Oct. 12, 1954 F. L. PATTERSON 2,691,293

REINFORCED CONCRETE SLAB

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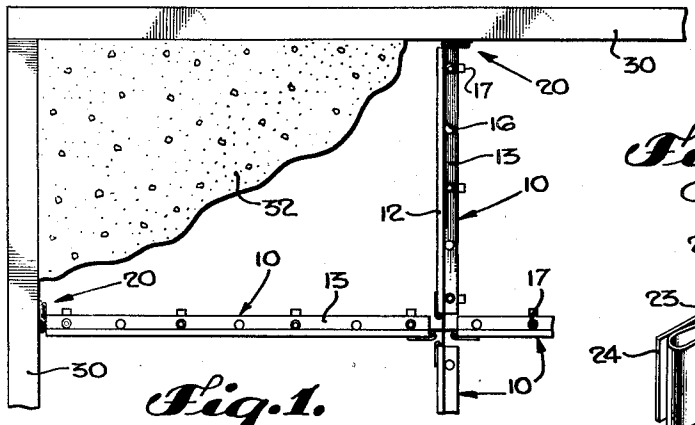


Fig. 1.

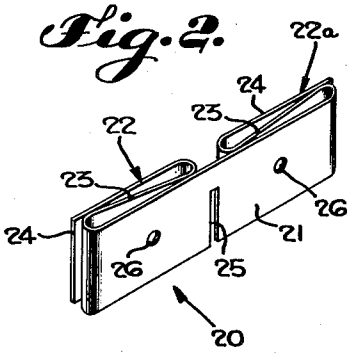


Fig. 2.

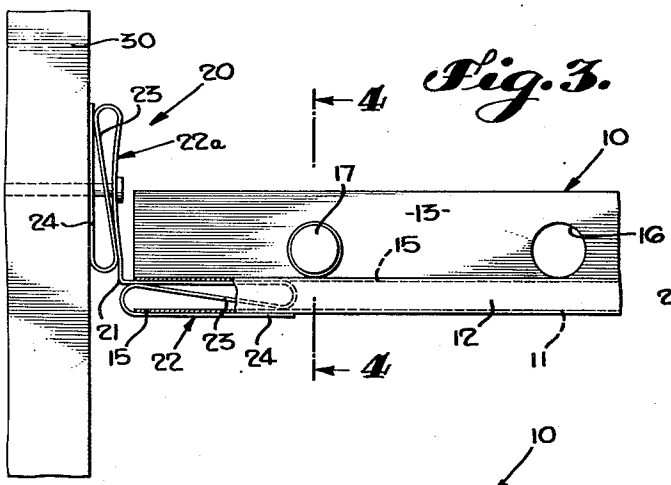


Fig. 3.

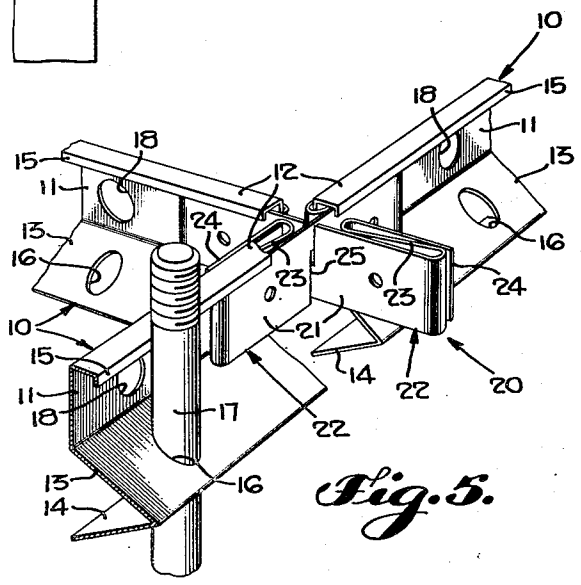


Fig. 5.

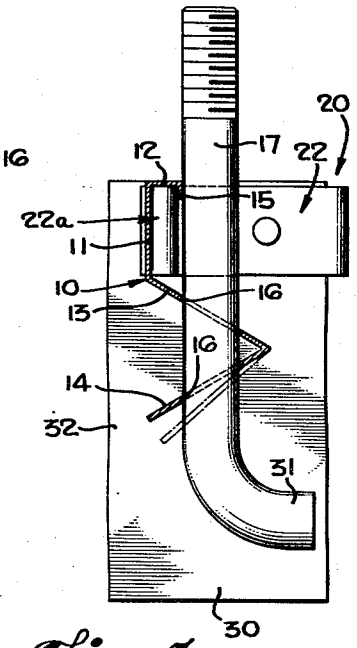


Fig. 4.

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REINFORCED CONCRETE SLAB

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1 Claim. (Cl. 72—71)

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My invention relates generally to devices and materials used in the construction of concrete slabs, and more particularly to improved materials and devices that are embedded in the slab for locating and holding other members to the slab.

The construction of buildings having the floor formed of a concrete slab has increased materially during recent years, since this form of construction offers many advantages. However, there are attendant disadvantages, including the difficulty of providing a smooth and level surface, particularly where a large area is to be covered in this manner. Heretofore, it has been the practice to embed boards or timbers in the concrete with their upper surface at the desired level so that a smoothing member may be scraped across the upper surface of the soft concrete to provide a smooth and level surface of the proper height. These guide timbers must be removed before the slab or floor is finished, and the space they once occupied then filled with concrete to provide a smooth and unbroken expanse. This, of course, is an expensive procedure but because of the possible moisture and attendant rotting of the wood, it is not practical to leave the timber permanently in the slab.

Another difficulty in the forming of a large concrete slab of this nature has been in the location of anchor bolts embedded in the concrete to receive the sill or footing of a wall that rests against or bears upon the slab. Previously, the anchor bolts have been placed in the concrete after the latter has partially set, a line being stretched to indicate the proper location of the bolts, and the latter then being driven into the partially hardened concrete. The intrusion of the bolt into the concrete has displaced some of the latter so that a raised portion is formed adjacent the bolt, and while this may be removed, the labor involved renders this impractical. As a result, the bearing edge of the wall does not fit snugly against the slab, but instead is held a slight distance therefrom by the raised portions adjacent the bolts. This reduces the load-carrying ability of the slab, and also means that the wall or similar member is less rigidly held. Furthermore, the placing of the bolts in this manner generally results in inaccuracies that prevent the use of a previously drilled sill, since the location of the individual bolts will vary an amount requiring that the sill be drilled on the job to align with the bolts as actually located.

To overcome these difficulties, I have developed the screed or structural element now to be described, intended to be permanently embedded in the slab to form an integral part thereof.

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It is therefore a major object of my invention to provide a screed for use in concrete and similar construction that becomes an integral part of the finished product.

Another object of my invention is to provide a screed of this type of light weight and attractive appearance that is easily used under a wide variety of conditions.

It is a further object of my invention to provide such a screed that may easily be located in its exact and final position prior to the pouring of any concrete, thereby facilitating checking of the work and general inspection of the job.

Still another object of my invention is to provide a screed particularly well adapted to the locating and holding of anchor bolts to which a wall or similar member will be attached.

It is a still further object of my invention to provide a screed that may be used to insure the smooth and level qualities of a slab, whether or not anchor bolts or similar members are embedded therein.

These and other objects and advantages of my invention will become apparent from the following description of a preferred form thereof, and from the drawings illustrating that form in which:

Fig. 1 is a plan view of a slab in the process of being formed, showing the use of my screed;

Fig. 2 is a perspective view of a clip used in joining or attaching one section of screed to the conventional forms or to other sections of screed;

Fig. 3 is an enlarged view showing the method of using the clip to hold the screed to the form;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 3 to show the location of my screed with respect to the upper surface of the concrete, and also to show the method of holding a bolt or similar element; and

Fig. 5 is a perspective view of a junction, such as that indicated in Fig. 1, of four screed portions, one of the portions being omitted, and an anchor bolt being shown.

Referring now to the drawings and particularly to Figs. 1 and 5 thereof, it will be seen that my improved screed or structural element is shaped in the form of a strip 10, preferably of a medium gauge metal, that is bent or otherwise formed to provide a generally vertically extending web 11 having a generally horizontal flange 12 at its upper edge. At its lower end, the web 11 carries an angularly positioned leg 13, while another angularly positioned leg 14 extends downwardly and rearwardly from the downward

and forward edge of the upper leg 13. In cross-section, the legs 13 and 14 thus form a V-shaped section, with the vertex of the V pointing horizontally, away from the web 11. For reasons that are hereinafter discussed, the flange 12 projects from the flange 11 in the same general direction as the upper and lower legs 13 and 14, and preferably, the free edge of the flange is provided with a downturned lip 15.

It will thus be realized that the screed 10 consists of a V-shaped section formed by the legs 13 and 14, with the upper end of the upper leg 13 joined to an angle section formed by the web 11 and flange 12. While the screed may be formed of extruded material, in general, better results and greater resilience is secured if it is formed of sheet or strip metal that is bent or rolled to the desired shape.

At regular intervals along the length of the screed 10, I provide vertically aligned holes 16 in the upper and lower legs 13 and 14, these holes preferably being somewhat elliptical to receive a vertically extending cylindrical member such as a bolt 17. However, in order for the holes 16 in the upper and lower legs 13 and 14 to be properly aligned, it is necessary to squeeze or compress the V-shaped portion of the screed, as indicated in Fig. 4.

In that view, the normal or unstressed shape of the screed 10 is indicated in phantom outline, while its stressed or compressed shape is indicated in full outline. By forming the holes 16 when the V-shaped portion is compressed, the holes will be of the proper size to receive a member such as the bolt 17 the cross-section of which is slightly less than the area of the hole, and if thereafter released, the upper and lower edges of the holes will tend to return to their original position, thereby insuring the firm frictional gripping of the bolt by the legs 13 and 14.

Preferably, the holes 16 are formed at fairly close intervals, such as every two or three inches along the length of the screed 10. Since it is not anticipated that all of the holes will be used to support members such as anchor bolts 17, most of the remaining holes are unoccupied and permit the flow of concrete from one side of the screed to the other. Thus, the space between the upper and lower legs 13 and 14 is easily and automatically filled with concrete as the pouring of the latter progresses, and consequently no voids are formed in the slab.

In addition to the holes 16 formed in the legs 13 and 14, I prefer to form additional holes 18 in the web 11 so that there is even greater opportunity for concrete to flow from one side of the screed 10 to the other. This insures that the portions of concrete on each side of the screed 10 are joined together at a number of points, the connections extending through the openings 16 and 18, to insure the production of a single unitary slab. Furthermore, the angular positioning of the upper and lower legs 13 and 14 forms the equivalent of a tongue and groove joint between these portions, thereby further increasing the strength of this slab. In this connection, it is contemplated that the height of the screed 10, from the lower edge of the lower arm 14 to the upper surface of the flange 12, will be materially less than the thickness of the slab of concrete, and consequently rods and other reinforcing members may be laid in the slab below the screed in the usual manner. In those cases where the thickness of the slab approximates the height of the screed 10, the load and other structural demands usually do not require the use of reinforcing members.

To join sections of the screed together, as at corners, or where two shorter lengths must be joined to form a continuous straight run, I employ the clip illustrated in Fig. 2. As shown there, the clip 20 is formed of resilient strip material such as metal, and includes a body portion 21 having folded end portions 22 and 22*a*. Each of the end portions is formed as a continuation of the strip material of the body 21, bent back upon itself to form a centrally projecting leg 23 that approaches but does not reach the center of the body portion, the end of that leg being bent outwardly to form an outwardly projecting leg 24 generally parallel to the body 21. As a result, the clip 20 includes a pair of S-shaped sections that are joined together by the body 21. A slit 25, extending substantially halfway across the body 21, is formed in the middle of the latter, and a pair of clips may thus be placed together, in the manner indicated in Fig. 5, to provide a right angle connection for two or more screeds 10. The clips 20 are completed by forming holes 26 passing completely through the S-shaped sections 22 and 22*a* to receive a nail in the manner hereinafter described.

To use the clip 20 in the joining of a pair of screeds 10, the clip is placed so that the outwardly extending leg 24 is on the back or outside of the web 11, and the centrally extending leg 23 is adjacent the inner or forward side of the web. The lip 15 fits over and engages the upper edge of the body portion 21, and the clip is then forced longitudinally of the screed 10 until the web 11 bears against the centrally located curve of the S-shaped section 22, as indicated in Fig. 3. The other portion or strip of the screed 10 that is to be joined to the first strip is then forced into engagement with the other end 22*a* of the clip 20, and the two strips are thus simply and quickly but firmly held together. If only two strips are to be joined together at an angle to each other, the clip 20 may easily be bent at its center, the slit 25 providing a zone or line of weakness that insures the proper location of the bend.

This last feature also renders it very easy to attach the screed 10 to the conventional external forms used for concrete work. As indicated in Figs. 1 and 3, the screeds 10 will normally extend generally perpendicularly from the external forms 30, and are held to the latter by clips 20. The latter, as previously suggested, are bent so that their ends are perpendicular, and one end 22 is clipped over the web 11 of the screed 10. The other end 22*a* of the clip 20 is thus parallel to the face of the form 30, and is held thereto by a nail passing through the hole 26 and driven into the form. Care should be taken to locate the flange 12 of the screed 10 so that it is substantially coplanar with the upper surface of the form 30, thereby providing a simple and convenient means for leveling and smoothing the upper surface of the concrete slab.

The method of joining two or more screeds 10 has previously been described, and thus it is possible to form a complete grid of the screeds, corresponding to the location of the various walls and similar members that are to bear against the slab.

To support the screeds 10 intermediate the connections to the form 30, I prefer to drive stakes or provide similar supporting members that pass through the holes 16 in the legs 13 and 14. It will be appreciated, of course, that while

the screeds 10 are sufficiently rigid and strong for the purpose intended, they must be supported intermediate their ends, particularly in the case of long spans. Generally, this will be accomplished by the use of stakes or similar supporting means, as suggested, that are passed through the holes 16, and are firmly engaged by the screed 10 by the natural resilience of the latter, in the same manner as the anchor bolts 17. It is not essential, and in general it is undesirable that the stakes extend to the upper surface of the flange 12, but instead they preferably stop just above the upper end of the upper leg 13. Care is taken in locating the stakes, of course, to make sure that they are not passed through holes 16 that are intended to receive an anchor bolt 17, but since the holes are located at frequent intervals, this is a simple matter.

After the screeds 10 have been properly located and supported, the anchor bolts 17 may be inserted in the proper locations by compressing or squeezing together the legs 13 and 14 of the screed adjacent the desired holes 16. Normally, the bolts 17 will be inserted from below, since the bolts are customarily provided with a head or an angularly positioned section 31 to prevent the turning of the bolt when a nut is placed upon its upper end. The flange 12, it will be noted, is shaped and positioned to bear against one side of the bolt 17 to partially support and to insure the correct alignment of the latter.

At this time, the construction has proceeded to a point where it will readily be apparent if any errors have been made in the location or alignment of any of the screeds 10, or if any errors have been made in the location of the anchor bolts 17. When it has been determined that all is in order, concrete 32 may be poured to form the slab, the upper surface of the concrete being leveled and smoothed to be flush with the upper surface of the flange 12. It will be appreciated that the screed or structural element 10 thus performs a very useful service in providing a simple and accurate method of smoothing and leveling the surface, in addition to supporting and aligning the anchor bolts 17. In this connection, the screed or structural element 10 can very easily be used as a smoothing and leveling gauge in the case of large expanses, where no walls or similar members bear or rest against the slab. Under such circumstances, the anchor bolts 17 are omitted, and the surface of the slab is leveled with the upper surface of the flange 12 as previously described. It will be realized that the downwardly projecting lip 15 on the flange 12 tends to insure that the flange will remain horizontal, and will not be caught and bent upwardly so that it projects from the upper surface of the slab.

From the foregoing, it will be seen that I have provided a simple and inexpensive screed or structural element that is fully capable of achieving the objects and securing the advantages heretofore set forth. It will be realized that the screed or structural element may be formed in any one of a variety of manners, and from a wide variety of materials, the important requirements being that the material be resilient, and not tend to stain or otherwise discolor the slab.

While I have shown and described a preferred

form of my invention, it will be apparent that modifications may be made within the broad outlines herein pointed out. Consequently, I do not wish to be restricted to the particular form or arrangement of parts herein described and shown, except as limited by my claim.

I claim:

A structural device embedded in a slab of cementitious material, said device including: a plurality of continuous strips of sheet material joined together and each having a flange positioned in the plane of the upper surface of the slab, a downturned edge along one side of said flange projecting downwardly therefrom into the space occupied by said slab, a web connected to and extending generally perpendicularly downwardly from the other edge of said flange and into said slab, said web having apertures therein through which said cementitious material passes, and a resilient V-shaped portion having the edge of one side connected to said web, and the edge of the other side of the V-shaped portion being left free, the apex of said V-shaped portion projecting laterally from said web, and the sides of the V-shaped portion being provided with a series of holes alignable by forcing the free edge of the V-shaped portion toward said web prior to placement of said slab; resilient connectors joining said continuous strips together, each connector having a depth substantially equal to that of said web and comprising a straight portion positioned against said web and reversely bent upon itself at each end, said reversely bent ends being again reversely bent, said reversely bent ends being engaged against the opposite sides of said webs at the adjacent ends of two strips, said connectors being transversely slotted from one edge to half their depth intermediate the reversely curved bent ends thereof, whereby a pair of said connectors engage with each other at the junctions of a plurality of angularly related strips and hold said strips in said angular relation and the flanges of the strips in a common plane; and elements inserted through certain of said holes and projecting above and below said strips, said elements being held against displacement in the V-shaped portion prior to placement of said slab by the binding of said portion therewith when the free edge of said V-shaped portion adjacent said elements is released, the cementitious material of said slab filling all the holes in the strip.

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