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R. E. MOORE ET AL
MOUNTING STRUCTURE

2,880,952

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2 Sheets-Sheet 1

FIG. 1

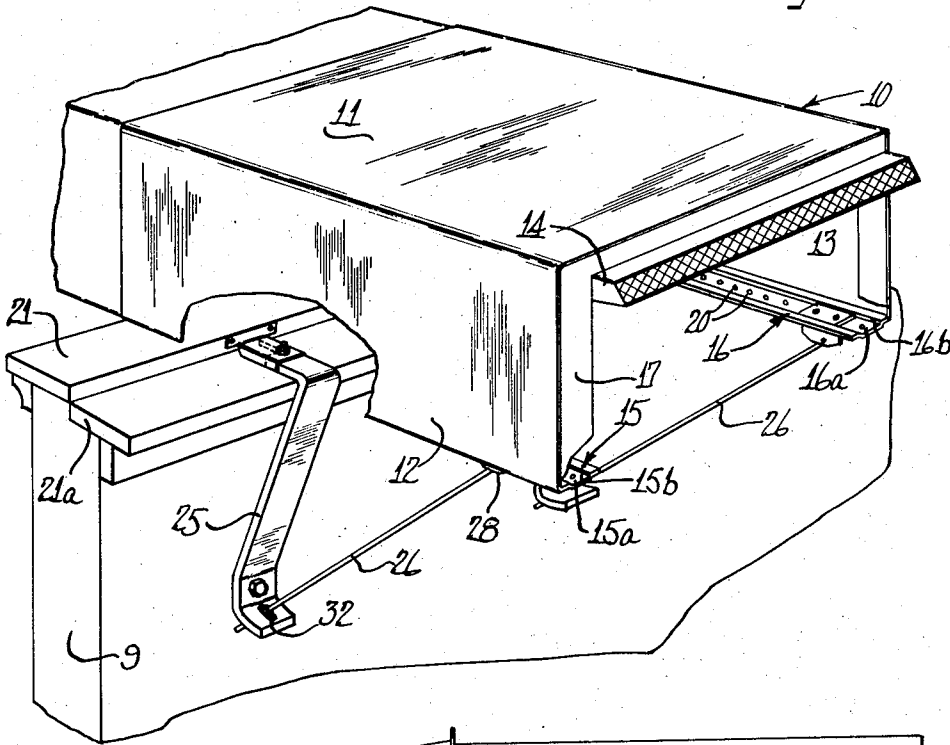
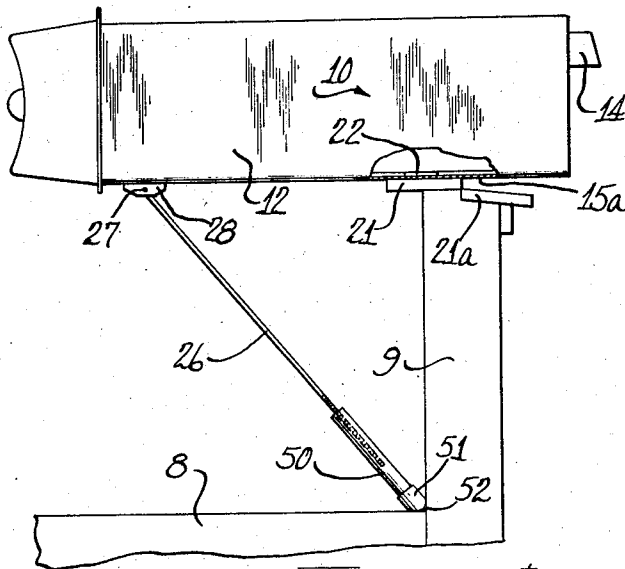


FIG. 4



Inventors
Robert E. Moore
Wallace E. Kessell
Attys

Bill, Sherman, Merrin, Good, Hanger

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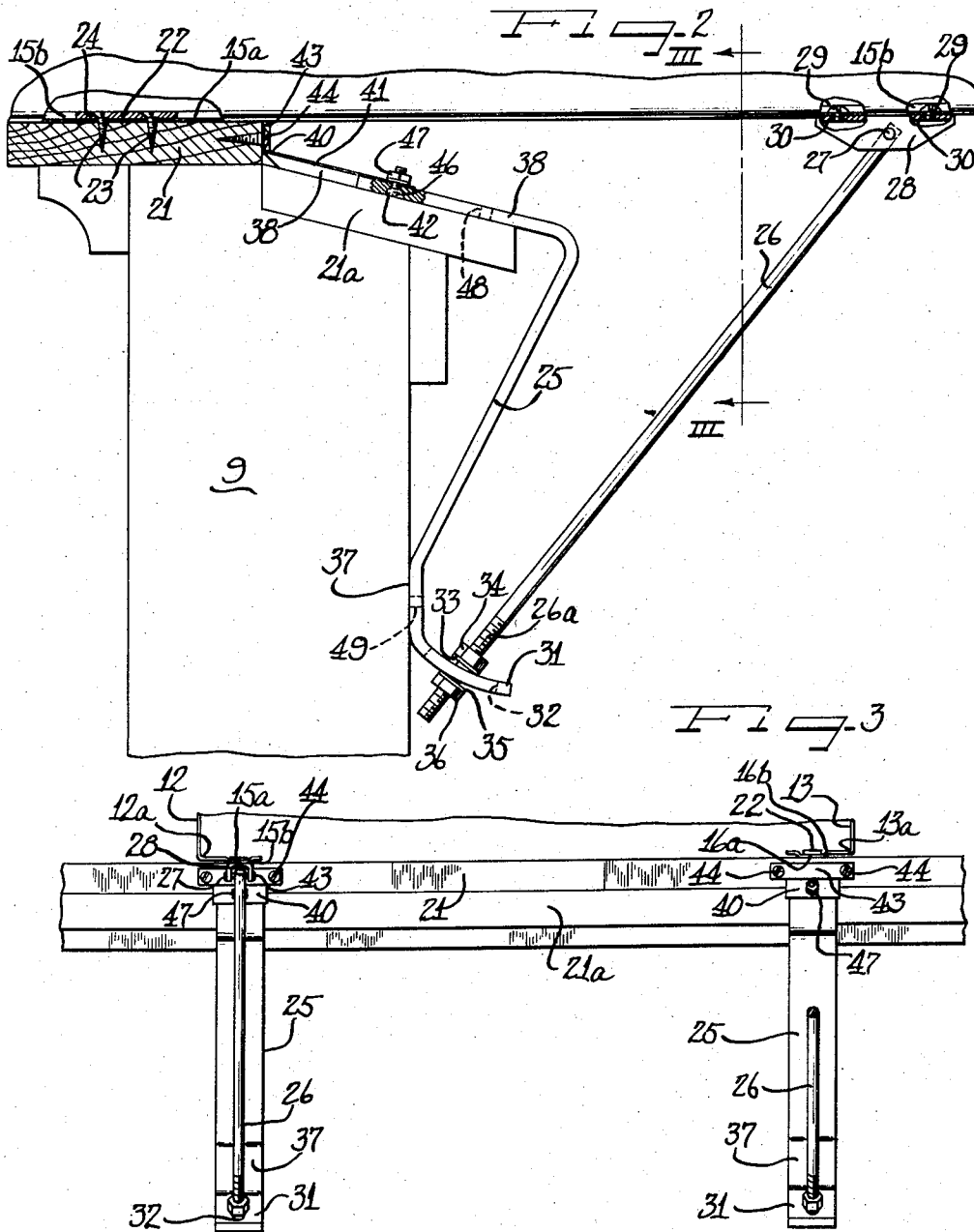
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2 Sheets-Sheet 2



Inventors
Robert E. Moore
Wallace E. Kessell

Attorneys
Shy, Sherman, Myers, Gresham & Gresham

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MOUNTING STRUCTURE

Robert E. Moore, Cedar Rapids, and Wallace E. Kessel, Iowa City, Iowa, assignors to Amana Refrigeration, Inc., Amana, Iowa, a corporation of Iowa

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3 Claims. (Cl. 248—208)

This invention relates to air conditioning units and more particularly to a device for positioning and maintaining room air conditioners in a window or similar opening of a room to be cooled.

Unit air conditioners and ventilators are frequently fitted in a window opening when utilized domestically or for cooling an office space. When thus employed it is conventional to rest the unit on the window sill such that it extends to both the exterior and interior of the room to be cooled. Most air conditioners of this type are comparatively heavy weighing from 150 pounds to 225 pounds, and installation thus poses a serious problem. Since for the sake of appearance it is desirable, where possible, to have only minimum protrusion of the unit into the interior of the room most of the weight of the unit is usually disposed outside the room beyond the plane of the window. Hence, it becomes readily apparent that a support structure must be positioned exteriorly in such a manner as to maintain the air conditioner in a fixed, substantially horizontal position.

In addition to the weight of the air conditioner Underwriters' Laboratories have specified that the bracing structure be sufficiently rigid to support a two-hundred pound man standing thereon at the outermost point of the unit with a safety factor of two. Therefore, in summation, in any mounting structure capable of providing universal satisfaction the mount must be capable of supporting between five and six hundred pounds.

In the prior art it is conventional to bolt or otherwise secure the air conditioner to the window sill in a balanced position extending approximately half within and half without the room. Another attempted solution includes a plurality of strap metal pieces securely bolted to the window sill and extending horizontally therefrom to the exterior with an adjusting bolt extending vertically from the free end of the strap metal to the base of the air conditioner to position and support it. Other structures include diagonal rods connected between the remote exterior bottom edge of the air conditioner and the exterior of the building beneath the window opening.

However, all of these prior art structures are lacking in one or more of the characteristics of a unit air conditioner mounting bracket considered completely satisfactory. Thus most of these devices cannot easily be attached to a masonry building and/or they are too weak and/or they fail to provide an adjustable mount whereby the air conditioner unit may be positioned entirely within or without the plane of the window.

The present invention encompasses all the desirable features of a support bracket for room air conditioners including ease of assembly in place from within the room, economy of the structural parts and fastening devices, and minimum protrusion within the room yet external rigidity in excess of the amount needed to support the air conditioner outside the window plus an additional four hundred pounds.

Facile installation is made possible by the construction of the air conditioner unit in two parts, viz. an outer

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case housing comprising a top, opposed sides and laterally spaced channel support runners adjacent and welded to each sidewall, and a machine unit mounted on a base pan to be slidably positioned within the outer housing.

5 The outer case housing is so fabricated that it can be completely braced and securely positioned in the window opening before the machine unit is installed. Thus only the outer housing need be lifted and held in place while securing it in the window opening and attaching the external mounting brackets and supports. This housing weighs a maximum of 30 pounds as compared with the weight of the machine compartment unit which weighs about 200 lbs. After the comparatively light outer housing is positioned securely it is a simple process to lift the machine unit and slide it into the emplaced housing.

15 Installation of the outer housing is equally simple whether on the ground floor or the fifteenth story of a skyscraper because with the mounting structure of the present invention it may be completely accomplished from inside the room. Since the housing is open at both ends and on the bottom, outside screws and nuts can easily be reached for tightening and adjustment.

25 Another great advantage in this device lies in the manner in which the downward forces at the end of the air conditioner remote from the window opening are transmitted to a sturdy mounting bracket overhanging the window sill. The instant invention prevents any possibility of structural failure and by providing a unique combination of mounting brackets, saddle plates, and adjustable support rods the housing may be maintained in the window opening with varying amounts of the air conditioner protruding within and without the room and in any desired angle variance from horizontal. Structural strength is so great and the mounting combination is so efficient that the structure of the present invention has proven more than twice as strong as the Underwriters' requirements.

35 It is therefore an object of this invention to provide a novel mounting bracket structure of superior strength for air conditioners and the like.

40 It is a further object to provide an external support means which can be entirely installed from inside the building.

45 Still another object is to provide a rigid, yet easily adjustable support means for an air conditioner in a window opening, whereby the air conditioner may be maintained in a horizontal plane, slanting downward interiorly, slanting downward exteriorly, or at any desired angle of slope varying from horizontal.

50 Another object of our invention is to provide a rigidly mounted housing into which an air conditioning machine unit mounted on a base pan may be imposed.

55 A further object is to provide a novel mounting bracket in combination with a diagonal support whereby vertical forces remote from the window opening are transferred into components acting on the window sill and the wall supporting the sill.

60 An object of our invention is to provide a mounting bracket having extreme flexibility, whereby an air conditioner may be maintained in a window opening with any desired degree of protrusion exteriorly and interiorly of the window opening and with any degree of tilt from the horizontal.

65 Still another object of our invention is to achieve a strong, rigid mounting bracket which is secured to the building only at the window sill.

70 Yet another object is to provide a mounting brace combination which may be installed in a window opening with equal facility whether the building wall be constructed of brick, stone, concrete or wood.

A further feature of the invention is the provision of an air conditioner housing which acts as a fixed struc-

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tural part of the truss system used to support the housing itself.

Another feature of the present invention is the provision of support apparatus capable of selectively supporting the air conditioner within or without the room.

Further objects and advantages of our invention will become apparent to those skilled in the art from a consideration of the attached drawings wherein:

Figure 1 is an isometric view, partially broken away, illustrating the installation of the support structure of the present invention;

Figure 2 is a side elevational view of the support structure of the present invention;

Figure 3 is an end elevational view of the structure in partial cross-section taken along the lines III—III of Figure 2; and

Figure 4 illustrates the installation of an air conditioner unit using the present apparatus for providing support within the room rather than exteriorly thereof.

As shown on the drawings:

As may be seen from Figures 1 through 4, the apparatus of the present invention comprises an outer housing or air conditioner casing 10, having a top panel 11, side wall panels 12 and 13, a rear end guard 14 and integral, intumed, longitudinally extending, attachment channels 15 and 16. Preferably, the above outline housing is manufactured from a single piece of sheet material. However, it may be desired in the interests of reducing expense to manufacture the guard 14 from a separate piece and install it behind an overturned flange 17 provided at the outermost extremity of the panels 11, 12 and 13. Likewise, it will be understood that the channels 15 and 16 may comprise separate channels welded or otherwise secured to the panels 12 and 13.

As is shown in Figure 3, the side walls 12 and 13 each may be inwardly deformed as at 12a and 13a and deformed as at 15 and 16 into retaining channels. The channels 15 and 16 comprise substantially horizontal disposed portions 15a, 16a and side walls 15b and 16b, thereby providing a substantial rigidifying effect. By forming the channels 15 and 16 into a generally U cross-section, the overall strength of the outer housing is greatly improved and, simultaneously, attachment may be made to the horizontal portions 15a and 16a without danger of the attachment means contacting the bottom surface of the air conditioning apparatus to be positioned within the housing 10.

The channels 15 and 16 are provided with a longitudinally extending series of apertures 20. The rows of apertures extend from the innermost end of the housing 10 to the extreme outer end thereof at the flange 17. Thus, as will be described below, the channels 15 and 16 may be provided with adjustment fixtures throughout the entire length thereof.

The housing 10 is intended to rest on the window sill 21, and, as may be seen from Figure 2, each of the channels 15 and 16 is secured to the sill 21 by means of a screw-plate 22 having a pair of wood screws 23 passing therethrough, through apertures 20 and the channel floor 15a and 16a into the sill 21. By providing the screw-plates 22 with counter-sunk apertures 24 and by using flat headed wood screws 23, no projection of the screw-plate 22 or the screws 23 occurs above the level of the main top surface of the channels 15 and 16. By the above set out attachment, the housing 10 is positively fixed to the sill 21 such that movement of the housing 10 horizontally in and out of the window is prevented.

In view of the rather great length of the cabinet housing 10, and in view of the weight of the air conditioning apparatus to be positioned therein, it is essential that a vertical support be provided for the outermost edge of the housing. This is accomplished through the provision of the pair of generally Z-shaped support brackets 25 that cooperate with a pair of adjustable sup-

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port rods 26 pivotally mounted at 27 to mounting brackets 28 which are in turn fixedly secured to the channels 15 and 16 by means of machine screws 29.

The brackets 28 are provided with threaded apertures 30 for cooperation with the machine screws 29 in order to permit simple assembly without the necessity for fumbling with conventional nuts. This is, of course, quite important in the present instance since it is desired that the mounting structure be capable of complete assembly from within the room, a requirement which is much simplified if the difficult-to-handle small parts, such as nuts, are reduced to a minimum. As may further be seen, simplification of the present design is enhanced through the use of a bracket having apertures 30 spaced the same distance as the apertures 24 in the screw plate 22. Thus, whatever the position of the case 10 may be, attachment of the brackets 28 and the screw-plates 22 may be accomplished readily and without modification of any sort to the housing itself.

The support rods 26 are threaded at 26a for adjustable association with the arcuately outturned ends or fingers 31 of the support bracket 25. The outturned fingers 31 are provided with elongated slots 32 through which the threaded portions 26a of the rods 26 may pass. The threaded portion 26a carries a washer 33 and an adjusting nut 34 positioned above the outwardly extending support finger 31 and may, if desired, also carry a washer 35 and nut 36 below the finger 31 to positively associate the rods 26 therewith and thus prevent upward movement of the case as well as providing support against downward movement thereof.

As viewed in Figure 2, the support brackets 25 abut the building wall 9 at 37, and are prevented from downward movement therealong by the generally horizontally extending upper arms 38 which rest on the exterior drain-board 21a of the window sill 21. In order to permit adjustment of the bracket 25 to various widths of window sills, and differing external wall characteristics, the generally horizontal upper arms 38 of the hangers 25 are secured to the sill 21 by means of an adjustable saddle bracket 40. Each bracket 40 comprises an inverted channel member of generally inverted U-cross section having a longitudinal slot 41 therein for adjustable alignment with an aperture 42 in the arm 38 and is also provided with an upstanding flange 43 provided with apertures through which wood screws 44 may be inserted into the sill 21. Conventional countersunk, flatheaded, stove bolts 46 are mounted in the countersunk apertures 42 and nuts 47 are threadedly positioned thereon for tightening the saddle bracket 40 snugly against the generally horizontally extending arm 38. By providing the nuts 47 for the stove bolts 46 in an upwardly facing position, installation or adjustment of the mounting may be accomplished from within the window opening rather than requiring operation from outside the wall and underneath the housing from a ladder or the like.

From the above described bracket arrangement, it will be apparent that the mounting system of the present invention can accommodate substantially any type of window and sill arrangement. Since the external sill portion 21a is slightly slanted in almost all window installations to permit drainage of water and the like from window surfaces, the standard amount of drainage angle is provided in the arm 38. This angle, which is approximately 14 degrees from the horizontal, has been found to operate satisfactorily on almost all windows of homes having sash-type windows.

By slidably moving the arm 38 of the respective hangers 25 in the saddle 40 until the point 37 of the brackets 25 abuts the outer wall 9 and then tightening the nuts 47, a firm support is provided. This support derives its main attachment forces from the sill 21. This will be seen from consideration of Figure 2 wherein the relationship between the housing, the brackets 25, and the support

rods 26 may readily be seen. As there shown, the housing 10 provides one rigid link of a triangular bracing arrangement. This link comprises the channels 15 and 16 which are secured at 23 to the sill 21. Due to the channel shape of the internal flanges 15 and 16, the case 10 is provided with substantial rigidity and it has been found that large amounts of bending stress can be withstood by the casing itself.

The above described, generally horizontal, portion of the bracing system is supported at its exteriorly remote end by means of the rigid support rods 26 which transmit downwardly applied forces to the outwardly extending fingers 31 of the brackets 25. Due to the angularity of the support rods 26, forces applied to the fingers 31 comprise both vertically downward forces and horizontally inward forces against the wall 9. Vertically downward forces are absorbed by the brackets 25 through the support given by the external sill portion 21a and the securement provided by the screws 44. The horizontal component of force supplied against the brackets 25 at 37 is, of course, resisted by the wall 9 itself.

It has been found that a generally satisfactory arrangement in installations of the type herein described, the positioning of the rods 26 at approximately 45 degrees from the horizontal is very satisfactory and properly balances the horizontal component applied against the wall 9 at 37 with the downward component applied against the fingers 31 of the brackets 25.

It will be apparent, that the movement of the brackets 28 toward the sill 21 will cause an upward movement of the external portion of the housing 10, and vice versa. Thus, the horizontal positioning of the casing 10 may be modified through an adjustment of the position of the brackets 28 or alternatively, through an adjustment of the adjusting nut 34 on the threaded portion 26a of the support rods 26. Due to the heavy forces involved, slight deflections of the casing 10 may be accomplished without over stressing the channel members at the screw plates 22. In actual practice, it is ordinarily desired that a slight slope downwardly toward the exterior of the casing 10 be provided since this permits drainage of condensate from the evaporator unit, ordinarily placed within the confines of the room, to move outwardly of the room to the condensate disposal unit placed adjacent the external edge of the air conditioner. However, through the use of the present mounting structure any drainage system may be provided since adjustment of the channels 15 and 16 may be accomplished to provide a slope in either direction.

Although the above described mounting structure has proven satisfactory for most installations, provision is made for installations in which unusually heavy load requirements are to be imposed on the mounting structure. As shown in Figures 1 and 2 apertures 48 and 49 are provided in the brackets 25. In heavy duty installations, screws similar to those shown at 23 may be inserted through the apertures 48 and 49, into the sill 21a and the wall 9 respectively to add reinforcement to the system.

By the present invention, means are also provided for mounting the air conditioner units substantially entirely within the room itself rather than substantially externally thereof as shown in Figures 1, 2 and 3. In such installations, the brackets 25 are dispensed with while the support rods 26 are retained. However, the brackets 28 are secured inside the room to the channels 15 and 16 rather than externally thereof as may be seen from a consideration of Figure 4. There, the screw plates 22 are positioned in substantially the same manner as shown in Figures 1 through 3 except that the screws 23 are passed through aperture 20 adjacent the external end of the air conditioning unit. The brackets 28 are then positioned adjacent the front or internal end of the channels 15 and 16 and are maintained in a substantially fixed position by means of the support rods 26. The support rods in

the modification shown in Figure 4 carry threadedly adjusted elongated nuts or pipes 50 having a rubber bumper or the like 51 on its bottom end.

As may be seen from Figure 4, the support rods 26 are angularly positioned in substantially the same manner as described above relative to external applications, but in view of the fact that the room has a floor 8, the vertical component of force to be absorbed in supporting the air conditioning unit may be counteracted by the floor 8 in combination with the wall 9 as shown at 52. Thus, by providing with the installation kit above described, an elongated nut 50, which may be in the form of a tubular pipe or the like, in addition to the short nut 34, the vertical support for the casing 10 may be provided selectively by the base board corner of the wall 9 and the floor 8 of the room rather or by the externally extending portion 31 of support brackets 25, positioned on the outside of the wall 9 as above described.

By providing an arcuate shape to the fingers 31 of brackets 25 improved seating may be provided over a wide range of positions of the brackets 28 on the channels 15 and 16. The arcuate construction permits the application of force to the finger 31 with maximum efficiency and without the possibility of sliding during vibrations of the air conditioning unit.

It will, of course, be apparent to those skilled in the art, that modifications and variations may be made in the above described structure without departing from the concepts of the present invention and we do not, therefore, intend to be limited other than as required by the scope of the appended claims.

We claim in our invention:

1. In means for mounting an air conditioner in a window opening extending through a wall and provided with a sill and a drain board extending outwardly from said sill; a pair of supporting members adapted to seat on and be secured to the window sill and to extend therefrom a substantial distance outward beyond the wall, a pair of substantially Z-shaped brackets respectively comprising a first and upper arm disposed to seat on and be secured to the drain board and a second arm extending at an inclination downward from said first arm and disposed to seat at its lower portion on the wall, said second arm having at its lower end an arcuate finger disposed to extend downwardly and outwardly away from the wall with its concaved face directed toward the corresponding supporting member, support rods pivoted at their upper ends to said supporting members adjacent the outer ends thereof and extending therefrom at an inclination downward and inward to said fingers, and abutment members adjustable on said rods and seating on the upper concaved faces of said fingers and effective in cooperation therewith for adjusting said rods lengthwise.

2. In means for mounting an air conditioner in a window opening extending through a wall and provided with a sill and a drain board extending outwardly from said sill; a pair of supporting members adapted to seat on and be secured to the window sill and to extend therefrom a substantial distance outward beyond the wall, a pair of substantially Z-shaped brackets respectively comprising a first and upper arm disposed to seat on and be secured to the drain board and a second arm extending at an inclination downward from said first arm and disposed to seat at its lower portion on the wall, said second arm having at its lower end an arcuate finger disposed to extend downwardly and outwardly away from the wall with its concaved face directed toward the corresponding supporting member, each of said fingers having a lengthwise slot therein, support rods pivoted at their upper ends to said supporting member adjacent the outer ends thereof and extending therefrom at an inclination downward and inward to said fingers with their lower end portions extending through said slots, and abutment members threaded on said rods and seating on the upper concaved

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faces of said fingers effective in cooperation therewith for adjusting said rods lengthwise.

3. In means for mounting an air conditioner in a window opening extending through a wall and provided with a sill and a drain board extending outwardly from said sill; a pair of supporting members adapted to seat on and be secured to the window sill and to extend therefrom a substantial distance outward beyond the wall, a pair of substantially Z-shaped brackets respectively comprising a first and upper arm disposed to seat on and be secured to the drain board and a second arm extending at an inclination downward from said first arm and disposed to seat at its lower portion on the wall, said second arm having at its lower end an arcuate finger disposed to extend downwardly and outwardly away from the wall with its concaved face directed toward the corresponding supporting member, each of said fingers having a lengthwise slot therein, support rods pivoted at their upper ends to said supporting members adjacent the outer ends thereof and extending therefrom at an inclination downward and inward to said fingers with their lower end

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portions extending through said slots, and abutment members threaded on said rods at the upper and lower faces of said fingers effective in cooperation therewith for anchoring said rods to said fingers and for adjusting said rods lengthwise.

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