Dec. 8, 1970 F. K. KNOHL 3,545,152

CONCRETE INSERT

Filed July 3, 1968

Fig. 1

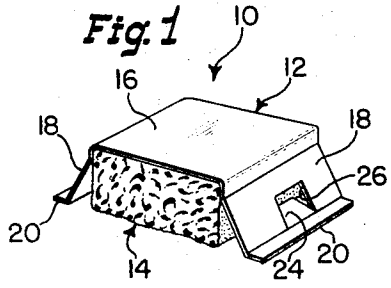


Fig. 2

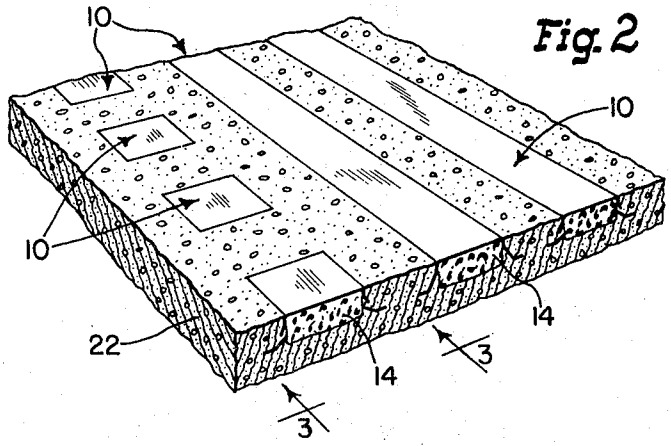


Fig. 3

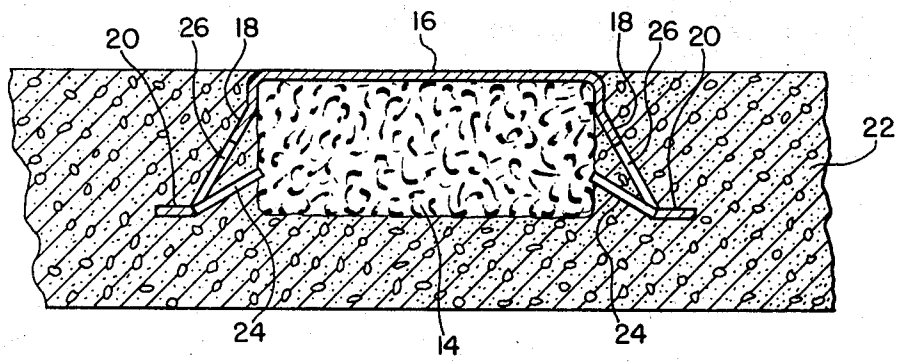


Fig. 4

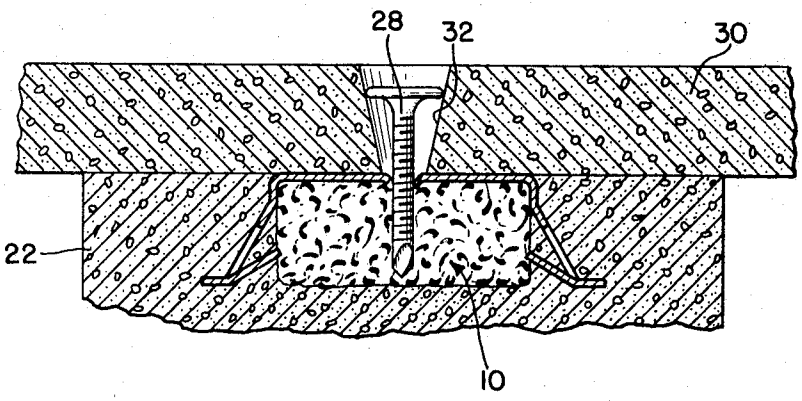
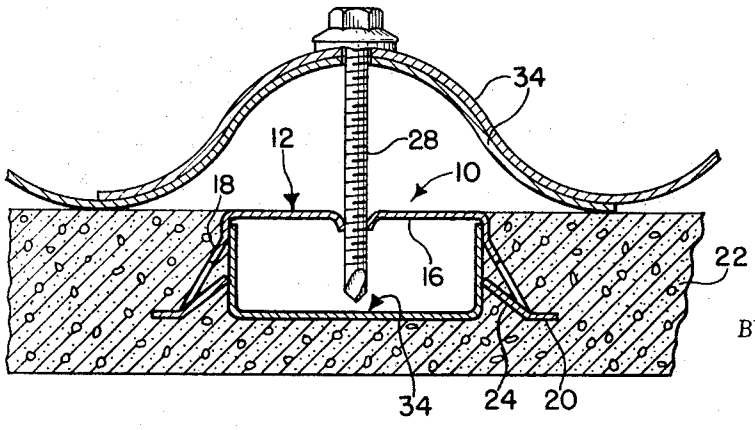


Fig. 5



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3,545,152

CONCRETE INSERT

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U.S. Cl. 52—367 11 Claims

ABSTRACT OF THE DISCLOSURE

An insert for pre-cast concrete or the like provides an exposed surface relative to one face of the concrete for attachment to a fastening element which secures a wood, metal or concrete section to the pre-cast concrete, the exposed surface of the insert having a concrete void immediately behind it which offers substantially no resistance to the fastening element which is attached to the insert.

In assembling wood, metal and concrete sections to a concrete support, it has been the practice to drill holes in the concrete support into which are placed fastener devices which anchor themselves to the concrete support and at the same time provide attachment or fastening means which secures the wood, metal or concrete section to the concrete support. It will be readily apparent that drilling holes in a concrete support is time consuming, and further, fastener devices for mounting in such holes have been difficult to assemble to the concrete support as well as to the section which is assembled thereto. As a result, various types of concrete inserts have been developed which can be placed within the concrete support prior to its hardening so as to be captured thereby while permitting access thereto for attaching various types of wood, metal and concrete sections to the concrete support. While concrete inserts have provided effective individual attachment means, they generally require special mounting techniques prior to the pouring of the concrete to properly expose the insert for the subsequent fastening that is required. The time and expense inherent in such special mounting techniques has limited broader and consistent uses of concrete inserts in the construction industry. Further, the special mounting techniques for concrete inserts have imposed additional limitations on the fastening techniques to be employed as well as the versatility of the concrete insert to the many possible uses that may be required.

Accordingly, it an object of the present invention to provide an insert for pre-cast concrete or the like which overcomes the above-mentioned deficiencies.

More particularly, it is an object of the present invention to provide an insert for pre-cast concrete or the like which is capable of self-positionment and exposure of a surface thereof relative to one face of the pre-cast concrete to facilitate attachment of a fastening element thereto, and at the same time provide a concrete void immediately behind the exposed surface which offers substantially no resistance to a fastening element assembled to the concrete insert.

Another object of the present invention is the provision of an insert for pre-cast concrete or the like which affords wide flexibility in both site alignment as well as the assembly of sections made from different types of material to the pre-cast concrete at a variety of locations.

Other objects of the present invention include the provision of insert for pre-cast concrete or the like which is of light weight and simple construction, capable of being manufactured and then assembled to a concrete support by fast, efficient and economical techniques, affords durability in use over long periods, and is otherwise well adapted for the purposes intended.

The above and other objects of the present invention are attained by the provision of an insert for pre-cast concrete or the like which includes a top wall and side wall depending therefrom on opposite sides thereof to define a channel-shaped member, and a floating element mug within the channel-shaped member to position at least outer marginal surfaces of the top wall thereof substantially flush with the top surface of the concrete adjacent the insert prior to the setting of the concrete, the floating element also being capable of providing a concrete void immediately behind the top wall of the channel-shaped member and having substantially no resistance to a fastening element driven therein during attachment thereof to the top wall of the channel-shaped member. The floating element, which may also be characterized as the secondary element of the concrete insert, may also be capable of being received and retained by the channel-shaped member.

Reference is now made to the drawings wherein:

FIG. 1 is a perspective view of the preferred form of concrete insert which is constructed in accordance with the teachings of the present invention;

FIG. 2 is a fragmentary perspective view illustrating the manner in which concrete inserts, either in block or in strip form, of the type depicted in FIG. 1 are capable of being mounted into a pre-cast concrete support or the like;

FIG. 3 is an enlarged fragmentary end elevational view as viewed along line 3—3 in FIG. 2;

FIG. 4 is an end elevational view showing the manner in which a fastening element is mounted relative to the concrete insert and holds a pre-cast concrete panel relative to the pre-cast concrete support in which the concrete insert is mounted; and

FIG. 5 is an end elevational view showing a modified form of concrete insert which is used in conjunction with a corrugated metal panel and concrete support assembly.

Reference is first made to FIGS. 1–3 for a description of the preferred embodiment of the present invention. As best seen in these figures, the concrete insert **10** includes a primary metal channel-shaped member **12** into which is mounted a secondary element **14** which is designed to provide floatation of the concrete insert **10** prior to setting of the concrete into which it is positioned and at the same time provide a concrete void immediately behind the top wall **16** of the channel-shaped member for reasons which will appear hereinafter. Although the secondary element **14** can be configured or made from any material which will provide floatation and concrete void features just mentioned, it has been found that foamed polystyrene block material which is illustrated in FIGS. 1–4 of the drawings or gypsum are preferred constructions. The foamed polystyrene blocks **14** are formed in a generally rectangular cross-sectional shape and mounted within the channel-shaped member **12** as illustrated in the drawings.

The metal channel-shaped member may be made from sheet steel such as AISI 1010 in suitable thicknesses as desired. The channel-shaped member **12** is formed by suitable dies as a one-piece construction and includes a top wall **16** with side walls **18** depending therefrom on opposite sides thereof, each side wall **18** terminating in a foot portion **20** at the free extremity thereof which may be aligned, if desired, with the lower face of the foamed polystyrene block **14**. Each of the side walls **18** flare or taper downwardly and outwardly from adjacent the juncture with the top wall **16** to facilitate introduction of the foamed polystyrene block **14** within the channel-shaped member. It will be noted that each of the side walls **18** immediately adjacent the juncture with the top wall **16** first are directed downwardly for a short distance, then proceed downwardly and outwardly as illustrated. This permits the foamed polystyrene block to completely underlie the top wall **16** if it is configured to fill

up the space as illustrated in the drawings so that there will be no concrete immediately below the top wall **16** of the channel-shaped member.

The downward and outward tapering or flare of the majority of the side walls **18**, together with the laterally outwardly directed foot portion **20** associated with each side wall **18**, provides a construction which can be securely retained in a concrete support **22** as best seen in FIGS. 2–3 upon hardening thereof.

Preferably, the channel-shaped member includes means for holding the foamed polystyrene block **14** therewithin. As shown in the drawing, such means may comprise an integral tab **24** struck from each of the side walls **18** and extending upwardly and inwardly relative thereto for engaging and retaining the foamed polystyrene block **14** within the channel-shaped member as best seen in FIG. 3 of the drawing. It is to be noted that each of the tab means is integrally hinged relative to a respective side wall along a line generally coincident with the juncture of the side wall **18** and associated foot portion **20**. Thus, each of the tabs **24** are flexibly and hingedly mounted so as to provide the desired flexibility upon mounting of the foamed polystyrene block **14** within the channel-shaped member, but upon the complete interfitting movement of such components, the tabs **24** on each of the side walls **18** function as struck elements to prevent removal of the foamed polystyrene block **14**. In this way, the foamed polystyrene block **14** is captured by the channel-shaped member **12** so that there will be no disassembly during use of the concrete insert.

The apertures **26** in each of the side walls **18** which are formed by the integral tabs **24** being struck from the side walls **18** enhances the retention of the concrete insert within a concrete support **22**. It will be readily understood that the concrete can easily flow through the apertures **26** so as to be positioned on opposite sides of each side wall **18**, foot portion **20** and tab **24** as best seen in FIG. 3 to effectively retain the insert within the concrete support.

Since the channel-shaped member **12** and its associated foamed polystyrene block **14** are light weight in construction, the concrete insert **10** will float during the concrete pour such that the top wall **16** of the channel-shaped member **12** can be positioned flush with the top surface or outer face of the concrete support **22**. This is important in providing a large surface area over which a fastening device, such as the self-drilling and tapping screw **28** shown in FIG. 4, can be attached to the top wall of the channel-shaped member **12**. For a specific description of one type of self-drilling and tapping screw, reference is made to U.S. Pat. 3,125,923. Where such a fastening element is used for attachment to the top wall of the channel-shaped member **12**, it is also important that there be a concrete void immediately behind the top wall **16** which offers substantially no resistance to a fastening element driven therein during attachment to the top wall **16**.

Thus, in assembling a concrete section **30** to a concrete support **22** having a concrete insert **10** as shown in FIG. 4 of the drawings, a fastener device such as the self-drilling and tapping screw **28** must be capable of penetrating the top wall **16** and attach itself relative thereto by tapping threads in the aperture which is formed by the self-drilling fastener **28** without encountering any substantial resistance beneath the top wall **16** of the channel-shaped member **12** which could substantially hinder and reduce the desirability of using the concrete insert **10**. All of the above features are obtained with the use of the concrete insert of the present invention. It will be noted that the concrete section **30** has a tapered hole **32** which aids in aligning the self-drilling and tapping fastener **28** or other equivalent fastener device during attachment to the concrete insert.

The concrete insert **10** of the present invention can be formed into short sections as shown at the left hand side of FIG. 2 or, alternatively, may be formed into elongated metal strips which are shown at the right hand side of FIG. 2. The concrete insert can be formed in a variety of configurations, including closed figures, if such is desired.

Although the foamed polystyrene block **14** functions well in achieving the desired purposes, there are other ways of achieving the desired end. One example is shown in FIG. 5 of the drawings wherein the foamed polystyrene block or secondary element **14** is replaced by a complementary channel-shaped element **34** which is inverted with respect to the channel-shaped member **12**, but is positioned within and retained by the channel-shaped member **12** in substantially the same manner as the foamed polystyrene block **14** in the FIGS. 1–4 embodiment. The inverted channel-shaped element **34**, as will be seen in FIG. 5 of the drawings, clearly provides a concrete void immediately behind the top wall **16** of the channel-shaped member **12** which offers no resistance to a fastening element such as the self-drilling and tapping screw **32**.

FIG. 5 also illustrates the use of the concrete insert **10** attaching corrugated metal strips **34** to the concrete support **22** by way of the self-drilling and tapping fastener **32** as illustrated. Thus, the concrete insert **10** provides the capability of attaching sections of different material and configurations to a concrete support as will be readily apparent.

While a self-drilling and tapping fastener **32** may be used in conjunction with the concrete insert **10**, it is also possible that various types of fastening devices may be captured within or attached to the top wall **16** of the channel-shaped member to permit attachment of various types of sections to the concrete support in which the concrete insert **10** is positioned. Other types of fastening components or extensions, either integral with or attached to the top wall **16** of the channel-shaped member **12** may be used as desired.

From the foregoing, it will be appreciated that the concrete insert of the present invention affords wide flexibility in attaching various types of sections to a concrete support over a wide range of locations, without sacrificing economy, simplicity in construction or ease of intended use of the device. While the preferred embodiments of this invention have been shown and described herein, it is obvious that many structural details may be changed without departing from the spirit and scope of the appended claims.

I claim:

1. A fastening insert for concrete comprising a channel-shaped section including an end wall integrally connected to generally opposed side walls, said side walls including generally opposed portions substantially normally directed relative to said end wall portion and portions generally flaring outwardly from said substantially normally directed portions, said flaring portions facilitating introduction of a secondary element within said channel-shaped member, said secondary element being a body of material cooperatively mounted within said side walls and capable of creating a concrete void immediately behind the end wall thereof to enable a complementary fastening element to be driven therein without offering any substantial resistance to said complementary fastening element during attachment thereof to the end wall of said channel-shaped member, means formed in at least one of said side walls to retain said complementary element within the channel-shaped member, said side walls being laterally spaced from said secondary element for at least a part of the axial height thereof, and outwardly directed foot portions at the terminating extremities of said flaring portion, said aforesaid means for retaining said secondary element within said channel-shaped member being a tab extending from the vicinity of the juncture of said outwardly directed foot portions and said side wall portions laterally spaced from said secondary element and extending inwardly a distance to permit same to engage said secondary element to assure positive retention of said element within said fastening

insert whereby the arrangement of said opposed side walls, laterally spaced side wall portions, associated foot portions and retaining means all facilitate the secure retention of the insert within the concrete when said complementary fastening element is attached to the end wall of said channel-shaped member.

2. A fastening insert for concrete comprising a channel-shaped section including an end wall integrally connected to generally opposed side walls, said side walls including generally opposed portions substantially normally directed relative to said end wall portion and portions generally flaring outwardly from said substantially normally directed portions, said flaring portions facilitating introduction of a secondary element within said channel-shaped member, said secondary element being a body of material cooperatively mounted within said side walls and capable of creating a concrete void immediately behind the end wall thereof to enable a complementary fastening element to be driven therein without offering any substantial resistance to said complementary fastening element during attachment thereof to the end wall of said channel-shaped member, means formed in at least one of said side walls to retain said secondary element within the channel-shaped member, said side walls being laterally spaced from said secondary element for at least a part of the axial height thereof, and outwardly directed foot portions at the terminating extremities of said flaring portion whereby said foot portions and the generally opposed side wall portions cooperate to securely retain the insert imbedded in the concrete when said fastening element is attached to the end wall of said channel-shaped member.

3. The insert as defined in claim 2 wherein the generally vertically directed portion of said side walls is located immediately adjacent the end wall thereof.

4. The insert as defined in claim 2 wherein the interconnecting portion at the juncture of said generally vertically directed portion and the end wall is generally rounded.

5. The insert as defined in claim 2 wherein said secondary element is capable of causing the insert to float in unset concrete.

6. The insert as defined in claim 2 wherein said secondary element comprises a complementary channel-shaped element which is inverted with respect to said first mentioned channel-shaped member.

7. The insert as defined in claim 2 wherein said secondary element comprises a one-piece, plastic material block.

8. The insert as defined in claim 2 wherein said one-piece, plastic material block consists of a lightweight, closed-cell structure.

9. The insert as defined in claim 2 wherein said one-piece, plastic material block is formed polystyrene.

10. The insert as defined in claim 2 wherein said generally opposed means comprises a pair of opposed tab means which extend inwardly and are inclined relative to the side wall with which such tab means is associated.

11. In combination, the fastening insert as defined in claim 2, said fastening insert being secured to a pre-cast concrete support, a section to be attached to the concrete support, and a headed fastening device which attaches the section to the concrete support, said section having a tapered hole extending therethrough which is configured and arranged relative to the head of the fastening device to prevent tilting thereof during attachment of the fastening device to the fastening insert.

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U.S. Cl. X.R.

52—372, 576, 730