Oct. 28, 1958 S. M. BERNSTEIN 2,857,836

EXHAUST FAN HOUSING

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Fig. 1.

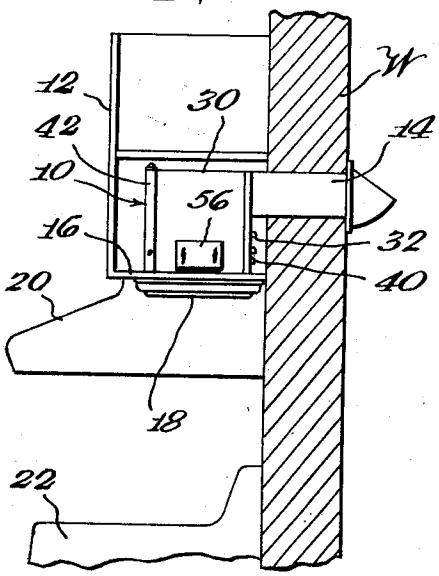


Fig. 2.

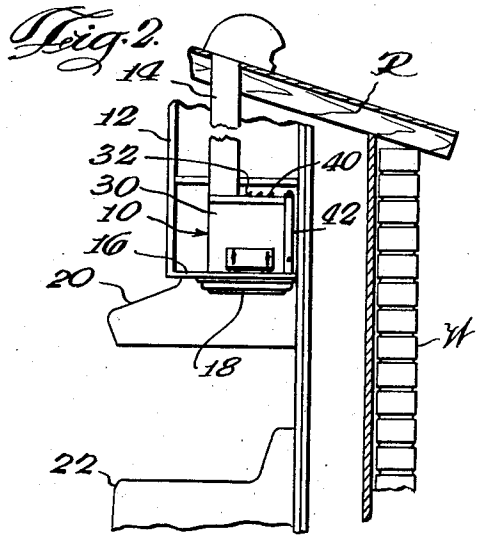
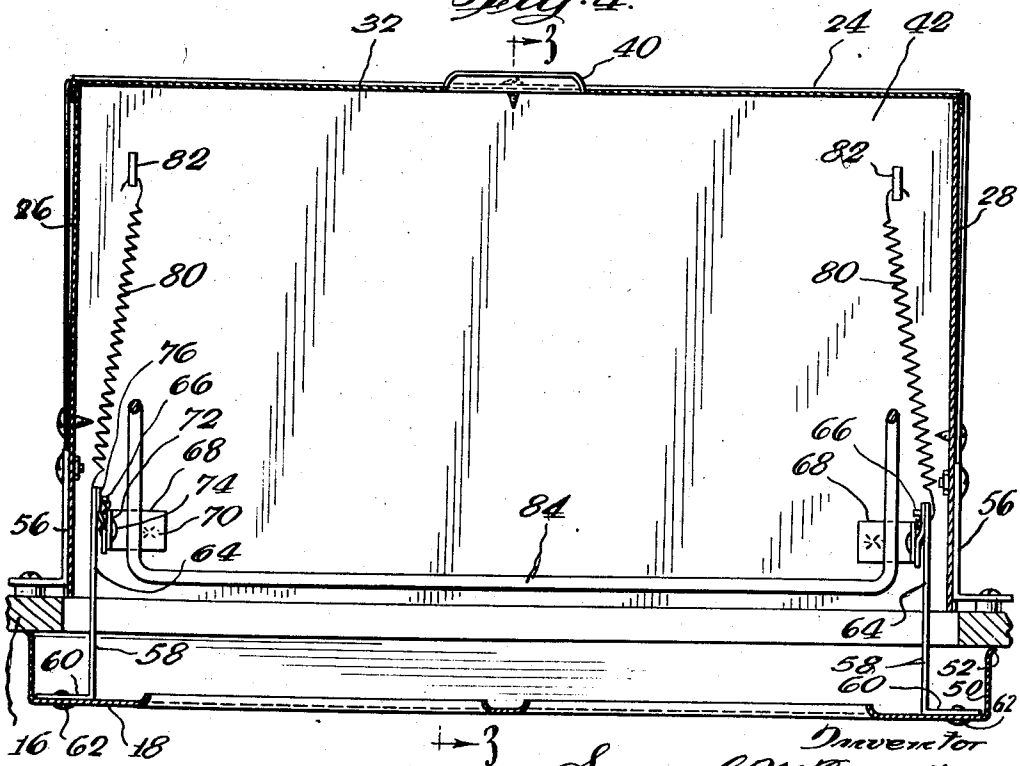


Fig. 4.



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Fig. 3.

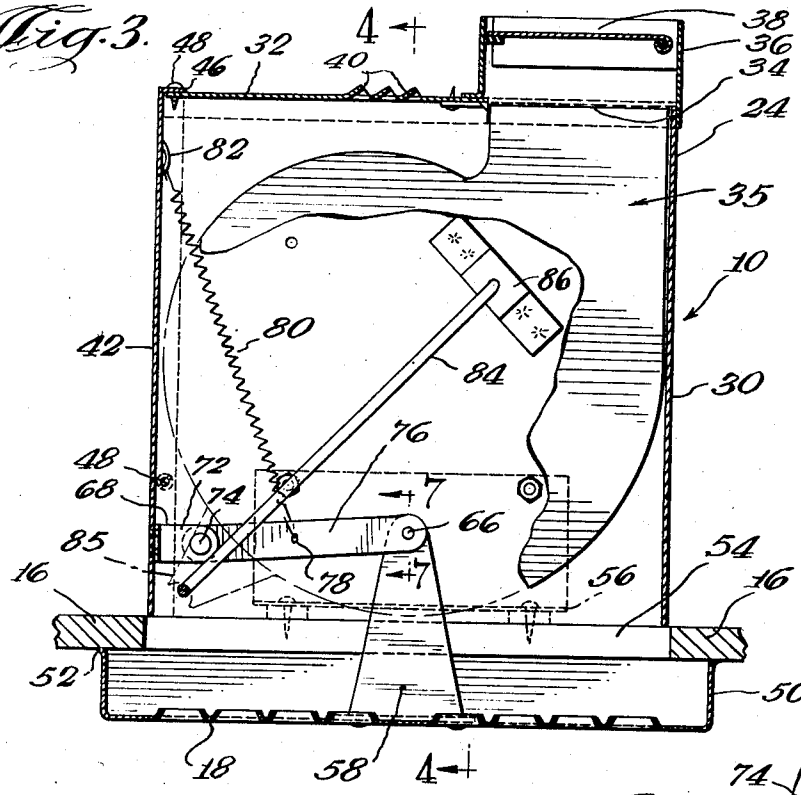


Fig. 7.

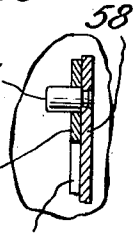


Fig. 5.

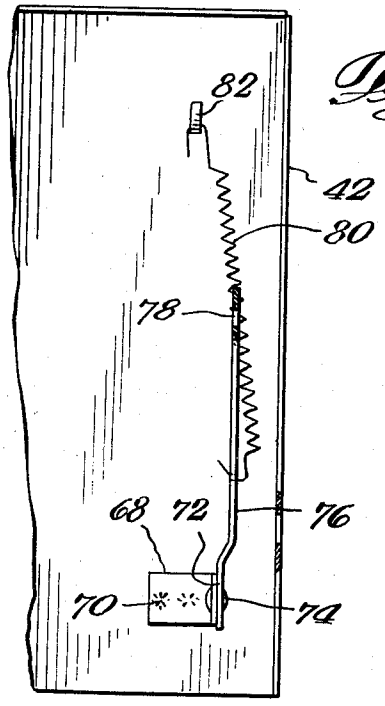
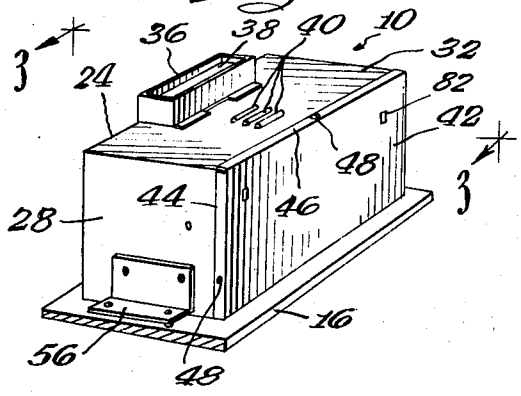


Fig. 6.



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United States Patent Office 2,857,836
Patented Oct. 28, 1958

2,857,836

EXHAUST FAN HOUSING

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Application March 14, 1956, Serial No. 571,500
6 Claims. (Cl. 98—43)

This invention relates to improvements in exhaust fan housings of the type used for containing blowers. Such blowers are ordinarily used to exhaust air from an interior, such as a kitchen, to the outside atmosphere by means, such as ducts. More particularly this invention relates to improvements in the housing construction whereby conversion from a vertical to a horizontal exhaust, vertical to horizontal intake, or vice versa is greatly simplified.

In recent years the use of exhaust fans in private residences has become increasingly prevalent. Such units are often used in connection with ventilating hoods for exhausting air laden with cooking vapors and greases. In such installations it is not uncommon for the ventilating hood to be positioned directly under wall cabinets, in which case it is convenient to install the ventilating fan indirectly in the cabinet.

In any blower installation it has long been recognized that maximum efficiency of air exhaust is achieved by moving the air in a straight path rather than through a tortuous path such as would be afforded by a duct having both horizontal and vertical legs. Since the shape of the exhaust duct is dependent to a considerable extent upon the building construction or similar circumstances, it is preferable to have a blower unit installation which may be readily converted from a horizontal to a vertical exhaust and/or intake or vice versa. Thus, for example, the blower may be installed adjacent a kitchen wall which also comprises the outer building wall, in which case a horizontal exhaust would be most convenient. On the other hand, the blower may be installed in a more central position within the room or in some other location requiring a vertical exhaust through the roof of the building. Hence a single blower unit which may be readily adapted to one or the other type of exhaust or intake without requiring special fittings or laborious conversions, is most desirable.

As a result of the foregoing, exhaust fan housings have been developed with a view towards simplifying the conversion from one type of exhaust or intake to another. Although, to some extent such blower constructions have succeeded in facilitating conversion, heretofore objectionable features have been present in all such improvements.

It is, therefore, an important object of this invention to provide an improved exhaust fan housing construction in which conversion from horizontal to vertical exhaust or intake or vice versa may be accomplished with the least possible effort and without requiring any special fittings or tools.

Briefly my invention comprises a rectangular-shaped housing having an open side closeable by a removable grill. The housing is further provided with an adjacent removable side or cover which may be interchanged with the grill so that the grill-covered opening is re-positioned in a plane perpendicular or horizontal, as the case may be, to the plane of the original opening. A discharge opening having a duct fitting encircling the opening is provided in one of the opposite permanent sides of the housing. Thus when the position of the grill-covered opening is changed as described hereinabove, the discharge opening is likewise changed from a horizontal to a vertical position, or vice versa, in accordance with the change of the position of the grill-covered intake opening.

The housing is further provided with spring-urged means for mounting the grill in the opening. Said means is so constructed and positioned that no conversion or re-arrangement of said mounting means is required other than the change in position of the removable side and grill.

It is an important object of this invention to afford an exhaust fan housing structure which will overcome all of the disadvantages set forth hereinabove.

Another important object is to afford a grill mounting means, all of the elements of which are positioned on the removable cover so that when the same is shifted from one to the other of its two positions, none of the parts or elements thereof need be disconnected from the permanently affixed elements of the housing and then re-connected to other such elements as was heretofore necessary.

Another related object is to so design the grill mounting means as to permit access to the interior of the housing without necessitating complete removal of the grill.

A further object of the invention is to provide an exhaust fan housing in which the blower may be readily removed and disassembled for cleaning and servicing without requiring the use of special tools or skills.

Yet another object is to afford a novel grill mounting means in an exhaust fan housing structure of the type described hereinabove which is conducive to greatly reduce breakage and damage to the component parts heretofore experienced by other mounting means constructions, especially during conversion operations.

Yet a further object is to provide a convertible exhaust fan housing of simple, inexpensive construction, yet attractive, sturdy and most effective.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel features of construction, arrangement and a combination of parts hereinafter fully described, illustrated in the accompany drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

For the purpose of facilitating an understanding of my invention, I have illustrated in the accompanying drawings a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, my invention, its mode of construction, assembly and operation, and many of its advantages should be readily understood and appreciated.

Referring to the drawings in which the same characters of reference are employed to indicate corresponding or similar parts throughout the several figures of the drawings:

Fig. 1 is a diagrammatic view of a blower installation showing the same in connection with a ventilating hood, with the exhaust fan housing installed in a cabinet and exhausting through a horizontally positioned duct extending through the wall of a building;

Fig. 2 is a similar diagrammatic view again of a similar installation, but showing the exhaust fan housing positioned for vertical discharge through a vertically positioned duct extending through the roof of a building;

Fig. 3 is a sectional view taken on the plane of line 3—3 in Fig. 6 of the drawings and viewed in the direction indicated;

Fig. 4 is a sectional view taken on the plane of line 4—4 in Fig. 3 of the drawings and viewed in the direction indicated;

Fig. 5 is a fragmentary view illustrating a detail of construction of the grill mounting means;

Fig. 6 is a perspective view of the exhaust fan housing positioned in vertical exhaust position; and

Fig. 7 is a fragmentary view taken on the plane of line 7—7 in Fig. 3 of the drawings and illustrating a detail of construction.

Referring first to Figs. 1 and 2 of the drawings, two typical exhaust fan installations are shown by way of illustration. Thus, in Fig. 1 of the drawings an exhaust fan designated generally by reference numeral **10** is shown installed in a kitchen wall cabinet **12** mounted on a wall W having a horizontally disposed air duct **14** extending therethrough and discharging into the atmosphere. Exhaust fan **10** is mounted on a bottom shelf **16** of the cabinet **12** with a grill member **18** bearing against the bottom thereof. In this installation the exhaust fan **10** cooperates with a ventilating range hood **20** which is in turn positioned above the kitchen range fragmentarily shown at **22**.

In Fig. 2 a similar installation is illustrated, differing however from the installation of Fig. 1 by virtue of the fact that the cabinet **12** is spaced from the outer wall W. For this reason it is more convenient for the air to be discharged through the roof R, and accordingly the duct **14** is positioned to extend vertically from the exhaust fan **10** through the roof R. It should be understood, of course, that the two illustrations shown herein are merely representative of a number of different installations to which my exhaust fan may be adapted. Thus, for example, the fan may be readily installed in a ceiling, between floors of a two-story building, or in a wall. Furthermore it should be obvious that the use of the fan is not limited to a kitchen ventilating range hood exhaust.

Directing attention now to Figs. 3, 4 and 6 of the drawings, it will be noted that the exhaust fan housing **24** is generally rectangular in shape and defined by a pair of integrally connected end walls **26** and **28**, slide wall **30**, and another side or top wall **32**. These walls define wall-sized inlet openings at the bottom and side of the housing.

The side wall **32** may have formed therein a pair of aligned openings such as **34** positioned adjacent the side wall **30** and affording exhaust outlets for a blower **35**, fragmentarily shown in Fig. 3 of the drawings, and positioned within the housing **24**. The exhaust outlets **34** communicate with a duct fitting **36** encircling said outlets and positioned on the outside of the wall **32**. The duct fitting **36** protrudes outwardly from the housing **24** and affords connecting means for joining thereto the end of a discharge air duct such as **14**. As shown in Figs. 3 and 6 of the drawings, a swinging baffle such as **38**, responsive to the air flow, may be used to close the openings **34** against the admission of foreign matter when the blower is not in operation. The wall **32** may further be provided with a plurality of baffle-protected slots such as **40** positioned centrally therein. Through these slots air may be drawn in for cooling the motor of the blower (not shown).

To this point the housing **24** has been described as comprising a pair of end walls and a pair of adjacent side walls. The wall-sized openings in the housing **24** are adapted to be interchangeably closed by either a removable closure wall **42** or the removable grill **18**. The conversion of the exhaust fan from a vertical to a horizontal exhaust, a vertical to horizontal intake, or vice versa, is determined by the interchanging or relative positioning of the grill **18** and the removable wall **42**. Thus, for example, when the grill and wall are positioned as shown in Figs. 2 and 6 of the drawings, it will be noted that the exhaust opening **34** is positioned at the top of the housing so that the duct fitting **36** protrudes upwardly. In this position it is obvious that the exhaust fan has been adapted for vertical discharge and horizontal intake. On the other hand, if the wall **42** and the grill **18** are interchanged in position and the entire housing merely rotated in a clockwise direction through an arc of 90° from the position shown in Figs. 1 and 6, the discharge opening **34** will be moved to a horizontal plane with the duct fitting **36** protruding horizontally, thus enabling horizontal discharge as shown in Fig. 1 of the drawings. Obviously interchanging the grill **18** and wall **42** without rotation of the housing, changes the intake only.

The removable side wall **42** may be provided with any suitable means for mounting the same in the housing **24**. However, I prefer to form the wall with marginal flanges such as **44** and **46** so that ordinary metal screws such as **48** fitted through aligned openings **41** in the flanges and in the walls **26**, **28** and **32** may be utilized for mounting the same in position. I have found that one screw for each of the flanges **44** and walls **26**, **28** and **32** is sufficient to securely fasten the removable wall **42** to the housing. An additional screw opening **41** may be afforded in the side wall **30** for use in affixing the wall **42** in its interchanged position. From the foregoing it should be apparent that the removal, interchanging and affixing of the wall **42** is readily accomplished with minimum effort.

The grill **18** may be of conventional construction, substantially rectangular in shape and somewhat larger than the housing **24**. As shown in Fig. 3 of the drawings, the grill is somewhat dished or cup-shaped with a peripheral upwardly extending wall **50** having an outwardly-flanged rim **52** at its upper edge. The flange **52** is adapted to bear against the shelf **16** thereby affording a closure for the opening **54** formed in the shelf **16**. Mounting brackets such as **56** may be used to mount and affix the housing **24** in position on the shelf **16**. As shown in Fig. 4 of the drawings, one such mounting bracket is affixed at each end of the housing.

For the purpose of removably mounting or affixing the grill in operative position, a pair of grill mounting brackets such as **58** is provided, one at each end of the grill. Each bracket is provided with a short leg **60** enabling the bracket to be affixed to the grill **18** by means of rivets such as **62**, and a longer substantially triangular-shaped leg **64**. In operative position, the bracket leg **64** extends into the housing interior as shown in Figs. 3 and 4 of the drawings. At the upper end of each bracket leg **64** there is provided a pivot pin **66** which extends inwardly in direction away from the end walls **26** and **28** respectively.

For the purpose of mounting the grill in conveniently removable relationship with the housing **24**, novel means is provided which will now be described in some detail. A pair of L-shaped brackets, such as **68**, may be affixed as by spotwelding at **70** to the removable wall **42** in spaced relationship as shown in Fig. 4 of the drawings. One leg **72** of each bracket **68** protrudes inwardly away from the wall **42**. To the outer end of this protruding leg **72** is pivotally affixed, as by means of a pivot rivet **74**, one end of a link arm **76**. The outer end of the link arm **76** has an opening **78** formed therethrough. This opening **78** is adapted to rotatably receive the pivot pin **66** of the grill bracket **58**.

Intermediate the length of the link arm **76**, an opening **79** may be provided within which may be inserted and attached one end of a coil spring **80**. The other end of the coil spring may be affixed to a loop **82** formed by broaching the wall **42** as shown in Figs. 3, 4 and 5 of the drawings.

To mount the grill **18** in operational position all that need be done is to pivot the link **76** outwardly against the bias of spring **80** to a position where the pivot pin **66** of the bracket **58** may be inserted therein. When so inserted the grill is mounted in operational position with the spring **80** urging the flange **52** of the grill **18** up against the bottom surface of the shelf **16**. This insures a tight-fitting most satisfactory mounting arrangement. When it is desired to gain access to the interior of the housing **24**, all that need be done is to grasp the grill **18** and pull it downwardly or outwardly as the case may be,

again against the action of the spring **80**. The link **76** is thereby pivoted to move the grill both away from the opening and also to one side thereof. Thus as viewed in Fig. 3 of the drawings, the movement of the grill **18** would be in a counterclockwise arcuate path. If it is desired to completely remove the grill, all that need be done is to flex outwardly the grill mounting bracket **58** until the ends of the pivot pins **66** are free of the link arm openings **78**.

It is most important to note that each and every element of the grill mounting means is mounted or affixed to the removable wall **42** so that when it is desired to interchange the wall **42** with the grill **18**, all that need be done is to loosen the metal screws **48** and shift the wall and grill to their respective new positions. Thus none of the elements of the grill mounting means need be disconnected since none of said elements are in any way attached to any of the permanently affixed sides of the housing.

It was previously indicated that it is often necessary to remove the blower from the housing for the purpose of cleaning or servicing the same. In order to facilitate such removal, simple but effective latching means is provided which comprises a retainer rod bail member **84** having the ends thereof pivotally mounted by means of brackets such as **86** to the end walls **26** and **28** respectively. The retainer rod bail **84** is adapted to cooperate with a pair of retainer clips **85** affixed to the housing of the blower **35**, thereby locking the blower unit within the housing. By merely swinging the bail away from engagement with the retainer clips **85**, the blower unit is freed for removal from the housing.

From the drawings and foregoing description, it should be apparent that I have provided an exhaust fan housing within which may be removably positioned a blower unit. The housing is so constructed as to greatly facilitate the conversion of the exhaust fan unit to any combination of horizontal or vertical intakes with horizontal or vertical discharges or exhausts. This is accomplished by providing the housing with an interchangeable wall and a removable grill which may be readily interchanged one for the other. The latter mentioned wall member is provided with self-contained means for mounting the grill member in removable relationship. The housing is characterized by the self-contained feature of the mounting means on the removable wall so that it is unnecessary to disconnect any of the elements of the mounting means from the permanently affixed portions of the housing during the interchanging operation.

It is believed that my invention, its mode of construction and assembly, and many of its advantages should be readily understood from the foregoing without further description, and it should also be manifest that while a preferred embodiment of the invention has been shown and described for illustrative purposes, the structural details are nevertheless capable of wide variation within the purview of my invention as defined in the appended claims.

What I claim and desire to secure by Letters Patent of the United States is:

1. An apparatus of the class described comprising a housing, said housing defined by a plurality of side walls and being open on two adjacent sides thereof, one of said walls formed with an opening adapted to afford an exhaust outlet for the housing, a combination closure member including an imperforate wall, an angularly disposed inlet grill and supporting means connecting said inlet grill to said imperforate wall, and fastening means for releasably connecting said closure member to said housing to selectively wall off either of said open sides with said imperforate wall and simultaneously cover the other of said open sides with said inlet grill.

2. The apparatus of claim 1 in which said inlet grill is connected to said imperforate wall by resilient supporting means, said resilient supporting means including spring means, whereby said inlet grill may be pulled away from said imperforate wall and access had to the interior of the housing without removing said combination closure member.

3. The apparatus of claim 2 in which said resilient supporting means comprises a pair of brackets, said brackets mounted on each end of said inlet grill and positioned to protrude into the interior of said housing, a pivot pin mounted on the end portion of each of said brackets, a pair of link arms pivotally mounted one near each end of said imperforate wall, each of said link arms having means in the free end thereof adapted to rotatably mount said pivot pin, and a pair of spaced springs, each spring having one end connected to one of said link arms and the other to said imperforate wall whereby said combination closure members may be selectively repositioned without necessitating the disengagement of any of said elements except said fastening means, said spring means urging each of said link arms inwardly towards the interior of the housing.

4. An apparatus of the class described comprising a substantially rectangular housing, said rectangular housing including integrally connected end walls, a top wall, and a side wall and having an open side and bottom, said top wall having outlet means, an imperforate closure wall, fastening means adapted to selectively mount said imperforate closure wall over said open side or bottom, a removable inlet grill having grill-mounting means affixed thereto, and spring-urged linkage means pivotally connected between said imperforate closure wall and said removable inlet grill, said means adapted to cooperate with said grill mounting means to movably and resiliently mount said grill in position over the remaining housing opening.

5. A housing for a blower exhaust fan assembly adapted for installation on a support member having an opening therethrough comprising a grill mounted to cover said opening with the marginal edges of said grill abutting the marginal edges of the support member surrounding the opening therein, said grill removably affixed to said housing by resilient mounting means whereby the grill can accommodate support members of different thicknesses, said resilient mounting means including members protruding through said opening into the housing, said housing being substantially rectangular in shape and having an open side and bottom, said housing including at least one imperforate closure wall, removable fastening means for removably holding said imperforate closure wall over either said open side or bottom, said members of the resilient mounting means in the housing connected to said imperforate closure wall to hold said grill against the support member and over the other of said housing openings.

6. The housing of claim 5 in which said resilient mounting means comprises link arms, each of said link arms being pivotally connected near one end to said imperforate closure wall with the other end in the housing, bracket members connected to said grill and protruding into the housing, pivot pins connected to the ends of the bracket members in the housing, the ends of said link arms in pivotal engagement with said pivot pins, and spring means connecting said closure wall and said link arms to urge said grill against said support member whereby all of the elements of said mounting means are attached to said imperforate closure wall so that said imperforate closure wall and grill may be selectively repositioned without necessitating the disengagement of any of said elements except said fastening means.

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