Dec. 8, 1964 W. F. LA MORTE 3,159,945

SUPPORTING DEVICE TO BE EMBEDDED IN CONCRETE STRUCTURE

Original Filed June 19, 1958

Fig. 1.

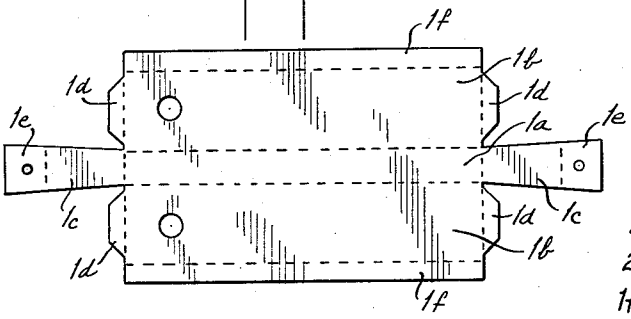



Fig. 2.

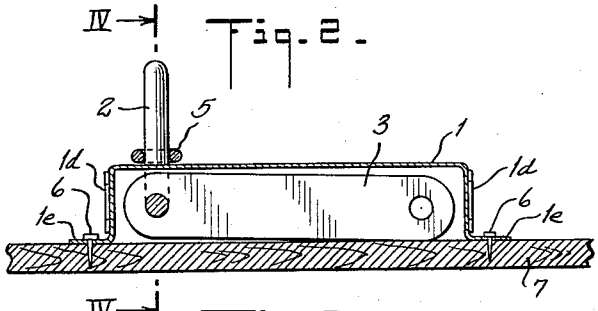



Fig. 3.

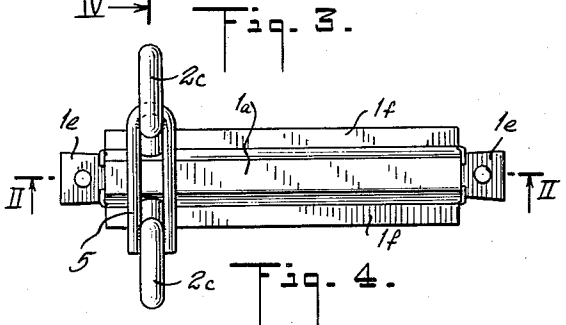



Fig. 4.

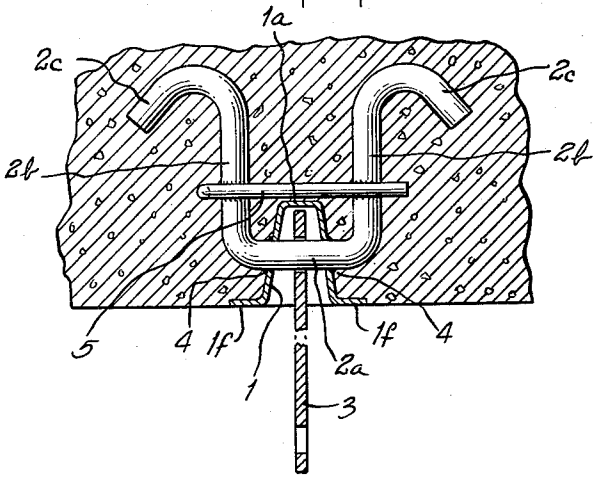



Fig. 5.

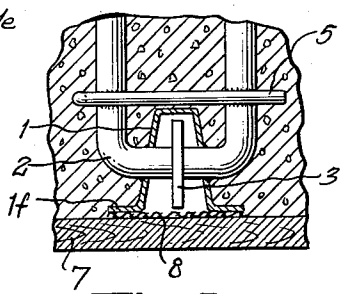



Fig. 6.

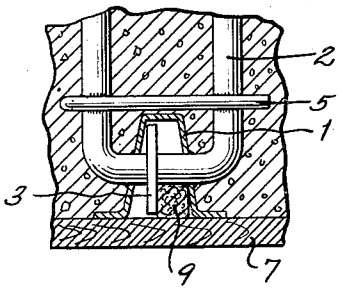
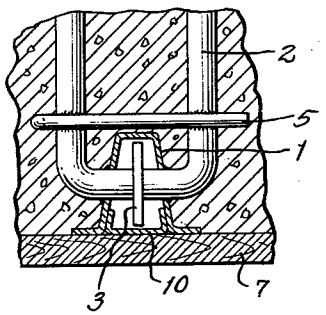



Fig. 7.




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# SUPPORTING DEVICE TO BE EMBEDDED IN CONCRETE STRUCTURE

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Continuation of application Ser. No. 743,154, June 19, 1958. This application Apr. 23, 1962, Ser. No. 191,667

2 Claims. (Cl. 50—473)

This application is a continuation of my copending application Serial No. 743,154, filed June 19, 1958, now abandoned, which is in turn a continuation-in-part of my prior application Serial No. 508,365, filed May 16, 1955, now abandoned. That application discloses a device which may be used as a ceiling hanger and which is adapted to be embedded in a horizontal reinforced concrete slab for supporting a ceiling below the slab. That device comprises a housing having an open face adapted for placement in abutting relation with the upper surface of a form for receiving poured concrete. A stress distributing member extends transversely through the housing and has a pair of oppositely projecting end portions which extend upwardly and laterally outside the housing. A support member is pivotally mounted on the portion of the stress distributing member within the housing. When the housing is in place on the form, the hanger element is in a retracted position, entirely enclosed within the housing. After the concrete is set and the form is removed, the support member may move down to an active position where it projects below the concrete slab and is free to receive the ceiling to be hung. The stress distributing element transfers the load from the support member to a considerable volume of the concrete slab. The internal dimensions of the housing are only slightly greater than the dimensions of the hanger element, so as to minimize any weakening of the slab which may be occasioned by the presence of the open space inside the housing.

The device disclosed herein embodies the invention of my prior application Serial No. 508,365 and further includes certain improvements over that invention.

One of the problems encountered with the use of devices of this type stems from the modern practice of vibrating the concrete as it is poured in order to make sure that it fills all the spaces around the reinforcing members and in the corners of the forms. This vibration is commonly accomplished by means of an air hose supplied with air under pulsating pressure, and resting on the top of the semifluid mass of poured concrete. The vibration has a tendency to make the concrete, and particularly the finer components thereof, penetrate into the smallest interstices in the forms and other parts with which it comes in contact. If the casing of the ceiling hanger is not tightly fastened to the form, the concrete may penetrate under the casing, so that when it hardens it blocks or partially blocks the downward movement of the support member which is necessary to make the support member useful. This necessitates removal of the blocking concrete particles, usually by hand with a hammer and chisel, thereby increasing the expense of construction.

Another problem encountered in connection with the use of devices of this type arises from the fact that these devices constitute obstructions to workmen walking along the tops of the forms during the construction thereof. The hangers are likely to be kicked by the workmen and to be thereby displaced. The projecting horns of the stress distributing members are particularly troublesome to the workmen in that they tend to snag the workmen's clothing and are likely to receive impatient and sometimes violent kicks which may break the connection, usually a weld, between the stress distributing member and the casing. If this connection is broken, the stress distributing element may fall from its intended upright position so that the stress on the loaded hanger element is not adequately distributed through the concrete slab, after the slab is set, but on the other hand, is distributed only through a relatively shallow portion of the slab.



An object of the present invention is to provide an improved ceiling hanger of the type described.

A further object of the invention is to provide an improved ceiling hanger including means for preventing seepage of concrete into the housing of the hanger during vibration of the slab being poured.

Another object is to provide a ceiling hanger of the type described including improved means for fixing the stress distributing elements in their intended positions with respect to the housing.

The foregoing and other objects of the invention are accomplished in the structures disclosed herein by providing a ceiling hanger such as that described in my copending application, with the following improvements. A yoke is connected between the upwardly extending end portions of the stress distributing member. In the form shown, the yoke is a rod bent in the form of a U and welded to the two end portions of the stress distributing member. This yoke limits the movement of the stress distributing member from its upright position.

A removable cover means is provided for the open face of the housing which is placed against the form. This removable cover means may comprise a strip of tape impregnated with mastic material. In another modification, the cover means comprises a stuffing element which may be pushed into the housing. In still another modification, the removable cover means comprises a sheet metal element which may be snapped into the housing.

Flanges are provided projecting horizontally and outwardly along all four sides of the housing. These flanges are subjected to a downward pressure from the concrete poured on top of them and tend to hold the housing firmly against the form.

Other objects and advantages of the invention will become apparent from a consideration of the following specification and claims, taken together with the accompanying drawing.

In the drawing:

FIG. 1 is a plan view of a piece of sheet metal which has been stamped out and is ready to be folded to form the housing of a ceiling hanger embodying the invention;

FIG. 2 is a cross-sectional view taken on the line II—II of FIG. 3 showing a complete ceiling hanger embodying the invention in place on a concrete form;

FIG. 3 is a plan view of the ceiling hanger of FIG. 2;

FIG. 4 is a cross-sectional view taken on the line IV—IV of FIG. 2, showing the hanger in place in a set slab of concrete;

FIG. 5 is a fragmentary view similar to FIG. 4, showing a modification prior to removal of the form;

FIG. 6 is a view similar to FIG. 5, showing another modification; and

FIG. 7 is a view similar to FIG. 6, showing still another modification.

*FIGS. 1 to 4*

The ceiling hanger of these figures comprises a housing generally indicated by the reference numeral 1, a stress distributing element generally indicated by the reference numeral 2 and a support member 3.

The housing is formed from a blank illustrated in FIG. 1. This housing comprises an inner wall portion 1*a*, two elongated side wall portions 1*b*, two end wall portions 1*c*, four tabs 1*d*, two end flanges 1*e* and two side flanges 1*f*.

When the housing 1 is folded and assembled, the tabs 1*d* fold over the end portions 1*c*. The flanges 1*e* project horizontally from the ends of the housing and the flanges 1*f* project laterally from the sides of the casing. The lower side of the casing, as it is formed from the blank 1, is completely open.

The stress distributing member 2 comprises a central portion 2*a* which extends transversely of the housing 1 and is welded to the housing where it passes through the walls thereof, as shown at 4 in FIG. 4. Outside the housing, end portions 2*b* of the stress distributing member are bent vertically upward and are formed on their upper ends with outwardly and downwardly extending tips 2*c*.

A yoke 5, best seen in FIG. 3, is formed by bending a steel rod in a U shape. The yoke 5 is welded to the upstanding ends 2*b* of the stress distributing member, as by means of welding. Preferably, the yoke 5 is slightly spaced above the top 1*a* of the casing.

The support member 3 is preferably cut from flat steel bar stock and has holes punched in it adjacent either end. One hole receives the central portion 2*a* of the stress distributing member. The other hole is adapted to receive the strap on the ceiling to be supported.

The ceiling hanger may be fastened in place on a concrete form 7 by means of nails 6 (see FIG. 2) driven through suitable holes provided in the flanges 1*e*. In the case of metal forms, the ceiling hanger is usually fastened in place by driving nails through the interstices between form elements. Alternatively, it may be fastened in place by tying or wiring the ends 2*b* of the stress distributing member to the reinforcing elements of the concrete slab.

When the structure shown in FIGS. 1 to 3 is in place on a form, the mass of concrete poured over it exerts a downward force on the flanges 1*e* and 1*f* and tends to hold them tightly in engagement with the slab 7, thereby inhibiting seepage of concrete into the housing 1 when the concrete is vibrated after pouring.

The yoke 5 serves to block angular movement of the stress distributing member 2 with respect to the housing 1, such as might be caused by an accidental or intentional kick directed at the stress distributing member. Such a kick may break the weld 4, but it is unlikely to break the yoke 5 so that the end portions 2*b* of the stress distributing member can depart substantially from their intended upright positions.

The yoke 5 should be spaced slightly above the casing 1, as shown, so that impacts delivered to the end portions of the stress distributing member 2 are not transferred to the housing through the yoke 5, but only through the weld 4. Consequently, the yoke 5 is substantially unstressed by such impacts. If the weld is broken by such an impact, the yoke is unlikely to be broken at the same time, because of the short duration of the impact. The yoke thus provides a second line of defense against kicking and maintains the member 2 in an effective operating position even if the weld 4 is broken. Consequently, proper distribution of the load on the member 2 deeply into the set slab of concrete is assured. If the yoke 5 were omitted, the stress distributing member 2 might, as a result of such a kick, fall to a position where its ends 2*b* were resting directly on the form. They would not then be effective to transfer the load from the hanger element 3 deeply into the concrete slab, but would deliver the stress to a rather shallow volume of the slab near its bottom side.

*FIG. 5*

This figure illustrates a modification of the structure of FIGS. 1 to 4 in which a removable cover is provided for the casing before it is mounted in place on the form 7. The cover illustrated in FIG. 5 consists simply of a strip 8 of tape impregnated with mastic material so that it can stick to the flanges 1*f* and 1*e* which surround the open face of the housing 1. The tape 8 prevents seepage of concrete into the interior of the housing where it might block the downward movement of the support member 3 to its active position.



*FIG. 6*

This figure illustrates a modified type of removable cover means comprising a wad 9 of felt or other similar light, space filling material pushed into the casing 1. The wad 9 is effective to prevent seepage of concrete into the casing. Although a wad 9 is shown on only one side of the support member 3, it may in some cases be convenient to use two wads, one on either side of the support member. Instead of a fibrous wad of material, the stuffing may consist of filling the casing with a heavy grease, such as axle grease.

*FIG. 7*

This figure illustrates a further modification of the invention, wherein the removable cover means comprises a sheet metal cover 10 formed with resilient flanges along its sides so that it may snap into place inside the open face of the housing 1, with the flanges yieldably and functionally engaging the wall of the casing.

In any of the modifications shown in FIGS. 5, 6 and 7, the removable cover means may be readily taken away after the form is stripped off the set slab.

When any of the removable cover means is in place, there may be a seepage which results in a very thin layer of concrete between the cover means and the form. Such a thin layer is very fragile when it sets, and may be readily removed, even if it does not break away during stripping of the form. The removable cover means in the various modifications shown do not prevent formation of such thin layers of concrete but do prevent the formation of thicker layers, inside the housing, which might block the movement of the hanger element to its active position, and which might require a chiseling operation for their removal.

While I have shown and described a preferred embodiment of my invention, other modifications thereof will readily occur to those skilled in the art, and I therefore intend my invention to be limited only by the appended claims.

I claim:

1. A supporting device adapted to be embedded in a horizontal reinforced concrete slab to support an external load on the slab, comprising:

(*a*) an elongated casing having walls of relatively thin sheet material and open at one of its elongated faces, said casing being relatively shallow as compared to its length and being relatively narrow between its two elongated side walls as compared to the height of said side walls, said casing being adapted for placement with its open face against and closed by a form to receive poured concrete;

(*b*) a stress distributing member having:

(1) a middle portion spanning the narrow dimension of the casing adjacent one end thereof and and inwardly of the open face thereof, said middle portion extending through apertures in the walls of the casing; and

(2) integral end portions outside the casing and extending upwardly from said middle portion and adapted to serve as anchors in the poured concrete;

(*c*) weld means at said apertures fastening the member to the walls to prevent rotation of the member in the apertures;

(*d*) a yoke attached to and connecting the end portions and spaced slightly above the housing so as to be unstressed by forces applied to said end portions as long as said weld means is intact, and effective to limit rotation of the member with respect to the housing upon rupture of the weld means;

(*e*) an elongated flat support member, slightly shorter than said casing, and positioned with its smallest dimension extending in the same direction as the rela-

tively narrow dimension of the casing and its width extending in the same general direction as the side walls of the casing, said support member being apertured adjacent one end to receive the middle portion of said stress distributing member, said support member having a retracted position when the open face of the casing is against a form, in which position it is closely confined within the casing and its other end is adjacent the other end of the casing, said support member being pivotally movable edgewise when said form is removed from the set concrete to an active position wherein its other end projects from the casing, said support member being adapted when in its active position to transfer a stress due to an external load directly to said stress distributing member at the middle portion thereof.

2. A supporting device as defined in claim 1 in which said stress distributing member is of circular cross-section, and the apertures in the walls of the casing, through which the middle portion of the stress distributing member extends, are also circular.




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