Nov. 4, 1969 E. J. PACE 3,476,344

GROOVED PANEL AND FIXTURE COMBINATION

Filed April 24, 1968

FIG. 1.

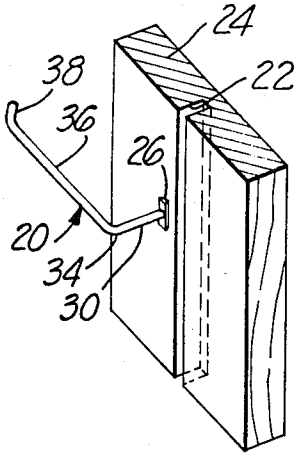


FIG. 2.

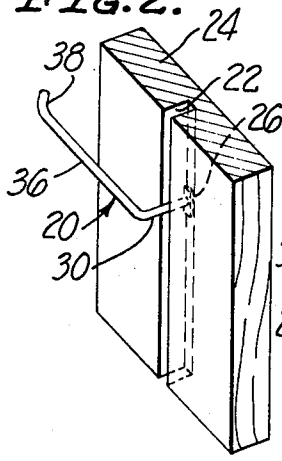


FIG. 3.

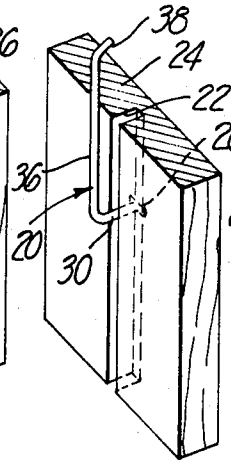


FIG. 4.

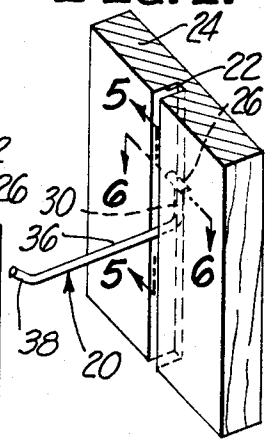


FIG. 7.

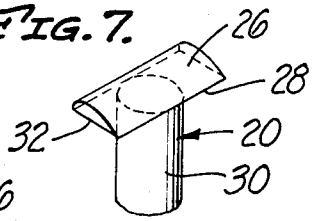
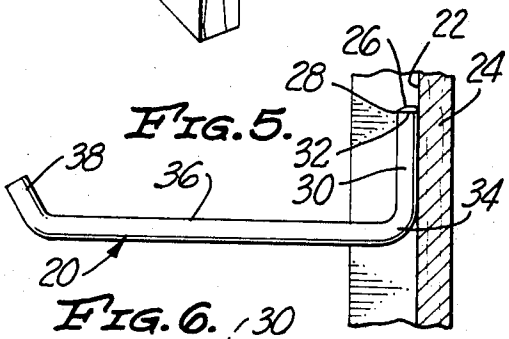


FIG. 5.



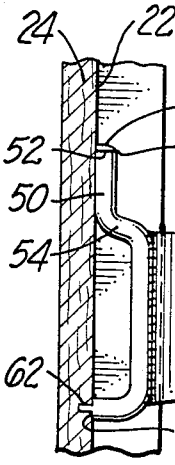


FIG. 8.

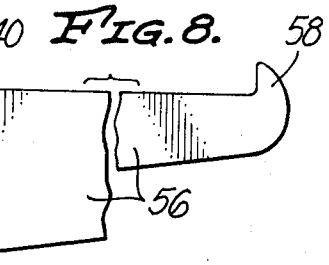


FIG. 6.

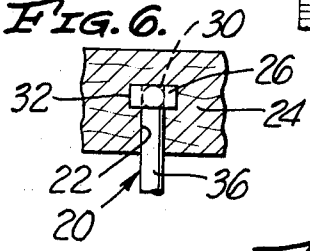


FIG. 11.

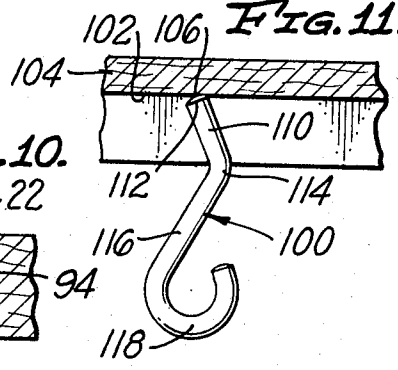


FIG. 9.

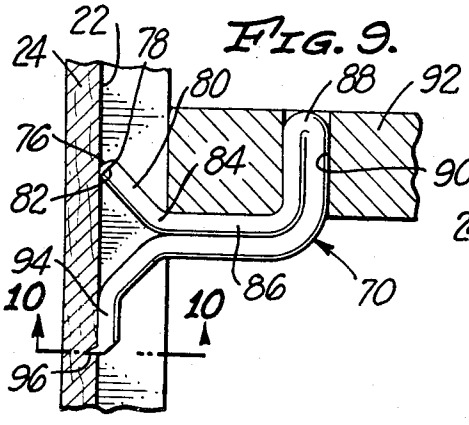
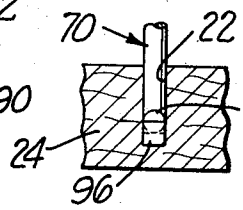


FIG. 10.



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3,476,344

GROOVED PANEL AND FIXTURE COMBINATION

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Int. Cl. E04g 3/00; E06b 7/28
U.S. Cl. 248—216 10 Claims

ABSTRACT OF THE DISCLOSURE

A fixture for attachment to a vertically grooved wall panel, or to a grooved ceiling panel. The fixture includes a generally flat, elongated supporting plate having a width less than the width of the groove and a length greater than the width of the groove, whereby the plate may be inserted into the groove while oriented longitudinally thereof, and whereby the plate may then be rotated about an axis generally perpendicular thereto to cause the ends of the plate to embed themselves in the side walls of the groove. In the ceiling fixture version, this results in so orienting the supporting plate that one side thereof faces generally downwardly to provide a large bearing area. In the wall fixture version, the supporting plate, as a final step in installation, is angularly displaced about an axis extending longitudinally thereof until one side of the plate faces generally downwardly to provide a large bearing area also. In either version, the load to be supported by the plate engages a load carrying member connected to the supporting plate by a shank member projecting from the generally downwardly facing side of the plate.

BACKGROUND OF INVENTION

The present invention relates in general to fixtures for attachment to grooved panels, or the like. More particularly, the invention relates to a wall fixture for attachment to a wall or wall panel provided with outwardly facing vertical grooves each having an outwardly facing inner wall and two spaced side walls, and to a ceiling fixture for attachment to a ceiling or ceiling panel provided with downwardly facing horizontal grooves each having a downwardly facing inner wall and two spaced side walls. The vertically grooved wall or wall panel and the grooved ceiling or ceiling panel are made of wood, or a material having generally similar characteristics as to penetrability, bearing strength, and the like.

Still more specifically, the invention contemplates a fixture which is attached by embedding the ends of a generally flat, elongated supporting plate thereon in the side walls of the desired groove. Thus, the fixture may be attached to the wall or ceiling without marring same in any way. If desired, the fixture may subsequently be removed without any visible evidence that it was ever attached.

The supporting plate has a width less than the width of the groove in which it is to be installed and a length greater than the width of the groove, whereby the plate may be inserted into the groove into a first position wherein the plate is oriented longitudinally of the groove and generally parallel to the inner wall thereof, and whereby the plate may then be rotated about an axis generally perpendicular thereto into a second position wherein the plate is oriented transversely of the groove and generally parallel to the inner wall thereof and wherein the ends of the plate are embedded in the side walls of the groove in a plane adjacent and generally parallel to the inner wall of the groove. Projecting from one side of the supporting plate, substantially midway between the ends thereof, is a shank member to which is

connected a load carrying member suitable for the type of load to be supported.

A wall fixture of the foregoing general nature is disclosed in Patent No. 3,313,509, granted Apr. 11, 1967 to John J. Lockert. In the Lockert wall fixture, the hereinbefore-mentioned second position of the supporting plate is in its final position. Thus, the supporting plate, in its final position, is oriented substantially vertically adjacent the inner wall of its groove. With this construction, therefore, any vertical load applied to the load carrying member connected to the supporting plate causes the supporting plate to tend to shear the material of the panel since the only bearing area provided by the plate is its relatively thin lower edge. If any substantial load is applied to this wall fixture, the vertical supporting plate may shear its way downwardly along a path generally parallel to the inner wall of the groove. Also, if the shear stress applied to the material of the panel is generally parallel to the grain of a wooden panel, the panel may split adjacent the side walls of the groove. In such a case, if the grain of the wood extends downwardly and forwardly, the supporting plate may even slice its way downwardly and forwardly out of the wood.

SUMMARY AND OBJECTS OF INVENTION

With the foregoing background, the primary object of the invention is to provide a wall or ceiling fixture wherein one side of the supporting plate faces at least generally downwardly, instead of horizontally, to provide it with a relatively large bearing area in engagement with the material of the panel. Preferably, the supporting plate is substantially horizontal in its operative position so that it is provided with a downwardly facing bearing area substantially equal to the sum of the areas of the ends of the plate which are embedded in the side walls of the groove.

With the foregoing construction, there is no tendency for the supporting plate to shear its way downwardly and, accordingly, the supporting plate is capable of sustaining much heavier loads, which are important features of the invention.

The foregoing relatively large, downwardly facing, bearing area for the supporting plate may be achieved in the ceiling fixture of the invention merely by rotating the supporting plate about an axis generally perpendicular thereto into the second position hereinbefore discussed, which is an important feature.

An important object in connection with the wall fixture of the invention is to angularly displace the supporting plate, after it has been rotated into its second position, into a third position wherein it is oriented at a predetermined angle to the inner wall of the groove and has its ends embedded in the material of the panel in a plane extending outwardly from the inner wall of the groove at this predetermined angle, which is at least of the order of 45°. With this construction, the supporting plate is prevented from tending to shear the material of the panel and is provided with a relatively large bearing area capable of sustaining a substantial load, which are important features of the invention.

More specifically, an important object of the invention is to provide a wall fixture wherein: the shank member projects centrally from one side of the plate and is oriented at an angle to the inner wall of the groove when the plate is in its second position, whereby the outer end of the shank member may be swung toward the inner wall of the groove so as to angularly displace the plate into its third position, wherein it is oriented at a predetermined angle to the inner wall of the groove and is embedded in the material of the panel in a plane extending outwardly from the inner wall of the groove at such pre-

determined angle to provide a relatively large bearing area; and wherein a load carrying member is connected to the outer end of the shank member and is oriented at an angle to the shank member, and extends outwardly away from the inner wall of the groove when the supporting plate is in its third position.

Another object is to provide a fixture wherein the shank member is generally perpendicular to the supporting plate, and wherein the load carrying member connected to the outer end of the shank member is oriented at an angle of at least of the order of 45° to the shank member.

Another and important object of the invention is to provide stop means on either the shank member or the load carrying member for engagement with the inner wall of the groove to prevent angular movement of the supporting plate beyond its third position, wherein it faces generally downwardly so that the embedded ends thereof provide it with a relatively large bearing area.

Another and quite important object of the invention is to provide a fixture of the foregoing nature wherein the stop means includes means for penetrating the inner wall of the groove when the supporting plate is in its third position, and to provide such a penetrating means having a downwardly facing bearing area which acts in concert with the downwardly facing bearing area provided by the ends of the supporting plate.

Still another object of the invention is to provide the supporting plate with a relatively sharp longitudinal edge capable of easily penetrating the material of the panel upon angular displacement of the supporting plate from its second position into its third position.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be evident to those skilled in this art in the light of the present disclosure, may be attained with the exemplary embodiments of the invention illustrated in the accompanying drawing and described in detail hereinafter.

DESCRIPTION OF DRAWING

In the drawing:

FIGS. 1, 2, 3 and 4 are fragmentary perspective views illustrating successive steps in the installation of a wall fixture of the invention in a vertical groove in a wall or wall panel;

FIGS. 5 and 6 are enlarged, fragmentary sectional views respectively taken along the arrowed lines **5—5** and **6—6** of FIG. 4;

FIG. 7 is an enlarged, fragmentary perspective view of a supporting plate and attached shank member of the fixture of the invention;

FIG. 8 is a vertical sectional view similar to FIG. 5, but illustrating another embodiment of a wall fixture of the invention;

FIG. 9 is a vertical sectional view similar to FIGS. 5 and 8, but illustrating still another embodiment of a wall fixture of the invention;

FIG. 10 is a fragmentary sectional view taken as indicated by the arrowed line **10—10** of FIG. 9; and

FIG. 11 is a vertical sectional view of a ceiling fixture of the invention installed in a downwardly facing groove in a ceiling or ceiling panel.

DESCRIPTION OF EXEMPLARY EMBODIMENTS OF INVENTION

Referring initially to FIGS. 1 to 7 of the drawing, illustrated therein is a wall fixture **20** of the invention for installation in a vertical groove **22** in a wall or wall panel **24**, the latter being formed of wood, or a material having similar characteristics.

The wall fixture **20** includes a generally flat, elongated supporting plate **26** having a width slightly less than the width of the groove **22** and having a length considerably greater than the width of the groove. Preferably, the length of the supporting plate is at least of the order of twice the width thereof, its size being dependent on the load to be supported. As shown in FIG. 7, the supporting plate **26** is generally airfoil shaped in transverse cross section and has a relatively sharp longitudinal edge **28**, which will be referred to hereinafter as the forward edge of the supporting plate for a reason which will become apparent.

The wall fixture **20** also includes a shank member **30** which is located substantially midway between the ends of the supporting plate **26** and which projects substantially perpendicularly from one side **32** of the supporting plate.

Projecting substantially perpendicularly from the shank member **30**, and connected to the outer end **34** thereof, is a load carrying member **36** shown as terminating at its outer end in a portion **38** which is upturned when the wall fixture is installed. The load carrying member **36** extends in the direction of the width of the supporting plate **26** and is substantially parallel to the side **32** thereof, the member **36** facing in the same direction as the sharpened forward edge **28** of the supporting plate. In the particular construction illustrated, the wall fixture **20** is of integral construction, i.e., all of the parts thereof are formed from the same piece of material.

Considering the manner in which the wall fixture **20** is attached to the wall panel **24**, it is first oriented in the position shown in FIG. 1. Then, as shown in FIG. 2, the supporting plate **26** is inserted into the groove **22** into a first position wherein the plate is oriented longitudinally of the groove and is generally parallel to and in engagement with the inner wall of the groove. Subsequently, as shown in FIG. 3, the wall fixture **20** is rotated through an angle of 90°, about an axis generally perpendicular thereto, i.e., about the axis of the shank member **30**, into a second position wherein the supporting plate is oriented transversely of the groove and generally parallel to the inner wall thereof and wherein the ends of the plate are embedded in the side walls of the groove in a plane adjacent and generally parallel to the inner wall of the groove. The direction in which the wall fixture **20** is rotated, in angularly displacing the supporting plate **26** from its first position into its second position, is such that the sharpened forward edge **28** faces upwardly.

Finally, referring to FIG. 4 of the drawing, the wall fixture **20** is swung downwardly so that the outer end **34** of the shank member **30** is displaced toward and into engagement with the inner wall of the groove **22**, the shank member now lying entirely within the groove and in engagement with the inner wall thereof. As this is done, the supporting plate **26** is angularly displaced, about an axis extending lengthwise thereof, into a third position wherein it is oriented substantially horizontally. The sharpened forward edge **28** of the supporting plate penetrates and moves upwardly and forwardly through the material of the panel **24** adjacent the side walls of the groove **22** to permit this, the action of the sharpened edge being a cutting action to prevent splitting. As will be apparent from FIG. 5, the outer end **34** of the shank member **30**, and, in fact the entire length of the shank member, are seated against the inner wall of the groove **22** to serve as a stop means preventing angular displacement of the supporting plate **26** beyond its third position.

As will be apparent, with the foregoing construction for the wall fixture **20**, the side **32** of the supporting plate **26** is substantially horizontal and faces downwardly so that the areas of the ends of the supporting plate in engagement with the material of the wall panel **24** on opposite sides of the groove **22** provide a large bearing area resisting downward movement of the supporting plate under the influence of a downward load applied to the load carrying member **36**. It will be noted that the vertical stress developed in the material of the wall panel **24** on opposite sides of the groove **22** therein is a

compressive stress, there being no shear stress applied to the panel **24** in the vertical direction. This factor, combined with the large downwardly facing bearing area provided by the substantially horizontal supporting plate **26**, renders the wall fixture **20** capable of sustaining a load much higher than can be sustained with a small bearing area acting in downward shear.

As best shown in FIG. 6, the width of the shank member **30**, and width of the portion of the load carrying member **36** within the groove **22**, are substantially equal to, but slightly less than, the width of the groove, so that these parts fit snugly within the groove to stabilize the wall fixture **20** laterally in the horizontal direction.

The particular construction illustrated for the wall fixture **20** renders it suitable for use as a hook from which to suspend a load, or as a shelf bracket capable of use with at least one additional, horizontally spaced, wall fixture **20** to support a shelf, not shown.

Turning to FIG. 8 of the drawing, illustrated therein is another wall fixture **40** installable in the vertical groove **22** in the wall panel **24**. The wall fixture **40** includes a supporting plate **46** similar to the supporting plate **26** and similarly equipped with a sharpened forward edge **48**. A similar shank member **50** projects from one side **52** of the supporting plate **46**, and the outer end **54** of the shank member **50** has a load carrying member **56** welded, or otherwise secured, thereto. In the particular construction illustrated, the load carrying member **56** is a vertical plate terminating in an upturned portion **58**, the configuration of the load carrying member **56** being such as to support a shelf, not shown.

An important feature of the wall fixture **40** is that the shank member **50** terminates in a stop surface **60** which abuts the inner wall of the groove **22** to prevent angular displacement of the supporting plate **46** beyond its third position, i.e., beyond the position thereof shown in FIG. 8. The stop surface **60** is provided with a projecting blade **62** which penetrates the inner wall of the groove **22** and which has a downwardly facing area of substantial size in engagement with the material of the panel **24**. The blade **62** thus provides an additional downwardly-facing bearing area which supplements the downwardly-facing bearing area provided by the supporting plate **46**, thereby rendering the wall fixture **40** capable of sustaining an even higher load. Preferably, the blade **62** is substantially coextensive with the groove **22**, in the direction of the width of the groove, to obtain as large a supplementary bearing area as possible.

The procedure in installing the wall fixture **40** is identical to that hereinbefore described in connection with the wall fixture **20**. Consequently, a further description is not required.

Turning to FIG. 9 of the drawing, illustrated therein is another wall fixture **70** for installation in the vertical groove **22** in the wall panel **24**. The wall fixture **70** includes a supporting plate **76** similar to the supporting plate **26** and similarly provided with a sharpened forward edge **78**. A longitudinally centered shank member **80** projects generally perpendicularly from the side **82** of the supporting plate **76** and terminates at its outer end **84** in a load carrying member **86** which makes an angle at least of the order of 45° with the shank member **80**. In the particular construction illustrated, the entire wall fixture **70** is formed of a single length of metal, and an extension of the load carrying member **86**, which is generally horizontal when the wall fixture is installed, extends upwardly, and is then doubled back downwardly, to form an upstanding loop **88**. This loop is adapted to fit into a vertical hole **90** in a shelf **92** one edge of which rests on the load carrying member **86**. With this construction, the shelf **92** is restrained against horizontal movement by the loop **88**, as well as being supported by the load carrying member **86**.

The single length of metal of which the wall fixture **70** is made is also doubled back under the load carrying member **86**, and terminates in a stop portion **94** which abuts the inner wall of the groove **22** to prevent angular displacement of the supporting plate **76** beyond its third position, i.e., beyond the position thereof shown in FIG. 9 of the drawing. The stop portion **94** terminates in a rearwardly projecting blade **96** similar to the blade **62** of the wall fixture **40** and serving the same function.

The wall fixture **70** is installed in the groove **22** in the wall panel **24** in the same manner as the wall fixture **20**, so that a detailed description is not required. It will be noted that since the load carrying member **86** makes an angle of less than 90° with the shank member **80**, the supporting plate **76**, in its third position, makes an angle of less than 90° with the vertical, such angle being at least of the order of 45°. Consequently, the downwardly-facing bearing area provided by the embedded ends of the supporting plate **76** is not the full area of the embedded ends, but is the downwardly projected area thereof. However, such bearing area is nevertheless relatively large and renders the wall fixture **70** capable of sustaining a high load, particularly since the downwardly-facing bearing area provided by the supporting plate **76** is supplemented by that of the blade **96**.

Turning to FIG. 11, illustrated therein is a ceiling fixture **100** installed in a downwardly-facing horizontal groove **102** in a ceiling or ceiling panel **104**. The ceiling fixture **100** has in common with the wall fixtures **20**, **40** and **70** the principle of providing a large downwardly-facing bearing area for compressive engagement with the material of the panel **104**.

More particularly, the ceiling fixture **100** includes a supporting plate **106** similar to the supporting plate **26**. A longitudinally centered shank member **110** projects generally perpendicularly from one side **112** of the plate **106**. The shank member **110** terminates at its outer end **115** in a load carrying member **116** terminating in a hook-like end having a load carrying portion **118** oriented nearly perpendicularly to the shank member **110**.

To install the ceiling fixture **110**, the supporting plate **106** is inserted upwardly into the groove **102**, with the supporting plate oriented longitudinally of the groove, until the supporting plate engages the inner, i.e., upper wall of the groove, the supporting plate being in a plane parallel to the inner wall of the groove under such conditions. Then, the ceiling fixture **100** is turned 90°, about an axis perpendicular thereto, until the supporting plate **106** is perpendicular to the groove **102** so that its ends are embedded in the side walls of the groove. This corresponds to the second position of the supporting plate **26** of the wall fixture **20**, i.e., the position shown in FIG. 3 of the drawing. If desired, the angular and positional relationships between the shank member **110** and the load carrying portion **118** are such that the supporting plate **106** is angularly displaced slightly about an axis extending longitudinally thereof in positioning the load carrying portion **118** directly beneath the supporting plate. This results in orienting the supporting plate **106** at a slight angle to the horizontal, as shown in FIG. 11, so as to firmly secure it in place in the horizontal direction.

As will be apparent, the ceiling fixture **100** provides a relatively large downwardly-facing bearing area in compressive engagement with the material of the ceiling panel **104**, due to the fact that the embedded ends of the supporting plate face generally downwardly. The ceiling fixture **100** is capable of sustaining a substantial load, although not as high a load as the wall fixture **20**, for example, because of the fact that there is nothing analogous to the stop means provided by the shank member **30** to prevent the ceiling fixture **100** from swinging somewhat in the plane of the groove **102**.

Thus, as will be apparent from the foregoing, the present invention provides wall and ceiling fixtures all capable of supporting substantial loads through the use of plates having ends which are embedded in side walls of grooves and which have large downwardly-facing bear-

ing areas applying compressive stresses to the materials of the panel in which the grooves are formed. The basic load carrying capacity provided in this manner can be supplemented as hereinbefore discussed in connection with the wall fixtures **20, 40** and **70,** and particularly the wall fixtures **40** and **70.**

Although exemplary embodiments of the invention have been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiments without departing from the spirit of the invention.

I claim as my invention:

1. In a fixture for attachment to a panel provided with a groove having an inner wall and side walls, the combination of:

(a) a generally flat, elongated supporting plate having a width less than the width of the groove and a length greater than the width of the groove, whereby said plate may be inserted into the groove into a first position wherein said plate is oriented longitudinally of the groove and generally parallel to the inner wall thereof, and whereby said plate may then be rotated about an axis generally perpendicular thereto into a second position wherein said plate is oriented transversely of the groove and generally parallel to the inner wall thereof and wherein said plate is embedded in the material of the panel in a plane adjacent and generally parallel to the inner wall of the groove;

(b) a shank member projecting from one side of said plate and oriented at an angle to the inner wall of the groove when said plate is in said second position, whereby the outer end of said shank member may be swung toward the inner wall of the groove so as to angularly displace said plate into a third position wherein it is oriented at a predetermined angle to the inner wall of the groove and is embedded in the material of the panel in a plane extending outwardly from the inner wall of the groove at said predetermined angle; and

(c) a load carrying member connected to said outer end of said shank member and oriented at an angle to said shank member, and extending outwardly away from the inner wall of the groove when said plate is in said third position.

2. A fixture according to claim **1** including stop means on one of said members and engageable with the inner wall of the groove for preventing angular movement of said plate beyond said third position thereof.

3. A fixture as defined in claim **2** wherein said shank member is located centrally of said plate in the direction of the length thereof.

4. A fixture as set forth in claim **3** wherein said shank member projects generally perpendicularly from said one side of said plate, and wherein said load carrying member is oriented at an angle of at least of the order of 45° to said shank member.

5. A fixture according to claim **4** wherein said load carrying member is generally perpendicular to said shank member.

6. A fixture as defined in claim **3** wherein said stop means includes means for penetrating the inner wall of the groove when said plate is in said third position.

7. A fixture as set forth in claim **3** wherein one longitudinal edge of said plate is sharpened to penetrate the material of the panel upon angular displacement of said plate from said second position into said third position.

8. In combination with a panel provided with a groove having an inner wall and side walls, a fixture attached to said panel, and including:

(a) a generally flat, elongated supporting plate having a width less than the width of said groove and a length greater than the width of said groove, the ends of said supporting plate being embedded in said side walls of said groove, respectively, and the plane of said plate being oriented at an angle of at least of the order of 45° to the vertical, whereby one side of said plate faces at least generally downwardly to provide a relatively large bearing area in engagement with the material of said panel;

(b) a shank member projecting from said one side of said plate and located centrally of the length of said plate; and

(c) a load carrying member connected to the outer end of said shank member and oriented at an angle to said shank member, and spaced outwardly from said groove.

9. A combination as defined in claim **8** wherein said plate is oriented substantially horizontally and faces substantially directly downwardly.

10. A combination as set forth in claim **9** wherein said shank member is substantially perpendicular to said one side of said plate and wherein said load carrying member is substantially perpendicular to said shank member.

References Cited

UNITED STATES PATENTS

2,987,289	6/1961	Inamsley	248—341
3,313,509	4/1967	Lockert	248—224 X

ROY D. FRAZIER, Primary Examiner

J. F. FOSS, Assistant Examiner

U.S. Cl. X.R.

248—223, 243, 304, 340