Oct. 20, 1959 G. T. PHILLIPS 2,909,054

ANCHOR FOR SECURING ACCESSORIES TO CONCRETE AND THE LIKE

Filed Feb. 13, 1956 2 Sheets-Sheet 1

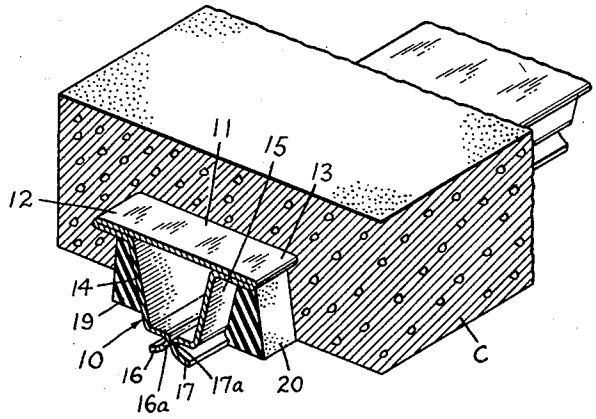


FIG.1.

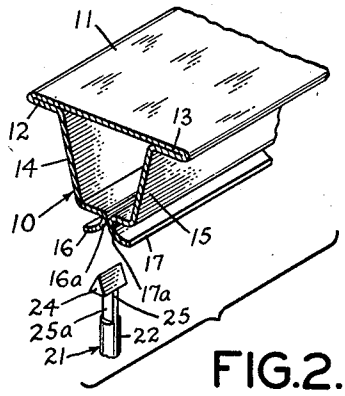


FIG.2.

FIG.3.

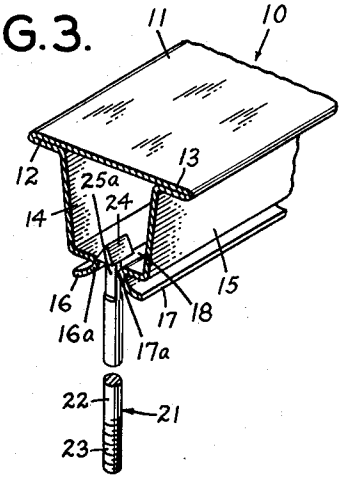


FIG.5.

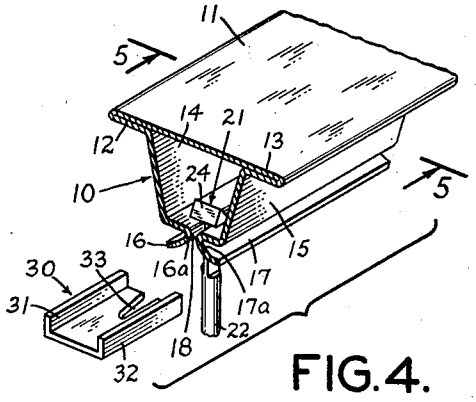
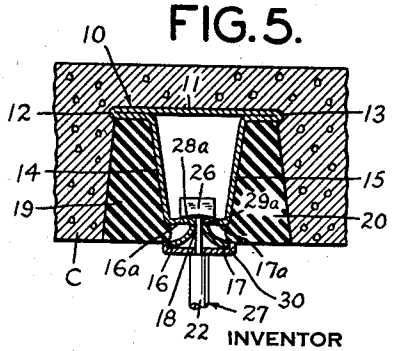


FIG.4.



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Filed Feb. 13, 1956 2 Sheets-Sheet 2

FIG.6.

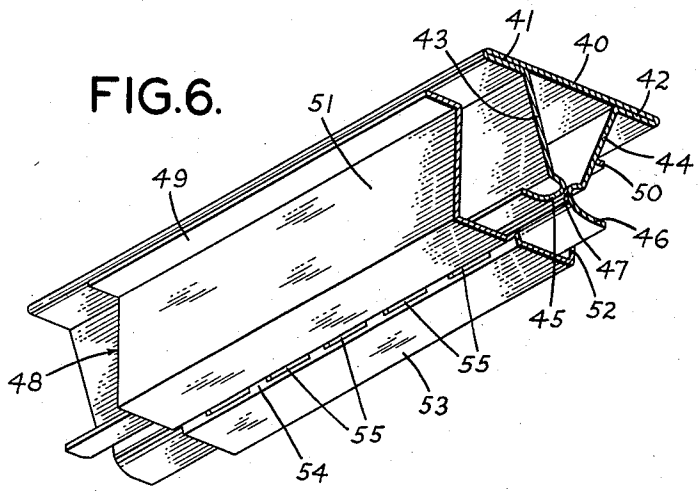
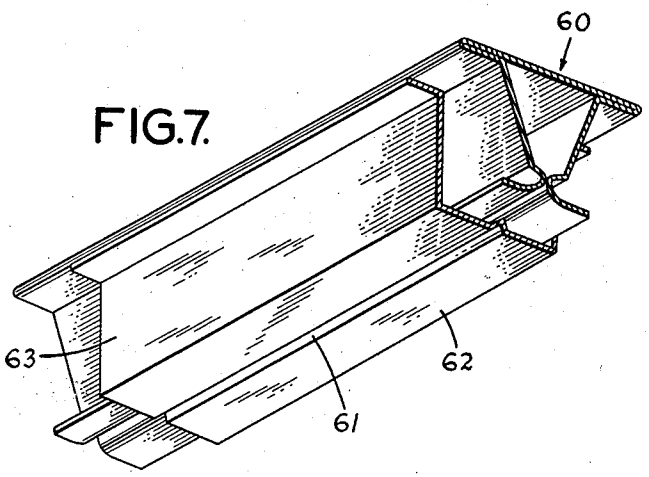


FIG.7.



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ANCHOR FOR SECURING ACCESSORIES TO CONCRETE AND THE LIKE

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9 Claims. (Cl. 72—105)

This invention relates to improvements in devices for anchoring or securing building accessories to building structures and it relates more particularly to a structural strip member which can be mounted in the walls, ceilings, floors or the like of buildings in order to receive a fastening or supporting element by means of which such building accessories as light fixtures, conduits, pipes, outlet boxes and the like may be supported.

This is a continuation-in-part of my U.S. application Ser. No. 547,949, filed Nov. 21, 1955 now abandoned.

Heretofore, when it is desired to suspend building accessories from the walls or ceilings of a building structure formed of masonry materials, it is necessary to drill or otherwise form holes in the building structure for expansion anchors or the like to receive screws to anchor the accessories to the structure. Oftentimes it is found that the ceiling or wall already has a pipe or conduit concealed therein at the zone in which the anchors are to be located so that the anchor-receiving holes either cannot be drilled at the place required or the workman damages the conduit or pipe when drilling into the wall or ceiling.

The present invention provides an effective means for overcoming the difficulties encountered with the supporting devices heretofore used. In accordance with the present invention, metallic strip members are provided which can be mounted in a wall, floor, ceiling or other part of a building structure during the construction of the same so that the strips become an integral part of the building structure. Each of the strips has an outwardly opening slot extending throughout its length to receive a headed fastening element that can be driven into the slot and gripped by the strip to retain the fastening element in the slot. Inasmuch as the slot runs the length of the fastening unit, any number of fastening devices in any desired spaced relation can be mounted in each strip. As a consequence, lighting fixtures, pipes, conduits and other building accessories can be mounted in almost any desired position or location by fastening devices inserted in one or more of the supporting strips at the desired location.

In order to facilitate the use of the new anchor and supporting devices, they may be provided with portions which enable the gripping portions of the strip to separate as the fastening elements are inserted into the slot and then to contract thereby to grip and support the fastening elements in such position that they cannot be removed readily or dislodged by vibration or any reasonable application of force thereto. This arrangement assures a strong connection between the fastening elements and the channel strips and a positive and firm support for the accessories.

For a better understanding of the present invention, reference may be had to the accompanying drawing in which:

Figure 1 is a perspective view of a portion of one of

the channel strips embedded in a concrete element such as a section of concrete ceiling;

Figure 2 is an exploded perspective view of a typical channel strip and a headed fastener for engagement therewith;

Figure 3 is a similar perspective view of the channel strip and headed fastener showing the relation of the parts at the time the head of the fastener has just entered the channel strip;

Figure 4 is a perspective view of a portion of the channel strip with the headed fastener inserted therein and illustrating a clip for anchoring the fastener in the channel strip;

Figure 5 is a view in section taken on line 5—5 of Figure 4 showing the assembly of the channel strip, headed fastener and clip in a masonry structure;

Figure 6 is a perspective view of a portion of a modified form of channel strip viewed from below; and

Figure 7 is a perspective view of a portion of another form of channel strip viewed from below the strip.

Figures 1 to 5 show a typical form of channel strip of a kind embodying the present invention and by means of which the invention can be practiced. The channel strip is formed of thin, springy, sheet metal, such as sheet steel. The channel strip **10** has a flat head portion **11** provided with reversely bent edge portions forming oppositely directed flanges **12** and **13** at the upper edge of the strip. The flange portions **12** and **13** merge into side panels **14** and **15** which converge inwardly and terminate in inwardly and reversely outwardly curved flanges **16** and **17** extending lengthwise of the strip. As illustrated in Figure 5, the flanges **16** and **17** may have inner surface portions **16***a* and **17***a* which converge upwardly slightly on opposite sides of the slot **18** between them which runs the full length of the strip **10**.

In use, one or more channel strips **10** may be supported at the bottom of the mold form for casting a concrete ceiling or the like. On opposite sides of the side flanges **14** and **15** of the channel are mounted elongated strips **19** and **20** formed of natural or synthetic rubber or other resilient and compressible material. The concrete C may then be cast on the mold form so that the channel strip **10** and its adjacent rubber strips **19** and **20** are embedded in the concrete when the latter has set. The presence of the rubber strips **19** and **20** permits the side panels **14** and **15** of the channel strips to be spread apart slightly for a purpose to be described.

Inasmuch as the channel units are disposed with their slotted sides at the surface of the concrete structure C, and the open sides thereof are protected by the shape of the flanges **16** and **17**, the concrete cannot flow into the hollow interior of the strip. If the strips **10** are so located in the building structure that concrete might flow into the gap **18** of the strip, the gap can be covered by means of a removable tape applied to the flanges **16** and **17** during pouring of the concrete, the tape being removed after the concrete has hardened and the mold form removed.

In order to secure building accessories, such as lights, conduits, pipes and the like, to the building structure, headed fastening elements **21** of the type disclosed generally in Figures 2 to 5 of the drawing are provided. Each fastening element may be an elongated rod or bolt **22** having a threaded end portion **23** and an enlarged, generally wedge-shaped head **24** thereon at its opposite end. The configuration of the head **24** is not important so long as it has a narrow outer edge or end and is generally wedge-shaped so that it can be driven into the gap **18** between flanges **16** and **17** to allow the head to pass into the hollow interior of the channel strip **10**. The rubber strips **19** and **20** allow the flanges **16** and **17**

to spread apart as the head is inserted and also aid in springing them back together to grip the portion of the fastener element 21 behind the head. The neck portion 25 of the fastening element 21 directly adjacent to the head 24 may have its opposite sides flattened as at 25*a* and is somewhat narrower than the diameter of the bolt portion 22. Moreover, the flats 25*a* on the fastener are disposed at an angle to the enlarged head 24 so that when the flanges 16 and 17 of the strip spring back against the flats, the fastener 21 will be rotated to dispose the head 24 at an angle to the slot 18. In this position the head 24 overlies the flanges 16 and 17 and resists withdrawal from the channel unit.

A most secure type of connection is obtained with the structure shown in Figure 5 wherein the head 26 of the threaded fastening element 27 is disposed at a right angle to the flats 28*a* and 29*a* on opposite sides of the fastening element and the lower surface of the head 26 is undercut at opposite sides to conform to the upwardly converging surfaces 16*a* and 17*a* of the flanges. This arrangement requires the fastening element 27 to be lifted as it is rotated in order to disengage the head from the flanges 16 and 17, an action which is unlikely to be caused by vibration when the device is used as a supporting element.

In order to preclude any possible rotation of the anchoring element 21 or 27 after it has been attached to the channel strip, I provide a generally channel-shaped clip 30 having edge flanges 31 and 32 to engage on opposite sides of the lower free edges of the reversely bent flanges 16 and 17 and having an elongated notch 33 to engage flats 25*a*, 28*a*, 29*a* of the fastening elements. The clip 30 prevents rotation of the fastening element relative to the channel strip so that disengagement of these elements is effectively prevented.

In some instances it may be undesirable to include, as a part of the channel strips, the rubber or resilient strips 19 and 20 described above. Building codes or regulations in some localities may prohibit the use of materials of inflammable nature. Accordingly, the channel strip can be modified to omit the resilient strips 19 and 20 and yet provide space for movement of the gripping flanges of the strip. Such a modified type of channel strip is disclosed in Figure 6 and includes a flat base portion 40 having outwardly extending wings or flanges 41 and 42 from which extend the converging side panels 43 and 44 having inwardly and reversely curved flange portions 45 and 46 defining the entrance slot 47. An inverted channel member 48 formed of sheet metal or the like is secured to the base portion 40 by means of outwardly extending flanges 49 and 50 at its lateral edges which are secured to the flanges 41 and 42 by spot welding, seam welding, brazing or in any other desired way. The side walls 51 and 52 of the channel member are of approximately the same height as the overall height of the side panels 43 and 44 and the outwardly extending flanges 45 and 46 so that the bottom panel 53 of the channel overlies and is substantially in contact with the edges of the flanges 45 and 46.

A centrally located groove 54 is formed in the bottom panel 53 of the channel in substantial alignment with the slot 47 between the flanges and the groove 54 is provided with a plurality of openings 55 through which supporting elements 21 can be inserted.

Inasmuch as the bottom panel 53 of the channel member 48 is substantially in contact with the lowermost edges of the flanges 45 and 46, it does not deflect inwardly appreciably when supporting member 21 is inserted through the slot. The width of the bottom panel 53 is wider than the combined widths of the flanges 45 and 46 and the slot 47 so that the flanges can spring outwardly to admit the head of the supporting element into the slot 47.

The above described channel strip can be used in the same manner as the channel strips disclosed in the Figures 1 to 5 and has the advantage of being even stronger because of the reinforcing action of the channel member 48.

Another channel strip 60 is disclosed in Figure 7. It is substantially the same as the channel strip disclosed in Figure 6 with the exception that the groove 61 in the base 62 of the channel member 63 is not provided with openings therein. However, the channel member 63 is formed of a relatively thin metal so that a wedge-shaped supporting element 21 can easily be driven through the metal in the groove 61 and into the slot 64 in the channel strip 60. The close proximity of the channel member 63 to the side panels of the channel strip prevents substantial distortion of the channel member when the supporting elements are driven through the bottom of the groove. This form of channel strip has the added advantage of requiring no covering to prevent entry of concrete into the strip during pouring of the concrete, inasmuch as the sides and bottom of the channel strip are completely closed. The ends can also be closed by providing suitable end caps for the ends of the channel strip, if desired.

It will be understood that the channel strips, when mounted in the ceiling of a structure, may be covered with a protective strip and may be concealed by plaster or the like on the ceiling or wall. However, if it is desired to attach an accessory such as a light bracket, the plaster can be opened at a point overlying the strip and fastening elements 21 are driven into the exposed channel portion to securely anchor the element in place.

Moreover, the size of the channel strips and the fastening elements can be varied depending upon the service conditions under which they are used. For example, when they are mounted in office buildings or the like where the accessories are light in weight, the channel strips may be on the order of an inch deep or smaller. On the other hand, when used in industrial establishments for supporting pulleys, machinery and the like, the channel strips may be made much larger and of much heavier material commensurate with the load to be supported.

The presence of the channel strips in a concrete ceiling or the like does not adversely affect the strength of the ceiling inasmuch as the channel strips in themselves will be in the nature of reinforcements for the concrete. Therefore, the channel strips more than compensate for the concrete displaced by the channel strips.

Inasmuch as the anchoring or supporting devices embodying the present invention are susceptible to considerable modification in size, shape and proportions, the forms of the invention described herein should be considered as illustrative and not as limiting the scope of the following claims.

I claim:

1. A connecting device to be mounted in a building structure to support building accessories thereon comprising a channel-like strip having a base and resilient side panels extending outwardly from said base with inwardly directed flanges at their outer edges defining a slot extending lengthwise of said strip, and a channel member enclosing and spaced from said side panels and having a base portion adjacent to and covering said flanges, said channel member having sides joined to said base of said channel-like strip and spaced from said side panels to enable outward displacement of said panels and flanges.

2. A connecting device to be mounted in a building structure to support building accessories thereon comprising a channel-like strip having a base and resilient side panels extending outwardly from said base with inwardly directed flanges at their outer edges defining a slot extending lengthwise of said strip, a fastening element having a head of generally wedge-shaped cross-section to be driven through said slot between said flanges

and gripped by the flanges to retain the fastening element in said channel strip and a channel member secured to said strip and having side portions disposed outwardly of said panels and a base portion adjacent to and outwardly of said flanges, said base portion having a groove therein substantially in alignment with said slot to guide the head of said fastening element into said slot.

3. A connecting device to be mounted in a building structure to support building accessories thereon comprising a channel-like strip having a base and resilient side panels extending outwardly from said base with inwardly directed flanges at their outer edges defining a slot extending lengthwise of said strip, a fastening element having a head of generally wedge-shaped cross-section to be driven through said slot between said flanges and gripped by the flanges to retain the fastening element in said channel strip and a channel member secured to said strip and having side portions disposed outwardly of said panels and a base portion adjacent to and outwardly of said flanges, said base portion having a groove therein with spaced apertures along its length substantially in alignment with said slot to guide the head of said fastening element into said slot.

4. The connecting device set forth in claim 1 comprising a fastening element having a head of generally wedge-shaped cross-section to be driven through the channel member and said slot between said flanges and gripped by the flanges to retain the fastening element in said channel strip, said fastening element having a neck portion of reduced cross-section adjacent to said head, said neck portion having flattened surfaces on opposite sides thereof disposed at an angle to said head for engagement with said flanges to dispose said head at an angle to said slot after it passes between said flanges.

5. A connecting device to be installed in a building structure to support building accessories thereon comprising an elongated resilient metal strip of channel-like cross-section having a substantially flat base, side panels converging away from said base, laterally extending flanges at the junction of said base and side panels, inturned flanges at the outer edges of said side panels defining a slot, said inturned flanges having substantially flat inner surfaces and diverging outer surfaces, a fastened element having an enlarged head to be driven into said slot between said inturned flanges to a position behind said flanges to be retained thereby and an inverted channel member having side portions secured to the laterally extending flanges of said strip and a bottom portion overlying the outer edges of said side panels and said slot, said side portions being spaced from said side panels to enable the side panels to move relatively.

6. A connecting device to be installed in a building structure to support building accessories thereon comprising an elongated resilient metal strip of channel-like cross-section having a substantially flat base, side panels converging away from said base, laterally extending

flanges at the junction of said base and side panels, inturned flanges at the outer edges of said side panels defining a slot, said inturned flanges having substantially flat inner surfaces and diverging outer surfaces, a fastening element having an enlarged head to be driven into said slot between said inturned flanges to a position behind said flanges to be retained thereby and an inverted channel member having side portions secured to the laterally extending flanges of said strip and a bottom portion overlying the outer edges of said side panels and said slot, said side portions being spaced from said side panels to enable the side panels to move relatively, said bottom portion having a groove therein substantially in alignment with said slot.

7. The connecting device set forth in claim 5 in which the fastening device comprises a bolt having a threaded shank and said enlarged head at one end, the head being of generally wedge-shaped cross-section to facilitate its passage through said slot and retention by said inturned flanges and having an apex edge of greater length than the greatest cross-sectional dimension of said shank and providing portions disposed on opposite sides of said shank.

8. The connecting device set forth in claim 5 in which the fastening device comprises a bolt having a threaded shank and said enlarged head at one end, the shank adjacent to said head having a pair of flat surfaces on opposite sides thereof adjacent to said head and the head being of generally wedge-shaped cross-section to facilitate its passage through said slot and having an apex edge of greater length than the greatest cross-sectional dimension of said shank and providing portions disposed on opposite sides of said shank.

9. The connecting device set forth in claim 5 in which the inner surfaces of said inturned flanges are inclined at an acute angle toward said base and the head of said fastening element has inner surfaces thereon substantially complemental to the inclination of said inner surfaces of said inturned flanges.

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