generally at **23**, is installed loosely between the limbs **22—22** of the lower channel.

As noted, a similar adjusting rail **23** may be installed in the upper edge of the door as indicated generally at **23** (FIGURE 1). In this instance, the parts are reversed with reference to the position shown in FIGURES 2 and 3.

In the present disclosure, the adjustment or compensating device **23** is disclosed in detail in relation to the floor **24** of the building. It will be understood that the adjustment device is also intended to be utilized in installations where the door casing **13** includes a raised threshold (not shown) extending across the floor at the lower end of the casing.

It will be understood at this point, that the adjustment device or rail **23** is installed initially within the lower edge portion of the door before the door is hung; thereafter, the adjustment rail is reset in the vertical plane to accommodate the clearance between the surface of the floor and lower edge of the door. Thus, the device **23** compensates for variations in the floor level which are met in the field and, thereby facilitates installation.

ADJUSTMENT RAIL STRUCTURE

As noted earlier, the adjustment rail assembly is disclosed in relation to the lower edge of the door. Referring to FIGURES 2–4, the adjusting device **23** essentially comprises an upwardly facing channel-shaped rail which telescopically interfits the downwardly facing channel **20** along the lower edge portion of the door. The rail **23** comprises a web **26** having a pair of upwardly projecting limbs **27—27**, which slidably interfit the downwardly projecting limbs **22—22** of the channel **20**. The adjustment rail **23** extends across the full width of the door, substantially coextensive with fixed channel **20**, as shown in FIGURE 5.

As viewed from above (FIGURE 5) the opposite ends of the adjustment rail **23** are provided with closure flanges **28** which reside within the flanges **5** at the opposite edges of the door. The closure flanges **28** are generally channel-shaped as viewed from above. One of the limbs **30** of the channel-shaped closure flange seats against one of the limbs **27** of the adjustment rail and is spot welded thereto. The other limb **31** of the end closure flange **28** is offset inwardly as at **32** with respect to the adjacent limb **27** of the adjustment rail **23**. The offset **32** provides clearance for the seam **6**. This construction is duplicated at opposite ends of the adjustment rail **23**.

The adjustment rail, when mounted in the lower edge portion of the door, may be raised or lowered after the door is hung, as noted earlier. For this purpose, the channel **23** is retained in place along the lower edge of the door, by a series of adjustment screws **33**, in the present instance two screws, as indicated in FIGURE 1. Each adjustment screw **33** includes a threaded shank **34** (FIGURES 2–4) which passes through a tapped hole **35** formed in the horizontal web **21** of the fixed channel **20**. The lower end of each adjusting screw **33** includes a head **36** which, in the present example, is hexagonal in

shape. It will be understood, that screws having standard heads of various designs may be utilized in place of the type illustrated herein.

In order to provide a flush surface across the web **26** of the adjustment rail **23**, which is contiguous to the surface of the floor **24**, the web is provided with respective dimples or circular depressed recesses **37—37** to accommodate the head **36** of each screw (FIGURES 3 and 4). Each recess comprises a cylindrical wall which is tapered upwardly from the lower surface of web **26**. The recess **37** terminates with a wall **38** adjoined to the cylindrical tapered wall and displaced upwardly with respect to the web **26** sufficiently to seat the head **36** of screw **33**.

Each adjustment screw **33** includes a coil spring **40** which is disposed in compression between the web **21** of the fixed channel **20** and the inner wall **38** of the recess **37**. The compression springs urge the adjustment rail **23** downwardly with respect to the fixed channel **20**.

In adjusting the door after it is hung, a suitable leverage tool **41**, having an angular foot **42** may be utilized. In making the adjustment, the foot **42** is inserted within the space between the floor **24** and web **26** of the adjustment rail, with the foot **42** in a generally horizontal position. The leverage tool or tools **41** are then swung downwardly, as indicated by the arrow in FIGURE 2, causing the foot to force the adjustment rail **23** upwardly, as indicated by the arrow. It will be noted that this motion compresses the springs **40** and exposes the heads **36** for engagement with a suitable tool **43** (FIGURE 2). The tool **43** may be an open end wrench of conventional design.

The thickness of the head **36** of the adjustment screw is substantially equal to the depth of the recess **37**, as shown in FIGURE 3. Before the door initially is hung, the screws are threaded inwardly to clear the floor level substantially as indicated at A in FIGURE 2. With this arrangement, the adjustment may be made in a simple manner by prying the adjustment rail **23** upwardly then adjusting the screws downwardly until the clearance between the floor level **24** and lower surface of the head **36** is reduced approximately to that shown at B in FIGURE 3. As a consequence, when the leverage tool **41** and wrench **43** are removed, the web **26** of the adjustment rail **23** will drop downwardly with respect to the floor level **24** approximately as indicated at B in FIGURE 3.

When the adjustment rail **23** is forced downwardly by the compression springs **40** the inner wall **38** of each recess **37** will be forced into engagement with the head **36** of the adjustment screw. This establishes a frictional engagement with the heads so as to lock the assembly permanently in its adjusted position.

Having described my invention, I claim:

1. An adjustment device for the edge portion of a door having an outwardly facing fixed reinforcing channel providing a recess extending along the edge portion of the door, said adjustment device comprising:

a shiftable adjustment rail telescopically interfitted within the fixed outwardly facing reinforcement channel and adapted to be set relative to a fixed surface;

a plurality of spring elements interposed between the fixed channel and adjustment rail and normally urging the adjustment rail outwardly relative to the fixed reinforcement channel and toward the said fixed surface;

a plurality of adjustment screws passing through the adjustment rail and having shank portions in threaded engagement with the fixed reinforcement channel;

said adjustment screws, which pass through the adjustment rail, being provided with heads having a substantial thickness for tool engagement;

the adjustment rail having recesses formed in its outer surface with the heads of the adjustment screws seated therein, said recesses having a depth substantially equal to the thickness of the heads of the adjustment screws, whereby the heads normally reside in substantially flush relationship with the outer surface of the adjustment rail in its adjusted position with reference to the said fixed surface, adapting the adjustment screws to be adjusted to set the heads thereof relative to the fixed surface, with the adjustment rail shifted inwardly relative to the heads and biasing the spring elements.

2. An adjustment device for the lower edge portion of a door having a downwardly facing fixed reinforcement channel disposed along the lower edge portion of the door adjacent the floor level of a building, said adjustment device comprising:

a shiftable adjustment rail telescopically interfitted within the downwardly facing fixed channel along the lower edge portion of the door and adapted to be set relative to the surface of the floor level of the building;

a plurality of spring elements interposed in compression between the fixed, downwardly facing channel and the adjustment rail and normally urging the adjustment rail downwardly relative to the fixed reinforcement channel and toward the floor level;

a plurality of adjustment screws passing through the adjustment rail and having shank portions in threaded engagement through the fixed reinforcement channel;

said adjustment screws being provided with heads having a substantial thickness for tool engagement;

the outer, downwardly facing surface of the adjustment rail having recesses seating said heads, said recesses having a depth substantially equal to the thickness of the heads, whereby the heads normally reside in substantially flush relationship with the outer surface of the adjustment rail in its adjusted position with reference to the floor level, adapting the adjustment screws to be adjusted to set the heads thereof relative to the floor level, with the adjustment rail shifted upwardly relative to the heads and counter to the bias effect of the spring elements, whereby, upon release of the adjustment rail, the spring elements urge the adjustment rail downwardly to a plane above the floor level corresponding to the spacing of the heads above the floor level.

3. An adjustment device for the lower edge portion of a door having a fixed reinforcement channel providing a downwardly facing recess extending along the lower edge portion of the door adjacent the floor level of a building, said fixed reinforcement channel having a web and a pair of limbs projecting downwardly from the web, said adjustment device comprising:

a shiftable adjustment rail telescopically interfitted within the downwardly facing fixed reinforcement channel and adapted to be set relative to a fixed surface;

said adjustment rail being channel shaped in cross section and having a web and a pair of upwardly projecting limbs shiftably interfitted between the downwardly projecting limbs of the fixed reinforcement channel;

a plurality of spring elements interposed in compression between the web of the fixed reinforcing channel and the web of the shiftable adjustment rail and normally urging the adjustment rail downwardly relative to the floor level of the building;

a plurality of adjustment screws passing through the web of the adjustment rail and having shank portions in threaded engagement with the web of the fixed reinforcement channel;

said adjustment screws including heads having a substantial thickness for tool engagement;

the web of the adjustment rail having recesses formed therein, said recesses each having an inner surface parallel with the web of the rail and spaced inwardly a distance substantially equal to the thickness of the heads of the adjustment screws, with the heads normally residing in flush relationship with the web of

the adjustment rail in its adjusted position with reference to the floor level;

whereby, in setting the adjustment rail with reference to the floor level, the adjustment rail may be forced upwardly by operation of a suitable tool to expose the adjustment screw heads for tool engagement, and whereby, upon release of the adjustment rail, the spring elements bias the adjustment rail downwardly and into frictional engagement with the heads of the adjustment screws, thereby to lock the adjustment screws in adjusted position.

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